MANIPAL UNIVERSITY JAIPUR

SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY
DEPARTMENT OF COMPUTER & COMMUNICATION ENGG.

PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

B.Tech – COMPUTER & COMMUNICATION ENGINEERING | Academic Year: 2018-19

PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analysing, the B Tech CCE graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are called society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

Year	Course CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
I year	CS1101	3	3	3	0	0	0	0	0	1	2	1	2	3	2	3	1
	HS1102	2	2	2	0	2	2	0	0	0	0	0	3	0	0	0	0
	PY1101	2	2	2	2	2	0	1	1	1	1	1	1	2	1	1	2
	CY1101	2	1	1	0	3	0	2	2	0	2	0	3	0	0	0	0
	EC1101	2	2	2	1	1	0	1	0	0	0	0	1	1	0	0	0
	EN1111	2	3	1	0	0	0	2	2	3	3	2	3	1	1	3	1
	ES1101	1	1	1	1	1	1	1	1	2	0	0	1	2	0	2	2
	ES1102	2	2	2	2	1	1	2	1	1	1	0	1	2	2	1	2
	BB1101	1	0	0	1	0	1	1	0	0	1	1	0	0	1	0	0
	MA1201	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	0
	ES1103	2	2	2	1	0	1	1	0	0	0	0	0	0	1	0	0
	EE1101	2	1	1	0	0	1	1	0	0	0	0	2	2	1	0	0
	MA1101	1	1	1	1	1	0	0	0	0	1	0	0	0	1	2	1
2nd Year	CS1303	2	1	1	0	0	0	0	0	0	0	0	1	2	1	1	1
	CS1331	3	2	2	0	0	0	0	0	0	0	0	2	3	2	2	1
	CS1301	1	1	0	0	0	0	0	0	0	0	0	1	1	0	1	0
	CS1304	1	1	1	1	0	0	0	0	0	0	0	1	1	0	0	0
	CS1332	1	2	2	1	1	0	0	0	0	0	0	0	2	0	0	0
	CS1302	2	2	1	1	0	0	0	0	0	0	0	2	2	2	2	0
	MA1307	2	2	2	1	1	0	0	0	1	1	1	2	2	2	1	0
	CS1401	2	1	2	0	1	1	0	1	1	0	0	1	1	1	1	0
	CS1402	3	3	3	3	3	0	0	0	0	0	0	0	3	3	0	0
	CS1403	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0	0
	CS1431	3	2	3	0	2	2	0	2	3	1	0	2	2	2	2	1
	CS1432	3	3	3	3	3	0	0	0	0	0	0	0	3	3	0	0
	CS1433	2	2	1	2	0	0	0	0	0	0	0	1	2	1	2	2
	MA1406	3	3	3	3	2	2	0	1	0	0	1	2	3	3	3	0
	HS1401	0	0	0	0	0	0	0	0	2	0	2	2	0	0	1	1
3rd Year	BB1540	1	1	1	2	1	0	2	0	0	0	0	0	3	2	2	0
	CC1501	1	1	1	2	2	1	1	0	1	0	1	1	1	1	1	1
	CC1502	1	3	3	3	0	1	0	2	2	0	2	2	3	3	3	3
	CS1501	0	1	0	1	1	1	0	1	2	0	0	0	2	1	1	1
	CS1530	0	2	1	1	1	1	1	1	2	1	1	0	2	1	2	1
	IT1504	2	1	1	0	0	0	1	0	1	1	0	1	2	1	1	1
	CC1551	1	0	2	2	2	0	1	1	1	0	2	2	2	1	2	1
	CC1530	3	1	1	1	3	1	0	0	1	0	0	3	3	3	0	0
	CC1552	2	2	2	2	2	2	2	2	2	1	2	2	2	2	2	2
	CS1602	0	0	2	0	2	0	1	0	1	0	0	0	2	1	2	1
	CC1601	2	2	1	2	1	0	0	0	0	0	0	0	2	2	1	0
	CS1631	2	2	2	3	3	0	0	1	2	1	1	1	2	2	3	0
	CC1630	1	1	1	2	2	0	0	1	1	1	1	1	1	1	2	0
	CC1634	2	1	1	3	3	1	1	1	1	1	1	1	1	1	1	1
	CC1652	1	0	1	1	1	0	0	0	0	0	0	1	1	0	0	0
	CC1653	2	2	1	1	1	0	0	0	0	0	0	0	2	2	1	0
	CC1654	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
4th Year	CC1701	1	1	1	1	0	0	1	0	0	0	0	2	1	0	1	2
	CC1702	1	1	1	1	1	1	0	1	1	0	1	1	1	1	1	0
	CC1730	1	1	1	2	2	0	0	0	0	0	0	0	2	2	2	1
	CC1731	1	0	0	1	1	1	0	0	1	1	1	0	2	2	2	1
	CC1751	2	1	1	2	0	1	0	0	0	1	1	0	2	1	0	1
	CC1753	2	1	2	2	1	0	0	0	0	0	0	2	2	1	0	0
	CC1754	1	2	1	2	2	1	0	0	0	0	0	0	0	1	1	0
	CC1755	2	1	1	0	1	0	0	0	0	0	0	1	1	2	1	1
	CC1881	2	2	1	2	3	1	0	1	0	0	0	0	2	2	1	1

MANIPAL UNIVERSITY JAIPUR

School of Electrical, Electronics & Communication Engineering (SEEC)

Course Hand-out

Basic Electronics | EC 1101| 4 Credits | 3 1 0 4

Session: Jan 19 – May 19 | Faculty: Dr. Prashant Povel Dwivedi | Class: Core Subject

A. Introduction:

The growth of mobile telephony, broadband and wireless internet has led to the growth of career opportunities in the field of communication engineering. This course is a basic overview of electronic components and their common uses. It covers the characteristics and applications of analog and digital circuit components. Emphasis is placed on analysis, selection and applications. The coverage is not as deep as an electronics course aimed at electrical engineers. There are a number of physical applications demonstrated in this course that serve to motivate a wider audience. The course is ideal for someone who wants to gain a basic understanding of electrical circuits, hobbyists, or for someone who is considering electrical engineering as a career.

Review of physics, introduction to semiconductor devices: diodes and transistors. Equivalent circuits and models of semiconductor devices. DC biasing circuits for transistors. Analysis and design of transistor amplifiers. Operational amplifier systems. Number System, Boolean Algebra, Specification and implementation of combinational and sequential systems. Introduction to basic electronic communication systems.

B. Course Outcomes: At the end of the course, students will be able to

[EC1101.1] Apply principles of physics to describe and analyse the working of semiconductor devices and integrated circuits their impacts and hence develop employability skills.

[EC1101.2] Analyse different biasing configurations of bipolar junction transistor and hence result in scope of entrepreneurship.

[EC1101.3] Analyse inverting or non-inverting amplifier structures comprising of operational amplifiers for lifelong learning and encouraging entrepreneurship.

[EC1101.4] Demonstrate interconversion on different number systems

[EC1101.5] Demonstrate minimization of Boolean expressions

[EC1101.6] Identify different parameters pertaining to analog modulation techniques

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]. **Engineering knowledge**: Demonstrate and apply knowledge of Mathematics, Science, and Engineering to classical and recent problems of electronic design & communication system.

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

[PO.3]. **Design/development of solutions**: Design a component, system, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

[PSO.1]. An ability to understand the concepts of basic Electronics & Communication Engineering and to apply them to various areas like Signal processing, VLSI, Embedded systems, Communication Systems, Digital & Analog Devices, etc.

[PSO.2]. An ability to solve complex Electronics and Communication Engineering problems, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions.

[PSO.3]. Wisdom of social and environmental awareness along with ethical responsibility to have a successful career and to sustain passion and zeal for real-world applications using optimal resources as an Entrepreneur.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	15
	Sessional Exam II (Open Book)	15
	In class Quizzes , Activity feedbacks (Accumulated and Relative)	30
End Term Exam (Summative)	End Term Exam (Open Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence	

	will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.

E. SYLLABUS

PN Junction: Formation of depletion region, Effect of forward and reverse bias on depletion region, I-V characteristics and equivalent circuits of ideal and practical diode, Diode equation.

Application of Diode: Series and parallel combination of diodes circuits, Half Wave and Full Wave rectifiers, Capacitor filter, clipper, clamper circuits, Zener Diode; I-V Characteristics, Zener Regulators, LEDs.

Bipolar Junction Transistor: Construction, schematic diagram and characteristic of CE, CB Configuration, CC configuration w.r.t. CE, Relation between α and β, transistor biasing, Q-point, load line, fixed bias, self-bias, bias stabilization, Transistor as amplifiers, frequency response.

Operational Amplifier: Characteristics of an Op. Amp., Inverting and Non-inverting, amplifiers, Linear Circuit applications as voltage follower, integrator, differentiator, summing amplifier, subtractor.

Digital Electronics: Number systems, Boolean algebra, DeMorgan's Theorem, logic gates; Truth tables, SOP, POS form, K-map for minimization of Boolean expressions, Implementation of Boolean expressions with logic gates, Designing combinational circuits: Half and full adders, Half and full subtractor. Flip-flop: S-R flip-flops.

Communication Systems: Elements of communication systems, Examples of communication systems: Analog and optical communications.

F. TEXT BOOKS

1. R. L. Boylestad, L. Nashelsky, Electronic Devices and Circuit Theory, Ninth edition, PHI.
2. A. P. Malvino, David J Bates, Electronic Principles, Seventh edition, TMH.
3. G. Kennedy, B. Davis, Electronic Communication systems, TMH.

G. REFERENCE BOOKS

Refer all course related books, other than text books here.

1. J. Millman and C. C. Halkias, Integrated Electronics, Tata McGraw Hill, New Delhi. (1994).
2. B. P. Singh and Rekha Singh, Electronic Devices and Circuits, Second Edition, Pearson Education, 2013.

H. Lecture Plan:

LEC NO.	TOPICS	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	Overview of Semiconductors	Recall concept of Semiconductors		EC1101.1 (CO 1)	Class Quiz, Mid Term I, End Term
2	Introduction to Extrinsic Semiconductors	Understanding of Doping	Lecture	EC1101.1 (CO 1)	Class Quiz, Mid Term I, End Term
3	Introduction to PN junction diode, Formation of depletion region	Understanding of switches	Lecture	EC1101.1 (CO 1)	Class Quiz, Mid Term I, End Term
4	Forward and reverse bias, I-V Characteristics	Understanding of switch operation and their characteristics	Lecture	EC1101.1 (CO 1)	Class Quiz, Mid Term I, End Term
5, 6	Equivalent circuits of ideal and practical diode	Model of the diode for circuits	Lecture	EC1101.1 (CO 1)	Class Quiz, Mid Term I, End Term
7	Diode equation	Introduction to the drift and diffusion in diode equation.	Lecture	EC1101.1 (CO 1)	Class Quiz, Mid Term I, End Term
8	Tutorial				
9-11	Application to Diodes: Series and Parallel combination of diode circuits	Use of switches to get different function in electrical circuits	Lecture	EC1101.1 (CO 1)	Class Quiz, Mid Term I, End Term
12	Half and Full wave rectifiers	Introduction to pulsating D.C	Lecture	EC1101.1 (CO 1)	Class Quiz, Mid Term I, End Term
13	Capacitor Filter	Introduction to Filters	Lecture	EC1101.1 (CO 1)	Class Quiz
14,15	Clipper circuits	Understanding of wave shaping circuits	Lecture	EC1101.1 (CO 1)	Class Quiz, Mid Term I, End Term
16	Clamper circuits	Understanding of wave shaping circuits	Lecture	EC1101.1 (CO 1)	Class Quiz, Mid Term I, End Term
17	Zener diode and its I-V characteristics	Understanding of voltage regulating device.	Lecture	EC1101.1 (CO 1)	Class Quiz, Mid Term II, End Term
18, 19	Zener regulators, LEDs	Understanding of voltage regulating circuits	Lecture	EC1101.1 (CO 1)	Class Quiz, Mid Term II, End Term
20	Tutorial		Quiz 1		
21	Introduction to BJT	Understanding of three terminal devices	Lecture	EC1101.2 (CO 2)	Class Quiz
22	Operation of BJT	Understanding of minority carrier movement	Lecture	EC1101.2 (CO 2)	Class Quiz
23	Transistor configuration:	Characteristics of BJT	Lecture	EC1101.2 (CO 2)	Class Quiz

	symbolic representation and CB Characteristics.	under various config.			
24	Transistor configuration: symbolic representation and CE Characteristics,	Characteristics of BJT under various config.	Lecture	EC1101.2 (CO 2)	Class Quiz
25	CC configuration w.r.t. CE, Relation between α and β	Characteristics of BJT under various config.	Lecture	EC1101.2 (CO 2)	Class Quiz, Mid Term II, End Term
26	Transistor Biasing, Q-point, Load line	Effect of load on the characteristics	Lecture	EC1101.2 (CO 2)	Class Quiz, Mid Term II, End Term
27	Fixed biasing	Effect of load on the characteristics	Lecture	EC1101.2 (CO 2)	Class Quiz, Mid Term II, End Term
28	Self-biasing, Bias stabilization	Effect of load on the characteristics	Lecture	EC1101.2 (CO 2)	Class Quiz, Mid Term II, End Term
29	Transistor as an amplifier, Frequency response	Understanding of amplifier characteristic and its response with frequency variation	Lecture	EC1101.2 (CO 2)	Class Quiz
30	Tutorial		Quiz 2		
31	Introduction to Operational Amplifier, Op. Amp Characteristics.	Understanding the OPAMP characteristics and it's difference from BJT as an amplifier.	Lecture	EC1101.3 (CO 3)	Class Quiz
32	Inverting amplifier	Application of OPAMP	Lecture	EC1101.3 (CO 3)	Class Quiz, Mid Term II, End Term
33	NON-Inverting amplifier, Linear applications of Op. Amp as voltage follower	Application of OPAMP	Lecture	EC1101.3 (CO 3)	Class Quiz, Mid Term II, End Term
34	Summing amplifier, Subtractor	Application of OPAMP	Lecture	EC1101.3 (CO 3)	Class Quiz, End Term
35	Integrator, Differentiator	Application of OPAMP	Lecture	EC1101.3 (CO 3)	Class Quiz, End Term
36	Tutorial		Quiz 3		
37	Digital Electronics: Number system	Mathematical understanding of Number System	Lecture	EC1101.4 (CO 4)	Class Quiz, End Term
38	Number conversion, Binary addition	Application of a Number System in Digital Electronics.	Lecture	EC1101.4 (CO 4)	Class Quiz, End Term
39	Binary subtraction with complements (1's and 2's complement)	Understanding of Subtraction in Digital Electronics	Lecture	EC1101.4 (CO 4)	Class Quiz, End Term
40	Boolean algebra, DeMorgan's	Understanding the	Lecture	EC1101.5 (CO 5)	Class Quiz,

	theorem	Algebra in Digital Electronics			End Term
41	Logic gates, Truth table.	Basic entities of Digital Electronics	Lecture	EC1101.5 (CO 5)	Class Quiz, End Term
42	Implementation of Boolean expression with logic gates	Use of Logic Gates to implement any Logic in Digital	Lecture	EC1101.5 (CO 5)	Class Quiz, End Term
43	SOP, POS forms	Understanding of various forms to represent a Logic	Lecture	EC1101.5 (CO 5)	Class Quiz, End Term
44	K-Map for minimization of Boolean expressions	A systematic way to minimize the given logic	Lecture	EC1101.5 (CO 5)	Class Quiz, End Term
45	Combinational Circuits: Half and Full adders	Understanding of Basic Combinational Circuits	Lecture	EC1101.5 (CO 5)	Class Quiz
46	Half and Full Subtractors	Understanding of Basic Combinational Circuits	Lecture	EC1101.5 (CO 5)	Class Quiz
47	S-R Flip Flop	Understanding of Basic Sequential Circuits	Lecture	EC1101.5 (CO 5)	Class Quiz
48	Tutorial				
49	Introduction to communication system	Basic concept of Communication	Lecture	EC1101.6 (CO 6)	Class Quiz
50	Analog and Digital communication	Understanding of different Communication Systems	Lecture	EC1101.6 (CO 6)	Class Quiz
51	Modulation techniques, Need for modulation	Understanding the importance of a Carrier and its Modulation	Lecture	EC1101.6 (CO 6)	Class Quiz
52	Types of Modulations.	Understanding the different ways to modulate a carrier	Lecture	EC1101.6 (CO 6)	Class Quiz, End Term
53	Tutorial		Quiz 4		

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
[EC1101.1]	Apply principles of physics to describe and analyse the working of semiconductor devices and integrated circuits their impacts and hence develop employability skills.	3	2	3	1			1					1	2	1	1
[EC1101.2]	Analyse different biasing configurations of bipolar junction transistor and hence result in scope of entrepreneurship.	3	2	1	2	1							**1**	2		1
[EC1101.3]	Analyse inverting or non-inverting amplifier structures comprising of operational amplifiers for lifelong learning and encouraging entrepreneurship.	3	3	3	2	**2**							1	2	1	
[EC1101.4]	Demonstrate interconversion on different number systems	3	2	3	2	**2**		1					1	2		
[EC1101.5]	Demonstrate minimization of Boolean expressions	**3**	3	1	**2**	**2**							1	2	1	1
[EC1101.6]	Identify different parameters pertaining to analog modulation techniques	**3**	2	**2**	2		1						2	2	1	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Electrical, Electronics and Communication

Department of Electrical Engineering
Course Hand-out

Electrical Engineering | EE 1101 | 4 Credits | 4 0 0

Session: Jan. 19 – May 19 | Faculty: Dr. Sunil Kumar Goyal | Class: First Year (All Branches)

A. Introduction: This course is offered by Dept. of Electrical Engineering as a basic fundamental subject to impart essential knowledge and information of Electrical Technology and their applications. The learning objective would cover the following aspects: -

a) To develop circuit designing skills through general insight of circuit laws and theorems.
b) To analyse the magnetic & electric circuit and calculate different parameters
c) To develop and analyse the single and three phase circuits.
d) To understand the concepts of basic construction & operation of transformer.
e) To understand the fundamentals of DC & Induction motors and measuring Instruments.

B. Course Outcomes: At the end of the course, students will be able to

[1101.1]. Recall basic circuit laws and apply theorems to analyse different types of DC circuits.
[1101.2]. Analyze and illustrate the comparison between linear electric & magnetic circuits.
[1101.3]. Identify and evaluate different configurations of single phase & three phase ac circuits.
[1101.4]. Understand the construction and operating principle of transformer.
[1101.5]. Illustrate the basic operating principles of DC machines & Induction motors and fundamental measuring Instruments

A. Program Outcomes and Program Specific Outcomes

[PO.1].Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2].Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3].Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4].Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5].Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6].The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7].Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8].Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9].Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. To solve complex practical problems related to electrical & electronics engineering applications by applying and correlating the knowledge gained from mathematics, basic sciences and other fundamental courses.

[PSO.2]. To design, develop and analyse the prevalent domains of electrical systems for sustainable, reliable, environmental friendly and feasible solutions.

[PSO.3]. Develop, investigate and solve different models of electrical networks using modern engineering tools for variety of real time, industrial and research problems.

B. Assessment Rubrics:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	15
	Sessional Exam II (Open Book)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Open Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

C. Syllabus

Introduction to Indian power scenario, Domestic appliances, Basic circuit elements, Source Transformation, Series & parallel resistive circuits, Review of Kirchhoff's laws, Star Delta Transformations, **DC Circuit Analysis:** Mesh and Node voltage analysis, DC Network Theorems-Superposition, Thevenin, Norton, Maximum Power Transfer. Capacitor and Inductor Series & Parallel connections, Charging & Discharging, Energy stored. **Magnetic circuits:** Terminologies, Analysis of series and parallel magnetic circuits, Review of Electromagnetism, Electromagnetic Induction, Fleming's left & right hand rules, Faradays laws, Lenz's law, Induced emf in a conductor & coil, Mutual Inductance, Coupling Coefficient and dot rule. **Single phase AC circuits:** Generation, EMF induced, Average value, RMS value, Peak factor, Form factor, Phasors, Analysis of Pure R, L, C Series and parallel combinations (RL, RC and RLC circuits), Power, Power factor, series and parallel Resonance. **Three phase AC Circuits:** Star and Delta connections, Analysis with balanced loads, Power measurements. **Transformers:** Single phase transformer- types, Construction, working principle, ideal and practical transformers, losses, Efficiency, Regulation. **Electrical Motors:** Introduction of Single & Three phase Induction motors, DC Motors. **Electrical Instruments:** Fundamentals of Electrical Measuring Instruments.

D. TEXT BOOKS

1. Nagasarkar & Sukhija, Basic Electrical Engineering, Oxford University Press, 2006.
2. S.K. Sahdev, Fundamentals of Electrical Engineering & Electronics, Dhanpat Rai & Co, 2010.
3. D. C. Kulsheshtha, Basic Electrical Engineering, McGraw Hill Education India, 2011.

E. REFERENCE BOOKS

1. S. N. Singh, Basic Electrical Engineering, PHI, 2011.
2. D. P. Kothari. & I. J. Nagarath, Basic Electrical Technology, TMH 2004.

F. Lecture Plan:

Lec No	**Topics**	**Session Objective**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing the Outcome**
L1	Introduction to the Course	To acquaint students with the outcome based education (OBE) and Course outcome (CO) and program outcome (PO) assessment process	Lecture		NA
L2	Basic circuit elements, Source Transformation	Recall the basic elements of a DC network	Lecture	[1101.1]	Class Quiz
L3	Series & parallel resistive circuits, Review of Kirchhoff's laws	Identify different series and parallel network configurations and their equivalent resistance calculation	Lecture	[1101.1]	Home Assignment Class Quiz
L4-L5	Star-Delta transformation	Explain the need of star-delta transformation and their applications	Lecture	[1101.1]	Home Assignment Class Quiz
T1	L1 – L5	Numerical problems based on L1-L5	Tutorial	[1101.1]	Mid Term Exam
L6 – L7	DC Circuit Analysis – Mesh & Node analysis methods	Recall KVL and KCL and apply them to find solution of different dc network problems using Mesh & Node analysis methods	Lecture	[1101.1]	Mid Term Exam
T2-T3	L6 – L7	Numerical problems based on L6-L7	Tutorial	[1101.1]	Mid Term Exam
L8-L11	DC Network Theorems: Superposition, Thevenin, Norton, Maximum Power Transfer	Analyze and solve different dc network problems using all mentioned theorems	Lecture	[1101.1]	Home Assignment Class Quiz Mid Term Exam
T4-T5	L8-L11	Numerical problems based on L8-L11	Tutorial	[1101.1]	Mid Term Exam
L12	Capacitor, Series & Parallel connections, Charging & Discharging, Energy stored	Recall series and parallel connection of capacitors and energy stored	Lecture	[1101.2]	Class Quiz
L13	Inductor, Series & parallel connections, Growth & Decay of current in inductive circuit, Energy Stored	Recall series and parallel connection of inductors and energy stored	Lecture	[1101.2]	Class Quiz
T6	L12 – L13	Numerical problems based on L12-L13	Tutorial	[1101.2]	Class Quiz
L14– L15	Magnetic circuits, Terminologies, Analysis of series and parallel circuits	Recall the concept of magnetic circuits and their configurations	Lecture	[1101.2]	Class Quiz
L16	Review of Electromagnetism, Electromagnetic Induction, Fleming's left & right hand rules, Lenz's Law	Recall the Fleming's rule, Lenz's law, Faraday's law and review the concept of Electromagnetism	Lecture	[1101.2]	Class Quiz
L17– L18	Induced emf in a conductor & coil, Mutual Inductance, Coupling Coefficient and dot rule	Describe the concept of emf induced in coil, dot rule and Coupling Coefficient	Lecture	[1101.2]	Class Quiz
T7-T8	L14– L18	Numerical problems based on L14-L18	Tutorial		Class Quiz
L19-L20	Single phase circuits: Generation, Emf induced, Average value, RMS value, Peak factor, Form factor	Describe the concept of generation of ac voltage and waveform analysis	Lecture	[1101.3]	Class Quiz
L21 – L24	Phasors, Analysis of pure R, L, C, Series RL, RC	Describe the phasor operations and	Lecture	[1101.3]	Mid Term Exam

	and RLC circuits, Impedance, Power, Power factor	calculation of different quantities pertaining to different combinations of series ac circuits			
L25-L26	Analysis of Parallel RL, RC and RLC circuits	Analyze and calculate different quantities pertaining to parallel ac circuits	Lecture	[1101.3]	Mid Term Exam
T9-T10	L19 – L26	Numerical problems based on L19-L26	Tutorial	[1101.3]	Mid Term Exam
L27 – L28	Series & Parallel Resonance, Resonant frequency, Voltage & Current magnification	Recall and examine the series and parallel resonance phenomenon	Lecture	[1101.3]	Class Quiz
T11	L27– L28	Numerical problems based on L27-L28	Tutorial	[1101.3]	Class Quiz
L29-L30	Three phase ac circuits, Advantages, Types of connections, Voltage & Currents, Line & Phase values	Identify and analyse different types of Three phase ac circuits	Lecture	[1101.3]	Class Quiz
L31-L32	Analysis of balanced 3 wire & 4 wire star and delta connected systems, Phasor diagrams	Analyze three phase balanced star and delta connected systems	Lecture	[1101.3]	Mid Term Exam
L33	Measurement of three phase power by two wattmeter method	Examine two wattmeter method for three phase power Measurement	Lecture	[1101.3]	Mid Term Exam
T12-T13	L29 – L33	Numerical problems based on L29-L33	Tutorial	[1101.3]	Class Quiz
L34	Single phase transformer: Introduction, types, Construction, Operating principle, Emf equation	Recall and analyse operating principle of Single phase transformer and their types	Lecture	[1101.4]	Class Quiz
L35 – L36	Ideal & practical transformer, Losses and Efficiency, Voltage regulation	Compare the ideal and practical transformer and analyse different performance parameters	Lecture	[1101.4]	Mid Term Exam
T14	L34 – L36	Numerical problems based on L34-L36	Tutorial	[1101.4]	Class Quiz
L37 - L38	Introduction of single and three phase induction motors	Describe the operating principle of single and three phase induction motors	Lecture	[1101.5]	Class Quiz
L39-L40	DC Machine: Introduction, Construction, Types	Describe the construction and operating principle of DC machine	Lecture	[1101.5]	Class Quiz
L41-L42	Fundamentals of Electrical Measuring Instruments	Describe the construction and operating principle of different Measuring Instruments	Lecture	[1101.5]	Class Quiz

C. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
EE 1101.1	Develop circuit designing skills through general insight of circuit laws and theorems.	3	2										2	3		
EE 1101.2	Analyze and illustrate the comparison between linear electric & magnetic circuits.	2	1										2	1		
EE 1101.3	Identify and evaluate different configurations of single phase & three phase ac circuits.	1	2										3	3	1	
EE 1101.4	Understand the construction and operating principle of transformer and evaluate efficiency.	2	2	1			1	1					2	1	2	
EE 1101.5	Illustrate the basic operating principles of DC & Induction motors and fundamental measuring Instruments.						1	1						1		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

D. Course Outcome Attainment Level Matrix:

CO	STATEMENT	ATTAINMENT OF PROGRAM OUTCOMES **THRESHOLD VALUE: 40%**												ATTAINMENT OF PROGRAM SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
EE 1101.1	Develop circuit designing skills through general insight of circuit laws and theorems.	3	2										2	3		
EE 1101.2	Analyze and illustrate the comparison between linear electric & magnetic circuits.	2	1										2	1		
EE 1101.3	Identify and evaluate different configurations of single phase & three phase ac circuits.	1	2										3	3	1	
EE 1101.4	Understand the construction and operating principle of transformer and evaluate efficiency.	2	2	1			1	1					2	1	2	
EE 1101.5	Illustrate the basic operating principles of DC & Induction motors and fundamental measuring Instruments.						1	1						1		

0-No Attainment; 1- Low Attainment; 2- Moderate Attainment; 3- Substantial Attainment

MANIPAL UNIVERSITY JAIPUR

School of Automobile Mechanical and Mechatronics Engineering

Department of Mechanical Engineering
Course Hand-out

Basic Workshop Practice| ME 1130 | 2 Credits

Session: JUL 18 – JUNE 19 | Faculty: Ashish Sharma

A. Introduction: This course is offered by Dept. of Mechanical Engineering which focuses on mainly hands on learning based on various working shops like carpentry, fitting, soldering & plumbing, lathe machine, welding and foundry. This course gives an overview of fundamental working of various machine tools, marking and cutting tools and measuring instruments.

B. Course Outcomes: At the end of the course, students will be able to

ME1130.1 Understanding about the various measuring, marking and cutting tools and Comprehend the safety measures required to be taken while using tools.

ME1130.2 Knowledge about lathe machine and its operations.

ME1130.3 Understand the process of moulding and welding processes.

ME1130.4 Have hands on practice in carpentry and fitting work.

ME1130.5 To fulfils the requirements of present day employers, who demand sound engineering skills employability.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2].Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3].Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4].Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5].Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6].The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7].Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8].Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9].Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Job preparation-	26
	File/Records-	14
	Viva-	20
End Term Exam (Summative)	End Term Exam (External Practical Exam)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup class on the job done on the day of absence will be given which has to be completed within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These jobs are limited to a maximum of 2 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. SYLLABUS

i. Introduction: Basic workshop experiments, tools, machines and applications of processes.

ii. Machine shop (A): Study of parts of lathe machine and lathe operations.

iii. Machine shop (B): Facing, Turning, Taper Turning and knurling on MS cylindrical work piece.

iv. Foundry shop (A): Study different types of moulding processes and various tools use for foundry processes.

v. Foundry shop (B): Prepare a green sand mould and demonstration of casting with molten aluminum.

vi. Welding shop (A): Study of types of welding process and applications of welding process.

vii. Welding shop (B): Welding of different types of joint on MS plate with arc welding process.

viii. Carpentry shop (A): Cut and prepare "T halving joint part A" *.

ix. Carpentry shop (B): Cut and prepare "T halving joint part B" *.

x. Fitting shop (A): Cut and prepare mild steel square part and make all the edges at 90 degree*.

xi. Fitting shop (B): Cut a 10x10 mm Notch on the mild steel Piece and make all the edges of notch at 90 degree *.

xii. Soldering shop (A): Cut and Prepare part A of the funnel *.

xiii. Soldering shop (B): Cut and Prepare part B of the funnel *.

xiv. Plumbing shop: Cut PVC pipe 'work piece' and prepare thread on it.

F. TEXT BOOKS

- H.S. Bawa "Workshop Practice" McGraw Hill Education, 2009

G. REFERENCE BOOKS

- S K Hajra Choudhary "Elements of Workshop Technology" Media Promoters & Publishers Pvt. Ltd 2007

Lecture Plan:

Lec No	**Topics**	**Session Outcome**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing the Outcome**
1	Introduction: Basic workshop experiments, tools, machines and applications of processes.	To have clear understanding of various tools	Lecture+Lab	1130.1	Lab Experiment
2	Machine shop (A): Study of parts of lathe machine and lathe operations.	Study of Lathe machine parts	Lecture+Lab	1130.2	Lab Experiment
3	Machine shop (B): Facing, Turning, Taper Turning and knurling on MS cylindrical work piece.	Preparation of job and different operations on Lathe machines	Lecture+Lab	1130.2	Lab Experiment
4	Foundry shop (A): Study different types of moulding processes and various tools use for foundry processes.	Understanding of moulding processes	Lecture+Lab	1130.3	Lab Experiment
5	Foundry shop (B): Prepare a green sand mould and demonstration of casting with molten aluminium.	Preparation of moulding and study casting	Lecture+Lab	1130.3	Lab Experiment
6	Welding shop (A): Study of types of welding process and applications of welding process	Welding process explanation	Lecture+Lab	1130.3	Lab Experiment
7	Welding shop (B): Welding of different types of joint on MS plate with arc welding process.	Preparation and understanding of lap and butt joint in welding	Lecture+Lab	1130.3	Lab Experiment
8	Carpentry shop (A): Cut and prepare "T halving joint part A" *.	Knowledge on carpentry tools	Lecture+Lab	1130.4	Lab Experiment
9	Carpentry shop (B): Cut and prepare "T halving joint part B" *.	Preparation of different of joints in carpentry	Lecture+Lab	1130.4	Lab Experiment

10	Fitting shop (A): Cut and prepare mild steel square part and make all the edges at 90 degree*.	Lecture on fitting tools	Lecture+Lab	1130.4	Lab Experiment
11	Fitting shop (B): Cut a 10x10 mm Notch on the mild steel Piece and make all the edges of notch at 90 degree *.	Preparation of mild steel job	Lecture+Lab	1130.4	Lab Experiment
12	Soldering shop (A): Cut and Prepare part A of the funnel *.	Lecture on soldering tools	Lecture+Lab	1130.5	Lab Experiment
13	Soldering shop (B): Cut and Prepare part B of the funnel *.	Preparation of soldering jobs	Lecture+Lab	1130.5	Lab Experiment
14	Plumbing shop: Cut PVC pipe 'work piece' and prepare thread on it.	Preparation of job in plumbing shop	Lecture+Lab	1130.5	Lab Experiment

H. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
ME1130.1	Understanding about the various measuring, marking and cutting tools and Comprehend the safety measures required to be taken while using tools.			1			1		2				1
ME1130.2	Knowledge about lathe machine and its operations.				1	2				1			1
ME1130.3	Understand the process of moulding and welding processes.									1			1
ME1130.4	Have hands on practice in carpentry and fitting work.									1			1
ME1130.5	To know about plumbing and soldering procedure by preparing a job.									1			1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Automobile Mechanical and Mechatronics Engineering

Department of Automobile Engineering
Course Hand-out

Engineering Chemistry | CY1101 | 4 Credits | 2 1 1 4

Session: Jan 18 – Jun 18 | Coordinator: Arunava Agarwala | Class: B.Tech. (I and II Sem)

A. Introduction: This course is offered by Dept. of Chemistry for all 1st year B.Tech. students. The objective of the course is to acquaint the students with the basic concepts of chemistry relevant to engineering field. The students with the knowledge of basic chemistry, will understand and explain scientifically the various chemistry related problems in the industry/engineering field.

B. Course Objectives: At the end of the course, students will be able to

[1101.1]. Understand and apply concepts of various types of fuel technology

[1101.2]. Develop new methods to produce soft water for industrial use.

[1101.3]. Understand the synthesis and applications of polymer science and polymer technology.

[1101.4]. Develop skills to synthesis, analysis and use of composite materials.

[1101.5]. Understand and apply the concepts in electrochemistry and corrosion science in protecting metallic objects.

[1101.6]. Acquire basic knowledge of Nanochemistry to appreciate its applications in the fields like medicine, opto-electronics, and electronics.

C. Program Outcomes and Program Specific Outcomes

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public healthand safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal,health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineeringpractice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions insocietal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of theengineering practices

[PO.9]. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverseteams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projectsand in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	15
	Sessional Exam II (Open Book)	15
	Quizz tests (Accumulated and Averaged)	10
	Laboratory Sessions	20
End Term Exam (Summative)	End Term Exam (Open Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. Syllabus

Chemical Fuels: Classification; Calorific value and its determination; Analysis of solid fuel;Liquid Fuel: Distillation of petroleum, Petroleum cracking, Reforming of petrol, Octane numberand Cetane value, Synthetic petrol, Combustion based numerical; **Water Technology**: Hardnessof water; Units of hardness; Ion exchange water softening technique; Boiler feed water: scale &sludge, priming and foaming; **Polymers & Composites**: Molecular weight determination; Glasstransition temperature; Methods of polymerization; Mechanism of polymerization reactions;Compounding of plastics; Vulcanization; Conducting polymers; Synthesis, properties andapplications of some polymers; Composition and characteristic properties of composites; **Nano Chemistry:** Synthesis, properties and applications of selected nanomaterials; **Corrosion and its Control**: Theories alrd Mechanism of Corrosion; Types of corrosion; Factors affecting corrosion,Protection against gorrosion, Paints and Coatings: Antifouling Coating, Fire retardant paintsand Case studies.

F. Text Books

T1. Jain P.C. and Jain M., Engineering Chemistry, Dhanpat Rai and Sons, Delhi, Revised, 15th Edn. 2006.

T2. Kuriacose J.C., Raja R. J., Chemistry in Engineering and Technology, Vol. I/II TMH 1988

G. Reference Books

R1. None

H. Lecture Plan:

Lec No	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1.	**Chemical fuels:** Introduction, Classification, Units of heat, Calorific value: Gross calorific value and Net calorific value.	To acquaint and clear teachers expectations and understand student expectations	Lecture	1101.1	Class Quiz End Term
2.	Description of working of Bomb calorimeter for detection of caloric value of solid /non-volatile liquid fuel; Discussion about all corrections.	Recall working of the calorimeter	Lecture	1101.1	Class Quiz Mid Term I
3.	Numerical problems based on Bomb calorimeter.	Analyze and solve numerical problems	Activity	1101.1	Class Quiz End Term
4.	Description of working of Boy's calorimeter for detection of caloric value of gaseous fuel; Numerical problems based on Boy's calorimeter.	Describe calorimeter and its working principle	Lecture	1101.1	Home Assignment End Term
5.	Dulong's Formula; Numerical problems based on Dulong's Formula; Coal analysis: Proximate analysis.	Analyze and solve numerical problems	Lecture, Activity	1101.1	Class Quiz End Term
6.	Coal analysis: Ultimate analysis; Numerical problems related to Proximate and Ultimate analysis.	Analyze and solve numerical problems	Lecture, Activity	1101.1	Class Quiz Mid Term I End Term
7.	Liquid Fuels: Fractional Distillation, Petroleum Cracking - Fixed Bed catalytic cracking.	Recall principles of distillation, cracking	Lecture	1101.1	Class Quiz Mid Term I End term
8.	Moving bed Catalytic Cracking; Knocking, Octane number, Anti-knocking agents, Unleaded petrol and power alcohol, Cetane number.	Recall principles of cracking, knocking	Lecture	1101.1	Class Quiz Mid Term I End Term
9.	Reforming of Gasoline: Thermal and Catalytic reforming, Synthetic Petrol, Bergius process, Fisher Tropsch method.	Recall basic principles of fuels	Lecture, Activity	1101.1	Class Quiz Mid Term I End Term
10.	Numerical based on Combustion (By Weight Type).	Analyze and solve numerical problems	Activity	1101.1	Class Quiz Mid Term I End Term
11.	Numerical based on Combustion (By Volume Type).	Analyze and solve numerical problems	Activity	1101.1	Class Quiz End Term
12.	**Water Technology:** Introduction, Hardness of water, Important units of hardness.	Describe the properties of water and its aplication	Lecture	1101.2	Class Quiz Mid Term II End Term

13.	Numerical problems based on hardness.	Analyze and solve numerical problems	Lecture, Activity	1101.2	Class Quiz Mid Term II End Term
14.	Estimation of hardness: Soap solution method and EDTA method.	Describe working hardness/softness of water	Lecture	1101.2	Class Quiz Mid Term II End Term
15.	Softening of water: cold and hot Lime soda process and numerical problems (calculation of amount of lime and soda).	Analyze and solve numerical problems	Lecture, Activity	1101.2	Class Quiz Mid Term II End Term
16.	Softening of hard water by Ion exchange method and zeolite method.	Describe the conversion of hard water to soft water	Lecture	1101.2	Class Quiz End Term
17.	Internal treatment: Phosphate conditioning and Calgon conditioning.	Recall the conversion of hard water to soft water	Lecture	1101.2	Class Quiz End Term
18.	Boiler problems: scale and sludge formation,priming and foaming and preventive methods.	Recall the conversion of hard water to soft water	Lecture	1101.2	Class Quiz End Term
19.	**Polymers and Composites:** Definition and classification of polymers: based on structure, origin, tacticity, and heating behavior (thermo plastic/ thermosetting).	Describe the working of polymer	Lecture, Activity	1101.3	Class Quiz End Term
20.	Functionality; Degree of polymerization; Co-polymerization: alternating, random, block and graft polymers.	Describe the properties of polymer	Lecture	1101.3	Class Quiz End Term
21.	Molecular weight of polymers: Number average and weight average molecular weights, polydispersity index; Numerical problems based on average molecular weight.	Describe the properties of polymer, Analyze and solve numerical problems	Lecture, Activity	1101.3	Class Quiz End term
22.	Mechanism of free radical polymerization and ionic (both cationic and anionic) polymerization.	Recall the properties of polymer	Lecture, Activity	1101.3	Class Quiz End Term
23.	Mechanism of coordination polymerization (Zieglar Natta Catalyst), Condensation polymerization: definition and examples.	Identify alternative ways to synthesize polymers	Lecture	1101.3	Class Quiz Mid Term II End Term
24.	Polymerization techniques: Bulk, Solution, Suspension and Emulsion.	Identify alternative ways to synthesize polymers	Lecture	1101.3	Class Quiz Mid Term II End Term
25.	Glass transition temperature & factors affecting it.	Identify alternative ways to synthesize polymers	Lecture	1101.3	Class Quiz Mid Term II End Term
26.	Elastomer: Natural rubber, Vulcanization, Synthetic rubbers.	Identify alternative ways to synthesize polymers	Lecture	1101.3	Class Quiz End Term
27.	Preparation, properties and applications	Identify alternative ways to	Lecture, Activity	1101.3	Class Quiz

	ofPolythene (LDPE and HDPE) and Nylon: 6, 6:6, 6:10, 11.	synthesize polymers			End Term
28.	Preparation, properties and applications of Phenol Formaldehyde resins (Novolacs / Resols).	Identify alternative ways to synthesize polymers	Lecture	1101.3	Class Quiz End Term
29.	Composites and its Classification.	Describe the properties of composites	Lecture	1101.4	Class Quiz End Term
30.	Characteristic Properties of Composites.	Describe the properties of composites	Lecture	1101.4	Class Quiz End Term
31.	Corrosion and its Control:Introduction, Significance, Chemical Corrosion, Pilling Bedworth Rule (Pilling–Bedworth ratio (P–B ratio).	Describe corrosion and its preventions	Lecture, Activity	1101.4	Class Quiz End Term
32	Electrochemical Corrosion.	Describe corrosion	Lecture	1101.5	Class Quiz End Term
33	Types of corrosion: Galvanic corrosion, Pitting corrosion.	Recall properties of corrosion	Lecture	1101.5	Class Quiz End Term
34	Water line Corrosion; Drop Corrosion; Stress corrosion (caustic embrittlement).	Recall properties of corrosion	Lecture	1101.5	Class Quiz End Term Practical End Term Theory
35	Factors affecting corrosion: the nature of the metal and environment.	Describe corrosion and its reasons	Lecture	1101.5	Class Quiz
36	Corrosion prevention by material selection and design; Protection against corrosion: Sacrificial anodic protection, Impressed current method, anodic protection; Corrosion inhibitors (cathodic/anodic).	Describe corrosion and its preventions	Lecture	1101.5	
37	Electroplating, galvanization, tinning and other metal coating methods.	Describe corrossion prevention	Lecture, Activity	1101.5	Class Quiz
38	Paints and Coatings: Antifouling Coating, Fire Retardants Paints.	Describe corrossion prevention	Lecture	1101.5	Class Quiz
39	**Nano-Chemistry**: Introduction, Synthesis of Nano Materials: Top down and Bottom up approach.	Describe nanochemistry	Lecture	1101.6	Class Quiz End Term Theory
40	Synthesis, properties and applications of Fullerenes and Carbon Nano tube.	Recall basics of nanochemistry	Lecture	1101.6	Class Quiz
41	General Properties of Nano Materials.	Recall nanomaterials	Lecture	1101.6	Class Quiz End Term Theory
42	Revision.	Recall and recap the lessons learnt during the semester	Activity	1101.1-6	Class Quiz Mid Term I Mid Term II End Term Theory

LAB SESSIONS	Lab sessions based on Alternative Fuel Synthesis, testing and fabrication of after exhaust device	Experiment and test different fuels on engines and analyse their impact on pollution reduction	Lab Sessions	1101.1-6	End Term Practical

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CY 1101.1	Understand and apply concepts of various types of fuel technology.	2						3			2		2			
CY 1101.2	Develop new methods to produce soft water for industrial.			2					2				3			
CY 1101.3	Understand the synthesis and applications of polymer science and polymer technology.	2				3					3		2			
CY 1101.4	Develop skills to synthesis, analysis and use of composite materials.								2				2			
CY 1101.5	Understand and apply the concepts in electrochemistry and corrosion science in protecting metallic objects.		2			2			2				3			
CY 1101.6	Acquire basic knowledge of Nanochemistry to appreciate its applications in the fields likemedicine, opto-electronics, and electronics.	2				3			2				3			

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Automobile, Mechanical and Mechatronics

DEPARTMENT OF MECHANICAL ENGINEERING

Course Hand-out

Engineering Graphics| ME 1002 | 3 Credits | 0 0 6 3

Session: July – Nov 19 | Course Coordinator: Dr. Mithilesh Kumar Dikshit | Class: Regular

A. Introduction: This course teaches the basics of engineering drawing utilising free hand sketching, mechanical drawing, and computer aided drafting. The fundamental principles of orthographic projection as well as the topics of dimensioning, sectional views, isometric and perspective pictorials views, descriptive geometry and assembly drawings are taught.

B. Course Outcomes: Upon successful completion of this course:

[CO1]. Students will be able to know and understand the conventions and the methods of engineering drawing.

[CO2]. Students will be able to understand the theory of projections. Draw orthographic projections of lines, planes and solids.

[CO3]. Apply sectional views to most practically represent engineered parts**.** Students will have **skill** to prepare basic engineering models.

[C4]. Student will have problem solving skill for various engineering design problems.

[CO5]. Student will learn **design and drafting** in autocad. Understand the application of industry standards and techniques applied in engineering graphics.

C. Program Outcomes and Program Specific Outcomes

[PO.1] Engineering Knowledge: Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

[PO.2] Problem Analysis: Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

[PO.3] Design/ Development of Solutions: Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.

[PO.4] Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.

[PO.5] Modern Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

[PO.6] The Engineer and Society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

[PO.7] Environment and Sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

[PO.8] Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

[PO.9] Individual and Team Work: Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

[PO.10] Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.

[PO.11] Project Management and Finance: Demonstrate knowledge and understanding of engineering and management principles and apply these to owners own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

[PO.12] Life-long Learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Programme Specific Outcomes:

[PSO.1]. Modelling & Analysis: Model and analyse mechanical engineering components using advanced software

[PSO.2]. Alternative fuels: Analyse performance of I. C. engines attributed to alternate fuels

[PSO.3]. Synthesis and Manufacturing: Synthesize Advance Materials and Manufacture components and spares.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Performance on sheets (Manual Drawing)	30
	Performance on AUTOCAD	20
	Viva voce	10
End Term Exam (Summative)	End Term Exam	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester Examination. The allowance of 25% includes all types of leaves including medical leaves.	

Make up Assignments (Formative)	Students who misses a class will have to report to his/her faculty about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.

E. Syllabus

Principle of Orthographic Projections: Points, straight lines parallel to one ref. plane (HP/VP) and inclined to other ref. plane; Straight lines inclined to both HP and VP; Straight lines inclined to both HP & VP and parallel to PP; Straight lines with traces; Practical problems on straight lines. Projections of Plane surfaces: Perpendicular one ref. plane (HP/VP) and inclined to other ref. plane, Inclined to both HP & VP, Inclined to both HP & VP and perpendicular to PP. Projections of Solids (right regular) by change of position method: Axis parallel to one ref. plane (HP/VP) and inclined to other ref. plane, Resting on one of the ref. plane, axis inclined to both HP & VP, Suspended freely, axis inclined to both HP & VP, Axis inclined to both HP & VP parallel to PP. Projections of solids by Auxiliary plane method: Axis inclined to both HP and VP. Sections of solids (right regular and no spheres): Using Horizontal and vertical section planes using section plane perpendicular to one ref. plane and inclined to the other ref. plane, Given the regular true shapes of various solids and find the inclination of section plane. Development of surfaces: Parallel line development, Radial line development, Triangulation development. Isometric projections: Plane surfaces and simple solids (prisms & cylinders), Frustum and combination of solids, Simple machine elements. Introduction to Computer Aided Drafting.

F. Text Books:

1. Bhat N. D., Engineering Drawing Charotar Publishing House, Anand , 2000.
2. Jeyapoovan T. Engineering Drawing and graphics Using AutoCAD, 3rd Ed. Vikas Publishing House Pvt. Ltd.,2010.

G. Reference Books:

1. Gopalkrishna K. R., Engineering Graphics, Suhas Publications, Bangalore, 2001.
2. Venugopal K., Engineering Drawing and Graphics + Autocad Newage International Publishers, Delhi (2001).
3. Narayana K. L. and Kannaiah P., Text book on Engineering Drawing, Scitech Publications, Chennai (2002).

H. List of Sheets

1. Projection of Points
2. Projection of Lines (inclined to one plane and parallel to other)
3. Projection of Lines inclined to both the planes and Traces of a line
4. Projection of Planes
5. Projection of Solids
6. Projection of Sections of Solids & Development of Surfaces
7. Isometric projections

CAD

1. Introduction to Auto-CAD and commands
2. Questions on projection of lines
3. Questions on projection of lines inclined to both the planes
4. Questions on projection of planes
5. Basic concept of 3D drafting and drawing

I. Lecture Plan: Engineering Graphics

Lecture Number	Topics	Session Outcomes	Mode of delivery	Assessments
L1	Introduction to Engineering Graphics	Layout of drawing sheet, conventions, scales, Dimensioning, Letterings and Numberings	Board/PPT	Sheet performance in class/End terms
L2	Theory of projection. Projection of Points	Types of Projections, orthographic projections, plane of projection, Quadrants, Angles of projections	Board/PPT	
L3	Problems on projection of points	Position of point, to find distance between any two points	Board/PPT	
L4	Projection of lines inclined to one plane and perpendicular to another plane	Position and projection of straight line, Methods for determining true length and true inclinations.	Board/PPT	Sheet performance in class/End terms
L5	Problems practice of lines inclined to one plane and parallel to other plane	Classroom practice.	Board/PPT	
L6	Projection and traces of straight line inclined to both planes	Projection of straight line inclined to both planes, determining apparent top view and apparent front view, angle of inclinations with both the planes.	Board/PPT	
L7	Problems practice on Lines inclined to both planes and traces of a line	Projection of straight line and traces.	Board/PPT	
L8	Projection of planes	Introduction to plane, location of plane, types of planes, Projection concepts	Board/PPT	Sheet performance in class/End terms
L9	Problems practice on projection of planes inclined to one plane and planes inclined to both planes	Projection of planes, perpendicular planes, plane inclined to reference planes	Board/PPT	
L10	Projection of Solids (right regular and by change of	Introduction, types of	Board/PPT	Sheet

	position method)	solids, position of solids w.r.t. HP and VP		performance in class/End terms
L11	Problems practice on projection of solids	Projection of solids in simple positions, Position of solids in typical positions	Board/PPT	
L12	Problems on projection of solids inclined to both planes	Oblique solids, Frustum of cone and Pyramid, Truncated solids	Board/PPT	
L13	Problems on projection of solids	suspended freely and axis inclined to both planes, Axis inclined to both HP & VP, parallel to PP	Board/PPT	
L14	Problems on projection of solids	Projection of solids by auxiliary plane method; Axis inclined to both HP & VP	Board/PPT	
L15	Projection of sections of solids	Introduction, section of solids, Different terminology, classifications	Board/PPT	Sheet performance in class/End terms
L16	Projection of sections of solids	Section perpendicular to VP and parallel to HP, Section perpendicular to HP and parallel to VP	Board/PPT	
L17	Problems on projection of sections of solids	Section perpendicular to VP and inclined to HP, Section perpendicular to HP and inclined to VP	Board/PPT	
L18	Development of surfaces	Parallel line development, Radial line development and Triangular development	Board/PPT	Sheet performance in class/End terms
L19	Development of Surfaces	Problems on Development of Surfaces for prism, pyramid, cone cylinder	Board/PPT	
L20	Isometric view and projection	Introduction, Difference between isometric view and isometric projection, Isometric axis, isometric lines and isometric planes	Board/PPT	Sheet performance in class/End terms
L21	Problems on Isometric view and projection of planes and solids	Dimensioning on isometric projection Isometric view and projection of plane geometries, Four center method to draw isometric view and	Board/PPT	

		projection of circle, Isometric view of right solids		
L22	Problems on Isometric projection of planes and solids	Isometric view and projection of Truncated solids, frustum	Board/PPT	
L23	Introduction to Auto CAD	Introduction, CAD applications, AUTOCAD workspace, Setting up drawing space, sheet layout, command execution	PPT	Classroom Test
L24	Commands and Projection of lines and lines inclined to both planes using Auto CAD	Methods of locating a point, Drawing lines and curves, texting and dimensioning of drawings	AUTOAD	
L25	Commands and Projection of planes using AUTOCAD	Drawing of polygons using commands, editing commands like OFFSET, FILLET, CHAMFER, TRIM, EXTEND, BREAK, ROTATE, MIRROR etc.	AUTOCAD	
L26	3D objects	Commands: EXTRUDE, CYLINDER, CONE, BOX, UNION, SUBSTRACT and SECTION	AUTOCAD	

J. Course Articulation Matrix: (Mapping of COs with POs and PSOs)

CO	STATEMENT	Correlation With Program Outcomes											Correlation With Program Specific Outcomes			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME1103.1	Students will be able to know and understand the conventions and the methods of engineering drawing.	3	1	2	1								2			
ME1103.2	Students will be able to understand the theory of projection. Draw orthographic projection of lines, planes and solids.	3	2	2	1								2	1		2

CO	STATEMENT	Attainment of program outcomes **Threshold value: 40%**	Attainment of program specific outcomes

ME1103.3	Apply auxiliary or sectional views to most practically represent engineered parts**.** Students will be able to prepare basic engineering models	3	3	3	1								2			3
ME1103.4	Draw the projection using AUTOCAD. Understand the application of industry standards and techniques applied in engineering graphics.	3	3	3	2	3							2	3		3

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

K. Course Outcome Attainment Level Matrix:

		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME110 1.1	Students will be able to know and understand the conventions and the methods of engineering drawing.															
ME110 1.2	Students will be able to understand the theory of projection. Draw orthographic projection of lines, planes and solids.															
ME110 1.3	Apply auxiliary or sectional views to most practically represent engineered parts. Students will be able to prepare basic engineering models															
ME110 1.4	Draw the projection using AUTOCAD. Understand the application of industry standards and techniques applied in engineering graphics.															

0-No Attainment; 1- Low Attainment; 2- Moderate Attainment; 3- Substantial Attainment

MANIPAL UNIVERSITY JAIPUR

Faculty of Engineering

B.Tech. First Year (All branches)

DEPARTMENT OF MATHEMATICS AND STATISTICS

Course Hand-out

Engineering Mathematics-I| MA1101 | 4 Credits | 3 1 0 4

Session: July – Dec., 2018 | Faculty: Dr. Mohd. Rizwanullah & Dr. Reema Jain | Class: B.Tech. First Year

A. Introduction: An engineering student needs to have some basic mathematical tools and techniques which emphasize the development of rigorous logical thinking and analytical skills. Based on this, the course aims at giving adequate exposure to the theory and applications. The course is aimed at developing the basic Mathematical skills of engineering students that are imperative for effective understanding of engineering subjects.

B. Course Objectives: At the end of the course, students will be able to

[MA1101.1] Solve the problem on Radius of curvature, Circle and chord of curvature, Asymptotes, curve tracing for Cartesian and polar curves.

[MA1101.2] Demonstrate understanding of the derivatives of functions of several variables

[MA1101.3] Optimize the functions of several variables using Hessian method and Lagrangian method and further will improve the logical skills hence Employability.

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[MA1101.4] Use matrices, determinants and techniques for solving systems of linear equations in the different areas of Linear Algebra

[MA1101.5] Solve Eigen value problems and apply Cayley Hamilton Theorem

[MA1101.6] Applications of integral calculus: area and length of curves and volume of solid of revolution of simple curves and it will enhance the problem solving skills.

C. Program Outcomes and Program Specific Outcomes

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

D. Assessment : Plan

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	15
	Sessional Exam II (Open Book)	15
	In class Quizzes	30
End Term Exam (Summative)	End Term Exam (Open Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. Syllabus

Differential Calculus: Radius of curvature, Circle and chord of curvature, Asymptotes, curve tracing for Cartesian and polar curves. Taylor's theorem for a function of one variable. Taylor's and Maclaurin's expansion of functions. **Partial Differentiation**: Euler's theorem on homogeneous functions, total derivative, derivatives of composite and implicit functions, Taylor's theorem for a function of two variables, extreme values of a function of two variables, Lagrange's method of undetermined multipliers, Errors and approximations. **Integral Calculus**: Reduction formulae. Applications of integral calculus: area and length of curves and volume of solid of revolution of simple curves. **Matrices**: Elementary transformations, Inverse and rank of a matrix by elementary transformation, consistency and solution of system of simultaneous equations, eigenvalues, eigenvectors, Caley-Hamilton theorem, diagonalization of a matrix

F. Text Books

T1. S. Pal & S. C. Bhunia, "Engineering Mathematics", Oxford University Press, 2015.
T2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, Delhi, 2006.
T3. B. V. Ramana, "Higher Engineering Mathematics", McGraw Hill, 2014.

G. Reference Books

R1. E. Kreyszig, "Advanced Engineering Mathematics", Wiley India Edition, 2006.

R2. B. Ram, "Engineering Mathematics", Vol. I & II, Pearson, 2012.

R3. S. Narayan, "Differential Calculus", Shyam Lal Charitable Trust, Delhi, 2002.
R4. S. Narayan, "Integral Calculus", S. Chand & Co., Delhi, 2005

H. Lecture Plan:

Lecture No.	Description of the Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
	Curvature & Asymptotes:				
1	Introduction, Definition, Radius of curvature (Cartesian Coordinate)	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
2	Radius of curvature (Parametric Coordinate)	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
3	Radius of curvature (Polar Coordinate)	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
4	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.1**	Quizzes, Two Sessional, End Term Examination
5	Circle of curvature	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
6	Chord of curvature	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
7	Asymptotes (Parallel)	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
8	Asymptotes (Inclined)	Identify, formulate, apply	Lecture,	**1101.1**	Quizzes, Two Sessional, End

		appropriate techniques, professional ethics, Communicate effectively & life-long learning	Discussion & Examples		Term Examination
9	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.1**	Quizzes, Two Sessional, End Term Examination
	Curve Tracing				
10	Procedure for tracing Cartesian curves	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
11	Problems based on above topic	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
12	Procedure for tracing polar curves	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
13	Problems based on above topic	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
14	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.1**	Quizzes, Two Sessional, End Term Examination
15	Taylor's theorem for a function of one variable	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.2**	Quizzes, Two Sessional, End Term Examination
16	Taylor's and Maclaurin's expansion of functions	Identify, formulate, apply appropriate techniques, professional ethics,	Lecture, Discussion & Examples	**1101.2**	Quizzes, Two Sessional, End Term Examination

		Communicate effectively & life-long learning			
17	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.2**	Quizzes, Two Sessional, End Term Examination
	Partial Differentiation				
19	Introduction & problems	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.2**	Quizzes, Two Sessional, End Term Examination
20	Euler's theorem on homogeneous functions	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.2**	Quizzes, Two Sessional, End Term Examination
21	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.2**	Quizzes, Two Sessional, End Term Examination
22	Total derivative	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.2**	Quizzes, Two Sessional, End Term Examination
23	Derivatives of composite and implicit functions	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.2**	Quizzes, Two Sessional, End Term Examination
24	Change of variables	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.2**	Quizzes, Two Sessional, End Term Examination
25	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.2**	Quizzes, Two Sessional, End Term Examination

27	Taylor's theorem for a function of two variables	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.2**	Quizzes, Two Sessional, End Term Examination
28	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.2**	Quizzes, Two Sessional, End Term Examination
29	Extreme values of a function of two variables	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.3**	Quizzes, Two Sessional, End Term Examination
30	Lagrange's method of undetermined multipliers	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.3**	Quizzes, Two Sessional, End Term Examination
31	Errors and approximations	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.3**	Quizzes, Two Sessional, End Term Examination
32	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.3**	Quizzes, Two Sessional, End Term Examination
	Matrices:				
33	Matrices, elementary column and row transformations	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.4**	Quizzes, Two Sessional, End Term Examination
34	Inverse of a matrix by elementary transformations	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.4**	Quizzes, Two Sessional, End Term Examination
35	Rank of a matrix by elementary transformations	Identify, formulate, apply appropriate techniques,	Lecture, Discussion &	**1101.4**	Quizzes, Two Sessional, End Term Examination

		professional ethics, Communicate effectively & life-long learning	Examples		
36	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.4**	Quizzes, Two Sessional, End Term Examination
37	Solution of systems of linear equations, consistency	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.4**	Quizzes, Two Sessional, End Term Examination
39	Solution by Gauss elimination	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.4**	Quizzes, Two Sessional, End Term Examination
40	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.4**	Quizzes, Two Sessional, End Term Examination
41	Cayley-Hamilton theorem, Eigenvalues	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.5**	Quizzes, Two Sessional, End Term Examination
42	Eigenvectors	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.5**	Quizzes, Two Sessional, End Term Examination
43	Diagonalization of a square matrix	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.5**	Quizzes, Two Sessional, End Term Examination
44	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.5**	Quizzes, Two Sessional, End Term Examination

	Integral Calculus:				
46	Reduction formulae	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.6**	Quizzes, Two Sessional, End Term Examination
47	Area of simple curves	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.6**	Quizzes, Two Sessional, End Term Examination
48	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.6**	Quizzes, Two Sessional, End Term Examination
49	Lengths of simple curves	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.6**	Quizzes, Two Sessional, End Term Examination
51	Volume of revolution of simple curves	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.6**	Quizzes, Two Sessional, End Term Examination
52	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.6**	Quizzes, Two Sessional, End Term Examination

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												~~CORRELATION WITH PROGRAM SPECIFIC OUTCOMES~~		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	~~PSO 1~~	~~PSO 2~~	~~PSO 3~~
MA1101.1	Numerical problem on Radius of curvature, Circle and chord of curvature, Asymptotes, curve tracing for Cartesian and polar curves.	3	2	3	1			1			1		1			
MA1101.2	Numerical problem on Euler's theorem on homogeneous functions, total derivative, derivatives of composite and implicit functions, Taylor's theorem for a function of two variables	3	2	1	2	1										
MA1101.3	Application based problem on extreme values of a function of two variables, Lagrange's method of undetermined multipliers, Errors and approximations	3	3	2	2						1		1			
MA1101.4	Applications of integral calculus: area and length of curves and volume of solid of revolution of simple curves	3	2	2	2	1		1					1			
MA1101.5	Using matrices to solve the linear equation of order mxn.	2	3	1	1	1							1			

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

Faculty of Engineering

B.Tech. First Year (All branches)

DEPARTMENT OF MATHEMATICS AND STATISTICS

Course Hand-out

Engineering Mathematics-I| MA1101 | 4 Credits | 3 1 0 4

Session: July – Dec., 2018 | Faculty: Dr. Mohd. Rizwanullah & Dr. Reema Jain | Class: B.Tech. First Year

A. Introduction: An engineering student needs to have some basic mathematical tools and techniques which emphasize the development of rigorous logical thinking and analytical skills. Based on this, the course aims at giving adequate exposure to the theory and applications. The course is aimed at developing the basic Mathematical skills of engineering students that are imperative for effective understanding of engineering subjects.

B. Course Objectives: At the end of the course, students will be able to

[MA1101.1] Solve the problem on Radius of curvature, Circle and chord of curvature, Asymptotes, curve tracing for Cartesian and polar curves.

[MA1101.2] Demonstrate the understanding of the derivatives of functions of several variables and it will enhance the problem solving skills.

[MA1101.3] Optimize the functions of several variables using Hessian method and Lagrangian method and further will improve the logical skills hence Employability.

[MA1101.4] Use matrices, determinants and techniques for solving systems of linear equations in the different areas of Linear Algebra

[MA1101.5] Solve Eigen value problems, Applications of integral calculus: area and length of curves and volume of solid of revolution of simple curves.

C. Program Outcomes and Program Specific Outcomes

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

D. Assessment ÷ Plan

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	15
	Sessional Exam II (Open Book)	15
	In class Quizzes	30
End Term Exam (Summative)	End Term Exam (Open Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. Syllabus

Differential Calculus: Radius of curvature, Circle and chord of curvature, Asymptotes, curve tracing for Cartesian and polar curves. Taylor's theorem for a function of one variable. Taylor's and Maclaurin's expansion of functions. **Partial Differentiation**: Euler's theorem on homogeneous functions, total derivative, derivatives of composite and implicit functions, Taylor's theorem for a function of two variables, extreme values of a function of

two variables, Lagrange's method of undetermined multipliers, Errors and approximations. **Integral Calculus**: Reduction formulae. Applications of integral calculus: area and length of curves and volume of solid of revolution of simple curves. **Matrices**: Elementary transformations, Inverse and rank of a matrix by elementary transformation, consistency and solution of system of simultaneous equations, eigenvalues, eigenvectors, Caley-Hamilton theorem, diagonalization of a matrix

F. Text Books

T1. S. Pal & S. C. Bhunia, "Engineering Mathematics", Oxford University Press, 2015.
T2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, Delhi, 2006.
T3. B. V. Ramana, "Higher Engineering Mathematics", McGraw Hill, 2014.

G. Reference Books

R1. E. Kreyszig, "Advanced Engineering Mathematics", Wiley India Edition, 2006.

R2. B. Ram, "Engineering Mathematics", Vol. I & II, Pearson, 2012.

R3. S. Narayan, "Differential Calculus", Shyam Lal Charitable Trust, Delhi, 2002.
R4. S. Narayan, "Integral Calculus", S. Chand & Co., Delhi, 2005

H. Lecture Plan:

Lecture No.	Description of the Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
	Curvature & Asymptotes:				
1	Introduction, Definition, Radius of curvature (Cartesian Coordinate)	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
2	Radius of curvature (Parametric Coordinate)	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
3	Radius of curvature (Polar Coordinate)	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
4	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.1**	Quizzes, Two Sessional, End Term Examination
5	Circle of curvature	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
6	Chord of curvature	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
7	Asymptotes (Parallel)	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
8	Asymptotes (Inclined)	Identify, formulate, apply	Lecture,	**1101.1**	Quizzes, Two Sessional, End

		appropriate techniques, professional ethics, Communicate effectively & life-long learning	Discussion & Examples		Term Examination
9	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.1**	Quizzes, Two Sessional, End Term Examination
	Curve Tracing				
10	Procedure for tracing Cartesian curves	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
11	Problems based on above topic	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
12	Procedure for tracing polar curves	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
13	Problems based on above topic	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.1**	Quizzes, Two Sessional, End Term Examination
14	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.1**	Quizzes, Two Sessional, End Term Examination
15	Taylor's theorem for a function of one variable	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.2**	Quizzes, Two Sessional, End Term Examination
16	Taylor's and Maclaurin's expansion of functions	Identify, formulate, apply appropriate techniques, professional ethics,	Lecture, Discussion & Examples	**1101.2**	Quizzes, Two Sessional, End Term Examination

		Communicate effectively & life-long learning			
17	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.2**	Quizzes, Two Sessional, End Term Examination
	Partial Differentiation				
19	Introduction & problems	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.2**	Quizzes, Two Sessional, End Term Examination
20	Euler's theorem on homogeneous functions	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.2**	Quizzes, Two Sessional, End Term Examination
21	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.2**	Quizzes, Two Sessional, End Term Examination
22	Total derivative	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.2**	Quizzes, Two Sessional, End Term Examination
23	Derivatives of composite and implicit functions	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.2**	Quizzes, Two Sessional, End Term Examination
24	Change of variables	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.2**	Quizzes, Two Sessional, End Term Examination
25	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.2**	Quizzes, Two Sessional, End Term Examination

27	Taylor's theorem for a function of two variables	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.2**	Quizzes, Two Sessional, End Term Examination
28	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.2**	Quizzes, Two Sessional, End Term Examination
29	Extreme values of a function of two variables	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.3**	Quizzes, Two Sessional, End Term Examination
30	Lagrange's method of undetermined multipliers	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.3**	Quizzes, Two Sessional, End Term Examination
31	Errors and approximations	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.3**	Quizzes, Two Sessional, End Term Examination
32	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.3**	Quizzes, Two Sessional, End Term Examination
	Matrices:				
33	Matrices, elementary column and row transformations	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.4**	Quizzes, Two Sessional, End Term Examination
34	Inverse of a matrix by elementary transformations	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.4**	Quizzes, Two Sessional, End Term Examination
35	Rank of a matrix by elementary transformations	Identify, formulate, apply appropriate techniques,	Lecture, Discussion &	**1101.4**	Quizzes, Two Sessional, End Term Examination

		professional ethics, Communicate effectively & life-long learning	Examples		
36	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.4**	Quizzes, Two Sessional, End Term Examination
37	Solution of systems of linear equations, consistency	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.4**	Quizzes, Two Sessional, End Term Examination
39	Solution by Gauss elimination	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.4**	Quizzes, Two Sessional, End Term Examination
40	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.4**	Quizzes, Two Sessional, End Term Examination
41	Cayley-Hamilton theorem, Eigenvalues	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.5**	Quizzes, Two Sessional, End Term Examination
42	Eigenvectors	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.5**	Quizzes, Two Sessional, End Term Examination
43	Diagonalization of a square matrix	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.5**	Quizzes, Two Sessional, End Term Examination
44	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.5**	Quizzes, Two Sessional, End Term Examination

	Integral Calculus:				
46	Reduction formulae	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.6**	Quizzes, Two Sessional, End Term Examination
47	Area of simple curves	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.6**	Quizzes, Two Sessional, End Term Examination
48	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.6**	Quizzes, Two Sessional, End Term Examination
49	Lengths of simple curves	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.6**	Quizzes, Two Sessional, End Term Examination
51	Volume of revolution of simple curves	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Lecture, Discussion & Examples	**1101.6**	Quizzes, Two Sessional, End Term Examination
52	**Tutorial Class**	Identify, formulate, apply appropriate techniques, professional ethics, Communicate effectively & life-long learning	Problem solving	**1101.6**	Quizzes, Two Sessional, End Term Examination

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												~~CORRELATION WITH PROGRAM SPECIFIC OUTCOMES~~		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	~~PSO 1~~	~~PSO 2~~	~~PSO 3~~
MA1101.1	Solve the problem on Radius of curvature, Circle and chord of curvature, Asymptotes, curve tracing for Cartesian and polar curves.	3	2	3	1			1			1		1			
MA1101.2	Demonstrate the understanding of the derivatives of functions of several variables and it will enhance the problem solving skills.	3	2	1	2	1										
MA1101.3	Optimize the functions of several variables using Hessian method and Lagrangian method and further will improve the logical skills hence Employability.	3	3	2	2						1		1			
MA1101.4	Use matrices, determinants and techniques for solving systems of linear equations in the different areas of Linear Algebra	3	2	2	2	1		1					1			
MA1101.5	Solve Eigen value problems, Applications of integral calculus: area and length of curves and volume of solid of revolution of simple curves	2	3	1	1	1							1			

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Basic Sciences

First Year B. Tech.

Engineering Mathematics-II| MA1201 | 4 Credits | 3 1 0 4

Session: January 2019 – May 2019 | Faculty: Dr. Giriraj Methi & Dr. M.Rizwan | Class: First Year B. Tech. II Semester

A. Introduction: An engineering student needs to have some basic mathematical tools and technique which emphasizes the development of rigorous logical thinking and logical skills. Based on this, the course aims at giving adequate exposure to the theory and applications. The course is aimed at developing the basic mathematical skills of engineering students that are imperative for understanding the engineering subjects.

B. Course Outcomes (Cos): At the end of the course, students will be able to

[MA1201.1]: Demonstrate the understanding of First order and First Degree differential Equations

[MA1201.2]: Apply and solve higher order linear differential equations and simultaneous differential equations

[MA1201.3]: Develop the skill to use Beta Gamma function in mathematical problems

[MA1201.4]: Able to change order of double integration and double integral in Cartesian form to polar form and vice versa

[MA1201.5]: Solve triple integral find area and volume of solids using double integral

[MA1201.6]: Understand and can handle solid coordinate figure Sphere, Right circular cone and Right Circular Cylinder

C. Program Outcomes and Program Specific Outcomes

[PO.1]. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations

[PO.6]. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO.11]. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Program Specific Outcomes (PSOs)

[PSO1]: Should be able to know the algorithm writing paradigms and provide algorithmic solutions to real world problems.

[PSO2]: Will be able to design, develop and implement efficient software for a given real life problem.

[PSO3]: Will be able to apply knowledge of AI, Machine Learning and Data Mining in analysing big data for extracting useful information from it and for performing predictive analysis.

[PSO4]: Apply standard Software Engineering practices and strategies in software project development using open-source programming environment to deliver a quality product for business success.

[PSO5]: Be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	15
	Sessional Exam II (Open Book)	15
	In class Quizzes	30
End Term Exam (Summative)	End Term Exam (Only Handwritten class notes)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal.	

E. Syllabus

MA1201 Engineering Mathematics-II

Ordinary Differential Equations: Solutions of first order and first degree differential equations, separable of variables, homogeneous and reducible to homogeneous equations, linear equations & Bernoulli equation, exact equations, reducible to exact. **Linear Higher Order Differential Equations:** Linear homogeneous equations with constant coefficients, inverse differential operators and method of variation of parameters, Solution of Cauchy's and Legendre's differential equations, solution of simple simultaneous linear differential equations. **Multiple Integrals:** Beta and Gamma Functions: elementary properties. Double and Triple integrals, area and volume by double integration, change of order of integration, change of variables from Cartesian to polar form and vice versa. **Analytical Solid Geometry:** Sphere, right circular cone, right circular cylinder.

A. TEXT BOOKS

1. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, Delhi, 2006.

2. E. Kreyszig, "Adianced Engineering Mathematics", Wiley India Edition, 2006.

B. REFERENCE BOOKS

1. B. Ram, “Engineering Mathematics", Vol. I and II, Pearson, 2012.
2. S. Pal & S. C. Bhunia, "Engineering Mathematics", Oxford University Press, 2015

F. Lecture Plan

Lecture No.	Topics	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1.	Introduction of Ordinary differential equations-Definition, order & degree of a differential equation	Lecture	[1201.1]	Mid Term - I End Term
2.	Solution of first order and first degree differential equations using Variable separable method	Lecture	[1201.1]	Mid Term - I End Term
3.	Solution of Homogeneous differential equations	Lecture	[1201.1]	Mid Term - I End Term
4.	Equations reducible to homogeneous form	Lecture	[1201.1]	Mid Term - I End Term
5.	Problems of equations reducible to homogeneous form	Lecture	[1201.1]	Mid Term - I End Term

6.	Problem Solving	Tutorial	[1201.1]	Mid Term - I End Term
7.	Solution of Linear differential equations	Lecture	[1201.1]	Mid Term - I End Term
8.	Solution of Bernoulli's equation	Lecture	[1201.1]	Mid Term - I End Term
9.	Solution of Exact differential equations	Lecture	[1201.1]	Mid Term - I End Term
10.	Equations reducible to exact differetnial equations	Lecture	[1201.1]	Mid Term - I End Term
11.	Problems and different IF for reducible Exact differential equations	Lecture	[1201.1]	Mid Term - I End Term
12.	Problem Solving	Tutorial	[1201.]	Mid Term - I End Term
13.	Applications of first order and first degree differential equations in real world problems	Lecture	[1201.1]	Mid Term - I End Term
14.	Introduction and develop theory for CF	Lecture	[1201.2]	Mid Term - I End Term
15.	ways for finding CF	Lecture	[1201.2]	Mid Term - I End Term

16.	Linear homogenous higher order differential equations with constant coefficients	Lecture	[1201.2]	Mid Term - I End Term
17.	Problem Solving	Tutorial	[1201.2]	Mid Term - I End Term
18.	Inverse differential operator	Lecture	[1201.2]	Mid Term - I End Term
19.	Rules for finding Particular integral for exponential and trigonometrical cases	Lecture	[1201.2]	Mid Term - I End Term
20.	Rules for finding Particular integral for remaining cases	Lecture	[1201.2]	Mid Term - I End Term
21.	Develop Method of variation of parameters	Lecture	[1201.2]	Mid Term – II End Term
22.	Problems related to method of varation of parameter	Lecture	[1201.2]	Mid Term – II End Term
23.	Solution of Cauchy's equation	Lecture	[1201.2]	Mid Term – II End Term
24.	Problem Solving	Tutorial	[1201.2]	Mid Term – II End Term
25.	Solution of Legendre's	Lecture	[1201.2]	Mid Term – II End Term

	equation			
26.	Solution of simple simultaneous linear differential equations	Lecture	[1201.2]	Mid Term – II End Term
27.	Problem Solving	Tutorial	[1201.2]	Mid Term – II End Term
28.	Applications of Linear higher order differential equations in real world problems	Lecture	[1201.2]	Mid Term – II End Term
29.	Beta & Gamma functions: Concept and Definitions	Lecture	[1201.3]	Mid Term – II End Term
30.	Properties and problems of beta function	Lecture	[1201.3]	Mid Term – II End Term
31.	Properties and problems of Gamma function	Lecture	[1201.3]	Mid Term – II End Term
32.	Problem Solving	Tutorial	[1201.3]	Mid Term – II End Term
33.	Double Integral & Tripal Integral	Lecture	[1201.4]	Mid Term – II End Term
34.	Area by double integration	Lecture	[1201.4]	Mid Term – II End Term
35.	Volume by double	Lecture	[1201.4]	Mid Term – II End Term

	integration			
36.	Problem Solving	Tutorial	[1201.4]	Mid Term – II End Term
37.	Change of order of integration	Lecture	[1201.4]	Mid Term – II End Term
38.	Change of variables from Cartesian to polar form	Lecture	[1201.5]	Mid Term – II End Term
39.	Change of variables from Polar to Cartesianform	Lecture	[1201.5]	Mid Term – II End Term
40.	Problem Solving	Tutorial	[1201.5]	Mid Term – II End Term
41.	Three D: Basic Concepts	Lecture	[1201.6]	End Term
42.	Introduction to Sphere Equation of sphere with problems	Lecture	[1201.6]	End Term
43.	plane section of sphere	Lecture	[1201.6]	End Term
44.	Problem Solving	Tutorial	[1201.6]	End Term
45.	Right circular cone	Lecture	[1201.6]	End Term
46.	Right circular cylinder	Lecture	[1201.6]	End Term
47.	Problems based on right	Lecture	[1201.6]	End Term

	circular cone & cylinder			
48.	Problem solving	Lecture	[1201.6]	End Term

G. Course Articulation Matrix (Mapping of COs with POs and PSOs) for Data Communications:

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4

1201.1	Demonstrate the understanding of First order and First Degree differential Equations	3	2	3	1	1		1					1				
2101.2	Apply and solve higher order linear differential equations and simultaneous differential equations	3	2	1	2	1											
1201.3	Use Beta Gamma function in mathematical problems	3	3	2	2						1						
1201.4	Able to change order of double integration and double integral in Cartesian form to polar form and vice versa	2	1	2	1	1		1									
1201.5	Solve triple integral find area and volume of solids using double integral	2	3	1	1	1							1				
1201.6	Understand and can handle solid coordinate figure Sphere, Right circular cone and Right Circular Cylinder					1											

MANIPAL UNIVERSITY JAIPUR
School of Basic Sciences

Department of Physics
Course Hand-out

Engineering Physics | PY 1101 | 5 Credits | 3 1 1 5

Session: Jan- May, 2019| Faculty: Dr. Saikat | Class: B.Tech. II Sem.

A. Introduction: The mission of the Engineering Physics course is to prepare students for careers in engineering where physics principles can be applied to the advancement of technology. The course work will develop sufficient depth in physics skills to produce engineers who can relate fundamental physics to practical engineering problems, and will possess the versatility to address new problems in our rapidly changing technological base. The present course is meant to provide a more thorough grounding in applied physics for a selected specialty such as optics, quantum physics, atomic & molecular physics and solid-state physics. The discipline is also meant for cross-functionality and bridges the gap between theoretical science and practical engineering. It is notable the term "engineering physics" is also called as "technical physics" in several universities and colleges.

B. Course Objectives: At the end of the course, students will be able to

[1101.1] understand the wide range of diversity in science and technology with the help of knowledge of basic Physics along with practical approach of Engineering Physics.
[1101.2] explain various processes involved in understanding the nature of light.
[1101.3] identify the problems and applications of Quantum mechanics.
[1101.4] impart the knowledge of empirical laws based on Solid state Physics and Atomic and Molecular Physics.
[1101.5] achieve perfectness in experimental skills and the study of practical applications in Physics.
[1101.6] develop skills to impart practical knowledge in real time solution.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1] Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2] Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3] Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4] Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5] Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6] The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7] Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8] Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9] Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10] Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11] Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12] Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

[P.S.O. 1] to understand the basic physics principles and to explain them clearly.

[PSO. 2] to apply these principles both in simple exercises and in more complex problems of advanced Physics.

[PSO. 3] to develop creative thinking and the power of imagination.

[PSO. 4] to expose the graduates in research in academia and industry for broader applications.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Handwritten Note Book)	15
	Sessional Exam II (Open Handwritten Note Book)	15
	In class Quizzes (Accumulated and Averaged)	10
End Term Exam (Summative)	End Term Exam (Open Handwritten Note Book)	40
Lab Evaluation	Regular Lab Performance & viva-voce, laboratory end term exam	20
	Total	100
Attendance (Formative)	A minimum of 75% attendance separately for each component (Theory lectures and Practical) is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. SYLLABUS

OPTICS: Two source interference, Double slit interference, Coherence, Intensity in Double slit interference, interference from thin films, Air-wedge, Newton`s rings, Michelson`s interferometer, Diffraction and wave theory of light, Single-slit diffraction, Intensity in single-slit diffraction (using Phasor Method), Diffraction at a circular aperture, Double-slit interference and diffraction combined-Intensity in double-slit diffraction (qualitative approach), Diffraction of light through multiples slits, Diffraction gratings, Dispersion and resolving power of gratings, Polarization of electromagnetic waves, Polarizing sheets, Polarization by reflection, Double refraction.

QUANTUM PHYSICS: Black body radiation and Planck`s hypothesis, Stefan`s Law, Wein`s displacement law, Photoelectric effect, Compton effect, Photons and electromagnetic waves, Wave properties of particles, de-Broglie hypothesis, Davisson-Germer Experiment, Quantum particle (wave packet, phase speed, ground speed), the uncertainty principle.

QUANTUM MECHANICS : An interpretation of quantum mechanics, Wave function and its significance, Schrodinger equation, particle in a box, Particle in a well of finite height (qualitative), Tunnelling through a potential barrier and its applications, The simple harmonic oscillator(qualitative).

ATOMIC PHYSICS & MOLECULAR PHYSICS : Atomic spectra of gases, Energy states and spectra of molecules(rotational and vibrational energy levels), X-rays-Types, Moseley law, Spontaneous and stimulated transitions, He-Ne and Ruby laser, Application of lasers.

SOLID STATE PHYSICS: Band theory of solids, Electrical conduction in metals, Insulators, and Semiconductors, Superconductivity- Type I and type II Super conductors, Meisner effect, BCS Theory (Introductory) and applications of Superconductivity.

F. TEXT BOOKS

1. Halliday, Resnick, Krane, PHYSICS, Volume 2, 5th edition, John Wiley & Sons, Inc, 2011 *(For Optics)*
2. Beiser & Mahajan, Modern Physics, Mc Graw Hill, 6th edition., 2009 *(For Quantum Physics, Quantum Mechanics, Atomic Physics, Solid State Physics)*

G. REFERENCE BOOKS

Serway & Jewett, PHYSICS for Scientists and Engineers with Modern Physics; Volume 2,6th edition,

H. Lecture Plan:

Lec No	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	Discussion of Lecture Plan	To acquaint and clear teachers expectations and understand student expectations	Lecture	**1101.1**	NA
2	Introduction to OPTICS	To make the student understand the difference between physical and geometrical optics. Recall elementary idea of transverse and longitudinal waves. Develop mathematical representation of waves.	Flipped Classroom	**1101.1 & 1101.2**	In Class Quiz (Not Accounted)
3	Interference of light, Young's double slit interference, coherence	Understanding of the concept of coherent waves and interference	Lecture	**1101.2**	Class Quiz – I Home Assignment - I Mid Term I End Term
4	Intensity in double slit interference using Phasor method	Derivation of the formula for intensity distribution in double slit interference	Lecture	**1101.2**	Class Quiz – I Home Assignment -I Mid Term I End Term
5	Interference in thin film, antireflection coatings	Understand the concept of thin-film interference	Lecture	**1101.2**	Class Quiz – I Home Assignment - I Mid Term I End Term
6	TUTORIAL:1		Activity (Think Pair	**1101.2**	

			Share)		
7	Interference in wedge shaped air film	Understand the concept of interference in wedge shaped films and introduction to Newton's ring	Lecture	**1101.2**	Class Quiz – 1 Home Assignment - 1 Mid Term I End Term
8	Newton's rings – theory and experiment	Describe the Newton's ring experiment and develop the theory of Newton's ring	Lecture	**1101.2**	Class Quiz – 1 Home Assignment-1 Mid Term I End Term
9	**TUTORIAL: 2**		Activity (Think Pair Share)	**1101.2**	
10-11	Michelson interferometer – construction & theory (Qualitative approach only), Applications of Michelson interferometer (determination of wavelength)	Description of Michelson interferometer and derivation of the formula for determination of wavelength using it.	Lecture	**1101.2**	Class Quiz – 1 Home Assignment -1 Mid Term I End Term
12	**TUTORIAL: 3**		Activity (Think Pair Share)	**1101.2**	
13-14	Diffraction and wave theory of light, Fraunhoffer diffraction at single slit – theory and intensity distribution	Introduction to diffraction and understand the difference between Fraunhoffer and Fresnel diffraction	Lecture, Activity	**1101.2**	Class Quiz – 2 Home Assignment- 2 Mid Term I End Term
15-16	Analysis by Phasor method, Intensity distribution curve, Diffraction at a circular aperture	Develop the theory and formula for single slit diffraction	Lecture	**1101.2**	Class Quiz – 2 Home Assignment - 2 Mid Term I End Term
17	**TUTORIAL:4**		Activity (Think Pair Share)	**1101.2**	
18	Fraunhoffer diffraction at double slit – theory (Qualitative approach only) and intensity distribution	Qualitatively develop the formula for intensity distribution in double slit diffraction	Lecture	**1101.2**	Class Quiz – 2 Home Assignment - 2 Mid Term I End Term
19	Fraunhoffer diffraction at multiple slit – theory and intensity distribution, Diffraction grating	Understand the multiple slit diffraction pattern and diffraction grating	Lecture	**1101.2**	Class Quiz – 3 Home Assignment- 2 Mid Term I End Term
20	**TUTORIAL:6**		Activity (Think Pair Share)	**1101.2**	
21	Rayleigh's criteria of resolution, Dispersion and resolving power of grating	Understand the Raleigh's criteria for resolution and derive the expression for dispersive and resolving power	Lecture	**1101.2**	Class Quiz – 3 Home Assignment-2 Mid Term I End Term
22	**TUTORIAL:7**		Activity (Think Pair Share)	**1101.2**	

23-24	Polarization of EM Waves, Polarizing sheets, Polarization by reflection, Double refraction, Malus law & Brewsters law	Understand the phenomena of polarisation and different approaches to polarise EM waves	Lecture	**1101.2**	Class Quiz – 3 Home Assignment - 3 Mid Term I End Term
25	**TUTORIALS: 8**		Activity (Think Pair Share)	**1101.2**	
26-27	Black body radiation , Wein's law, Stefan-Boltzmann law, Raleigh-Jeans Law, UV Catastrophe, Planck's hypothesis and Planck's law of black body radiation	Understand the laws of Black Body radiation and introduction to Planck's hypothesis	Flipped Class, Lecture	**1101.1 & 1101.3**	Class Quiz – 4 Home Assignment - 4 Mid Term II End Term
28-29	Photoelectric effect, Experimental observations of Photoelectric effect, Compton effect (Qualitative approach)	Describe the theory of Photoelectric effect and Compton effect	Lecture	**1101.1 & 1101.3**	Class Quiz – 4 Home Assignment - 4 Mid Term II End Term
30	**TUTORIAL:9**		Activity (Think Pair Share)	**1101.3**	
31	Photons and electromagnetic waves, de-Broglie hypothesis of matter wave, Davisson-Germer Experiment	Understand the concept of de-Broglie hypothesis and describe the Davission-Germer Experiment	Lecture	**1101.1 & 1101.3**	Class Quiz – 5 Home Assignment - 4 Mid Term II End Term
32-33	Quantum particle, Concept of wave packet. Group and phase velocity, Relation between V_g & V_p in dispersive medium, Uncertainty Principle (Statement and expression only) and its Physical significance	Understand the Group Velocity and Phase Velocity and the concept of Uncertainty Principle	Flipped Classroom, Lecture	**1101.3**	Class Quiz – 5 Home Assignment - 5 Mid Term II End Term
34	**TUTORIAL: 10**		Activity (Think Pair Share)	**1101.3**	
35	An Interpretation of Quantum mechanics, Wave function and its physical significance, SchrŐdinger wave equation	Introduction to wave function and Schrodinger wave equation	Lecture	**1101.3**	Class Quiz – 5 Home Assignment - 5 Mid Term II End Term
36	Particle in a box of infinite potential height	Derive the wave-function and energy of a particle confined in a one dimensional box	Lecture	**1101.3**	Class Quiz – 6 Home Assignment - 5 Mid Term II End Term
37	**TUTORIAL: 11**		Activity (Think Pair	**1101.3**	

			Share)		
38-39	Particle in a well of finite height (qualitative), Tunnelling through a potential barrier (qualitative) and its applications	Qualitatively describe the phenomena of particle in a finite well and the phenomena of tunnelling	Lecture	**1101.3**	Class Quiz – 6 Home Assignment -5 Mid Term II End Term
40	Quantum mechanical simple harmonic oscillator (Qualitative)	Qualitative discussion of the wave function and energy of a harmonic oscillator	Lecture	**1101.3**	Class Quiz – 6 Home Assignment - 5 Mid Term II End Term
41	**TUTORIAL: 12**		Activity (Think Pair Share)	**1101.3**	
42-43	Bohr's Theory, Atomic Spectra of gases, Continuous and characteristic X-rays, Duane – Hunt relation, Moseley's law	Recall Bohr's theory and atomic spectra. Understand the continuous and characteristic X-rays and derive the related formula.	Flipped Classroom, Lecture	**1101.1 & 1101.4**	Class Quiz (Not Accounted) Home Assignment - 6 End Term
44-45	Energy states and spectra of molecules (Rotational and Vibrational spectra)	Qualitative discussion of Rotational and Vibrational spectra and the related formulas	Lecture	**1101.4**	Class Quiz – 7 Home Assignment - 6 End Term
46	**TUTORIAL: 13**		Activity (Think Pair Share)	**1101.4**	
47	Lasers-Spontaneous and stimulated transitions, Population inversion and metastable state,	Understand the lasers and the related optical phenomena.	Lecture	**1101.4**	Class Quiz – 7 End Term
48-49	Construction and working of Ruby laser , Construction and working of He-Ne laser, Energy level diagram of He-Ne laser, Application of Laser	Description of Ruby laser and He-Ne laser and understand their working	Flipped Classroom, Lecture	**1101.4**	Class Quiz – 7 End Term
50	**TUTORIAL: 14**		Activity (Think Pair Share)	**1101.4**	
51	Band Theory of solids, Electrical conduction in Metals, Insulators, and Semiconductors	Understand qualitatively the band theory of solids	Lecture	**1101.4**	Class Quiz – 8 End Term
52-53	Superconductivity: Type-I and Type- II Superconductivity, Meisner effect	Introduction to super conductivity and superconductors and the related phenomena	Lecture	**1101.4**	Class Quiz – 8 End Term
54	**TUTORIAL: 15**		Activity (Think Pair Share)	**1101.4**	
55	BCS Theory (Introductory) and	Qualitatively understand the BCS theory and their applications	Lecture	**1101.4**	Class Quiz – 8 End Term

	Applications of superconductivity				
56	**TUTORIAL: 16**		Activity (Think Pair Share)	**1101.4**	
LAB SESSIONS	Lab sessions based on different aspects of physics	Experiment and test different aspects of physics related to the theory taught in the class	Lab Sessions	**1101.5 & 1101.6**	Experimental results and viva-voce of 14 lab sessions Laboratory End Term Exam

I. Course Articulation Matrix: (Mapping of COs with POs and PSOs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
PY 1101.1	understand the wide range of diversity in science and technology with the help of knowledge of basic Physics along with practical approach of Engineering Physics	2			2			3				3					
PY 1101.2	explain various processes involved in understanding the nature of light																
PY 1101.3	identify the problems and applications of Quantum mechanics		2		3							2					
PY 1101.4	impart the knowledge of empirical laws based on Solid state Physics and Atomic and Molecular Physics		2			2					3						
PY 1101.5	achieve perfectness in experimental skills and the study of practical applications in Physics		2				2			3							
PY 1101.6	develop skills to impart practical knowledge in real time solution				2						3	3					

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Automobile Mechanical and Mechatronics Engineering

Department of Mechanical Engineering
Course Hand-out

Engineering Thermodynamics| ES 1103 | 3 Credits | 3 0 0 3

Session: Jan 19 – May 19 | Faculty | Class: Ist Year

A. Introduction: Thermodynamics is a basic science that deals with equilibrium, energy and its transformation, and the laws governing such transformation. These laws are of wide applicability and are used in several branches of engineering and science. Principles and concepts of thermodynamics are important and indispensable tools in the innovation, design, development and improvement of engineering process, equipment and devices which deal with effective utilization of energy. Notable applications of engineering thermodynamics in the field of energy technology are:

power producing devices, e.g., internal combustion engines and gas turbines, steam and nuclear power plant, power consuming devices, e.g., fans, blowers and compressors, refrigeration and air conditioning plants, chemical process plant and direct energy conversion devices. It is essential that every engineer should have a thorough knowledge of thermodynamics and hence thermodynamics has been an essential part of engineering curricula all over the world.

B. Course Outcomes: At the end of the course, students will be able to

[ES1103.1] Understand the fundamental concepts of thermodynamics such as temperature, pressure, system, properties, process, state, cycles and equilibrium in the context of engineering applications.

[ES1103.2] Apply first law of thermodynamics on flow and non-flow processes.

[ES1103.3] Design and analyse the concept of components (compressor, turbine, pump, etc.) with the use of thermodynamic law to enhance the **skills** for industrial application.

[ES1103.4] Analyse the concept of second law and entropy in the context of thermal applications.

[ES1103.5] Apply the concept of first & second law of thermodynamics to design/utilize the power generating and power consuming devices.

C. Program Outcomes and Program Specific Outcomes

[PO.1]. **Engineering Knowledge:** Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

[PO.2]. **Problem Analysis:** Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences**.**

[PO.3]. **Design/ Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.

[PO.4]. **Conduct investigations** of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions**.**

[PO.5]. **Modern Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modelling to complex engineering activities with an under- standing of the limitations.

[PO.6]. **The Engineer and Society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.

[PO.7]. **Environment and Sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

[PO.8]. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice**.**

[PO.9]. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.

[PO.10]. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.

[PO.11]. **Project Management and Finance:** Demonstrate knowledge and understanding of engineering and management principles and apply these to owners own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

[PO.12]. **Life-long Learning:** Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

[PSO.1]. Model and analyse mechanical engineering components using advanced software.

[PSO.2]. Analyse performance of I. C. engines attributed to alternate fuels.

[PSO.3]. Synthesize advance materials for mechanical engineering applications.

D. Assessment Rubrics:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	15
	Sessional Exam II (Open Book)	15
	Quizzes (Open Book/Close Book) and Assignments	30
End Term Exam (Summative)	End Term Exam (Open Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Homework/ Home Assignment/ (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. A student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. Syllabus

Definitions & Concepts: SI Units; System, Thermodynamic Properties of Fluids: Mathematical, Tabular and Graphical representation of data; Ideal gas Van der Waals Equation of state; Compressibility chart; Thermodynamic Diagrams including Mollier diagram; Steam Tables. Zeroth Law of thermodynamics: temperature scale. First Law of Thermodynamics: Applications to Non flow processes, Applications of First Law of Thermodynamics of Flow Processes – Steady State / Transient; Applications of First Law of Thermodynamics to Chemically Reacting Systems. Second Law of Thermodynamics: Applications. Thermodynamic Relations: Thermodynamic Potentials, Maxwell's Relations; Availability. Power Cycles and Refrigeration Cycles, Gas-Vapor Mixtures and Psychrometry.

F. Text Book:

T1. An Introduction to Thermodynamics, YVC Rao, Universities Press (India) Private Limited, Revised Edition, 2004.

G. Reference Book:

R1. Thermodynamics: An Engineering Approach, Y.A. Cengel and M.A. Boles, McGraw Hill (Fifth Edition), 2006.

H. Lecture Plan:

Lec No	**Topics**	**Session Objective**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing the Outcome**
1	Introduction to Thermodynamics	Know the basics of the course and understand its applications	Lecture	ES1103.1	Home Assignment and Class Quiz Mid-Term I End-Term
2	Concepts and Definitions- System, Surroundings, Intensive and Extensive Properties, Energy, Equilibrium	Discuss the terms system and surroundings, thermodynamic properties and describe their use	Lecture	ES1103.1	
3	Equilibrium, Stability, Process, Work	Understand the criteria of thermal equilibrium, mechanical equilibrium and chemical equilibrium	Lecture	ES1103.1	
4	Work, Definition of Thermodynamics, Modes of work, Heat	Brief about the thermodynamics definition of work, distinguish between heat and work and identify their effects	Lecture	ES1103.1	Home Assignment and Class Quiz Mid-Term I End-Term
5	Thermodynamic Properties of Fluids- Concepts of phases, Equations of state	Understand a pure substance and a phase and phase transformation	Lecture	ES1103.1	
6	Ideal gas, van der Waals equation, Critical constants	Understand the concept of ideal gas and van der Walls equation of state	Lecture	ES1103.1	
7	Other equations of state, Compressibility chart, Reduced equation of state, Generalized compressibility chart	Use of compressibility chart and generalized compressibility chart and its applications	Lecture	ES1103.1	Home Assignment and Class Quiz Mid-Term I End-Term
8	Graphical representation of data – T-V diagram, P-V diagram, P-T diagram, Mollier diagram	Understand various thermodynamic diagrams like T-v, P-v, P-T, and Mollier diagram	Lecture/Activity	ES1103.1	
9	Tabular representation of data, Steam table	Estimating the properties of steam using steam tables.	Lecture/Activity	ES1103.1	
10	Zeroth law of thermodynamics, First law of thermodynamics-History	Understand the Zeroth law of thermodynamics	Lecture	ES1103.1 ES1103.2	Home Assignment and Class Quiz Mid-Term I End-Term
11	First law of thermodynamics, Consequences, Analysis of elementary processes	Know the genesis of the first law of thermodynamics	Lecture	ES1103.2	
12	Analysis of elementary	Apply the first law of	Lecture	ES1103.1	

	processes, Isothermal processes, Adiabatic processes, Polytropic processes	thermodynamics to analyse different thermodynamics process		ES1103.2	
13	Constant internal energy processes	Apply the first law of thermodynamics to analyse constant internal energy process	Lecture	ES1103.1 ES1103.2	Home Assignment and Class Quiz Mid-Term I End-Term
14	First law analysis of processes – Control mass analysis, Control volume analysis	Explain the control mass and control volume analysis	Lecture	ES1103.2 ES1103.3	
15	Applications of steady state flow processes, Throttling process, Applications of throttling	Analyse the steady flow processes and its applications	Lecture	ES1103.2 ES1103.3	
16	Transient flow processes, Case of an ideal gas	Analyse the transient flow processes.	Lecture	ES1103.1 ES1103.2 ES1103.3	Home Assignment and Class Quiz Mid-Term II End-Term
17 & 18	Second law of thermodynamics- Heat engine, Heat pump or refrigerator, Second law of thermodynamics	Understand the concept of second law and its requirement	Lecture/Lab Visit	ES1103.4	
19	Kelvin, Plank, and Clausius statement, Reversible and Irreversible reactions, Criteria for irreversible processes	Understand the statements of second law of thermodynamics and also discuss the criteria for irreversible process	Lecture	ES1103.4	
20	Carnot cycle, Carnot theorem, Thermodynamic temperature scale	Understand the Carnot cycle and its use in thermodynamics	Lecture	ES1103.4	Home Assignment and Class Quiz Mid-Term II End-Term
21	Clausius inequality, Entropy, Calculation of entropy change	State the Clausius inequality and calculate the entropy change of the system	Lecture	ES1103.4	
22	Principles of entropy increase, Temperature-entropy diagram	Understand the principles of entropy increase and its reason	Lecture	ES1103.4	
23	Available energy, Loss in available energy,	Define the available and unavailable energy through the concept of second law	Lecture	ES1103.4	Home Assignment and Class Quiz Mid-Term II End-Term
24	Availability and Irreversibility	Estimate the loss in available energy in a given process	Lecture	ES1103.4	
25	Thermodynamic relations- Maxwell's relations, Mnemonic diagram, Thermodynamic potentials	Understand the importance the Maxwell's relations	Lecture	ES1103.3 ES1103.4	

26	Thermodynamic potentials, Mathematical preliminaries, Entropy relations	Know the thermodynamic potentials	Self-Study	ES1103.3 ES1103.4	Home Assignment and Class Quiz Mid-Term II End-Term
27	Joule-Thompson coefficient, Clapyeron equation, Gibb's phase rule	Understand the Joule-Thompson coefficient, Clapyeron equation, Gibb's phase rule	Lecture	ES1103.3 ES1103.4	
28	Power and Refrigeration cycles-Classification, Vapor power cycles, Carnot vapor power cycle,	Classify the power cycles into vapour cycles and gas power cycles	Lecture	ES1103.1 ES1103.3 ES1103.5	Home Assignment and Class Quiz End-Term
29	Ideal Rankine cycle and practical Rankine cycle	Explain the basics of Rankine cycle and estimate the thermal efficiency of an Ideal and actual Rankine cycle	Lecture	ES1103.1 ES1103.3 ES1103.5	
30 & 31	Gas power cycles, Otto cycle, Diesel cycle	Analyse the Otto and diesel cycle	Lecture/Lab Visit	ES1103.1 ES1103.3 ES1103.5	
32	Comparison of Otto and Diesel cycle, Air standard dual cycle	Analyse the differences in Otto, Diesel and dual cycle	Lecture	ES1103.1 ES1103.3 ES1103.5	Home Assignment and Class Quiz End-Term
33	Ideal and Actual Brayton cycle	Analyse air standard Brayton cycle	Lecture	ES1103.1 ES1103.3 ES1103.5	
34 & 35	Refrigeration cycle, Vapor compression refrigeration cycle	Understand the practical refrigeration cycle and its components	Lecture/Lab Visit	ES1103.1 ES1103.3 ES1103.5	
36	Refrigerants, Gas refrigeration cycle	Know the criteria in selection of refrigerants and their use	Self-study	ES1103.1 ES1103.3 ES1103.5	Home Assignment and Class Quiz End-Term
37	Gas vapor mixtures and Psychrometry, ideal gas mixtures	Predict the properties of an ideal gas mixture from knowledge of the properties of the constituent species	Lecture	ES1103.1 ES1103.2 ES1103.5	
38	Psychrometer, Psychrometric chart	Use the psychrometric charts in the analysis of process of dealing with air-water vapour mixtures	Activity	ES1103.1 ES1103.5	

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ES1103.1	Understand the fundamental concepts of thermodynamics such as temperature, pressure, system, properties, process, state, cycles and equilibrium in the context of engineering applications.	3													1	
ES1103.2	Apply first law of thermodynamics on flow and non-flow processes.	3	2													
ES1103.3	Design and analyse the concept of components (compressor, turbine, pump, etc.) with the use of thermodynamic law.	3		3	2										1	
ES1103.4	Analyse the concept of second law and entropy in the context of thermal applications	3	2	3	2		2	2							1	
ES1103.5	Apply the concept of first & second law of thermodynamics to design/utilize the power generating and power consuming devices.	3	3	3			2	2							1	

MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering
Course Hand-out

Environmental Studies | ES 1101 | 3 Credits | 3 0 0 3

Session: January – May 2019 | Faculty: Dr. M. Prabhu Inbaraj | Class: B. Tech Semester II

Introduction: This course is offered to B. Tech. first year students to make them aware of the importance of our natural environment. The course offers insights into the basics of environment, its components, functions; impacts of natural and anthropogenic activities on environment; methods to tackle such environmental issues. Further, this course emphasises on the significance of life on earth and thus, the need for its protection. Overall, this course is aimed to sensitise students to realise links between the natural and man-made environment.

A. Course Outcomes: At the end of the course, students will be able to;

[1101.1]. Apply the fundamental knowledge of environment, ecology and ecosystem to save the environment for sustainable development.

[1101.2]. Apprehend environmental problems and its linkage to the health and safety of society; think and act with a sense of responsibility, committing to the professional ethics.

[1101.3]. Develop the skill of the technique / procedures to predict / qualitatively assess the reduction in the environmental impact for sustainable development.

[1101.4]. Realise the active involvement of oneself and society in designing the activities / processes with which the environment and ecosystem would be preserved, considering public health and safety.

[1101.5]. Explore the impacts of various man-made activities from an environmental context. Students can demonstrate the knowledge by participating in class debates and presentations on various topics of environmental concern with effective communication.

B. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

[PSO.1]. Design economic, environment friendly, sustainable civil engineering structures keeping in view national and social requirements.

[PSO.2]. Conduct investigation, analysis and interpretation of the results using modern scientific tools and technical skills for solving complex civil engineering problem.

[PSO.3]. Manage/ execute civil engineering projects effectively and ethically as a member or/and leader in diverse teams.

[PSO.4]. Communicate effectively with multidisciplinary members and engage in independent and lifelong learning for global betterment.

[PSO.5]. Discharge social responsibility as a civil engineer by innovative approaches.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	15
	Sessional Exam II (Open Book)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Open Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the	

	entire semester.
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.

D. SYLLABUS

Introduction to Environmental Studies; Multidisciplinary Nature of Environmental Studies, Scope and importance, concept of sustainability and sustainable development; spheres of the earth; structure of atmosphere.

Ecosystems; concept, structure and function, energy flow in an ecosystem, food chain, food webs and ecological succession, Forest, Grassland, Desert and Aquatic (Ponds, Streams, Lakes, River, Oceans, Estuaries) ecosystem.

Natural Resources (Renewable & Non Renewable Resources); Land Resources and land use change, Land degradation, soil erosion and desertification; Deforestation; Causes and impacts. Water; Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state). Energy resources; Renewable and non- renewable energy sources, use of alternate energy sources, growing energy needs.

Biodiversity and Conservation; Genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots, threats to biodiversity; Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity; *In-situ* and *ex-situ* conservation of biodiversity. Ecosystem and biodiversity services; Ecological, economic, social, ethical, aesthetic and Informational value.

Environmental Pollution; Environmental Pollution; type, causes, effects, and controls; Air, Water, Soil and Noise pollution, Nuclear hazards and human health risks, ill effects of fireworks, Solid waste management; control measures of urban and industrial waste, pollution case studies.

Environmental Policies and Practices; Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture, Environment laws; Environmental Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act; International agreements; Montreal and Kyoto protocols and Convention on Biological Diversity (CBD). Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

Human Communities and the Environment; Human population growth; impact on environment, human health and welfare, Resettlement and rehabilitation of project affected persons; case studies, Disaster management; flood, earthquake, cyclone and landslides. Environmental movements; Chipko, Silent valley, Bishnois of Rajasthan, Environmental ethics; Role of Indian and other religions and cultures in environmental conservation, Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi), Environmental Impact Assessment (EIA).

Field Work and field visits.

E. TEXT BOOKS (number as T1, T2 etc)

1. Bharucha, E. (2013). Text book of Environmental Studies for undergraduate courses, Universities Press, Hyderabad, 2nd Edition
2. Carson, R. (2002). Silent Spring. Houghton Mifflin Harcourt.
3. De, A. K. and De, A. K. (2007). Environmental Studies, New Age International Publishers, New Delhi.
4. Gadgil, M. and Guha, R. (1993). This Fissured Land; An Ecological History of India. University of California, Press.
5. Groom, Martha J., Gary, K. Meffe and Carl Ronald Carroll (2006). Principles of Conservation Biology. Sunderland; Sinauer Associates.
6. Grumbine, R. Edward and Pandit, M. K. (2013).Threats from India's Himalaya dams. Science, 339; 36-37.
7. Rajagopalan, R. (2016). Environmental Studies; From Crisis to Cure, Oxford University Press.
8. Singh, J. S., Singh, S. P. and Gupta, S. R. (2014). Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.

F. REFERENCE BOOKS (number as R1, R2 etc)

1. Molles, M. C. (2015). Ecology: Concepts and Applications. McGraw Hill Higher Education, 7th Edition, 592 P.
2. Chiras, D. D. (2014). Natural Resource Conservation: Management for a Sustainable Future. Pearson India.

Lecture Plan:

LEC NO	TOPICS
1	**Multidisciplinary Nature of Environmental Studies:** Scope of environmental studies, a multidisciplinary view, Importance of environmental studies
2	**Ecosystems and Environment:** Spheres of the earth: atmosphere, lithosphere, hydrosphere, biosphere
3	**Structure of the atmosphere:** troposphere, stratosphere, mesosphere, thermosphere, exosphere
4	**Ecology**: structure and function of the ecosystem
5	**Bio-geochemical cycles:** Nitrogen, Carbon
6	**Bio-geochemical cycles:** Sulphur, Phosphorous
7	**Ecological succession**
8	**Natural resources (Renewable & Non Renewable Resources):** Water Resources
9	**Energy Resources**: Conventional and non-conventional
10	**Energy Resources:** Conservation and Management
11	Forest Resources
12	Land Resources
13	**Biodiversity and its Conservation:** Biodiversity: Importance of biodiversity
14	Threats to biodiversity
15	Factors affecting biodiversity
16	Conservation of biodiversity
17	**Environmental pollution and control** : **Air pollution**: sources of air pollution and classification of air pollutants
18	Primary and secondary air pollutants
19	**Fireworks:** Chemical used, toxic fall out and their persistent in soil and water, Its ill effects on air quality pertaining to gaseous and particulate matter, Health hazards prevention and Control
20	**Water pollution:** Sources of water pollution, water quality standards (physical, chemical and biological characteristics of water quality parameters)
21	Effects of water pollution and Water Borne Diseases and its control
22	Basic water treatment process (filtration, sedimentation and overview of treatment plant)
23	**Soil pollution:** sources, effects and control of soil pollution
24	**Noise pollution:** sources, effects and control of noise pollution
25	**Solid waste management:** sources, characteristics
26	**Solid waste management:** control measures of urban and industrial wastes
27	Hazardous Waste – Environmental problems and health risks
28	**Environmental impact assessment(EIA):** Methodology and importance
29	**Social Issues and Environment:** Environmental concerns: urbanization, industrialization, agricultural revolution and their impact on environment
30	**Global warming** and greenhouse effect.
31	**Acid rain:** Causes and effects
32	**Ozone depletion** & depletion of ozone hole over Antarctica.
33	Urban problems related to energy
34	Water conservation, rain water harvesting, watershed management
35	Resettlement and rehabilitation of people; its problems and concerns. Case Studies
36	Wasteland reclamation
37	Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act.
38	**Human Population and the Environment:** Population growth, variation among nations, Population explosion – Family Welfare Programme.
39	Environment and human health, Women and Child Welfare, Role of Information Technology in Environment.
40	Concept of sustainability and sustainable development.
41	**Field Work:** Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc. Study of common plants, insects, birds and basic principles.
42	Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
43	Study of simple ecosystems-pond, river, Delhi Ridge, etc.

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES				
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
[1101.1].	Apply the fundamental knowledge of environment, ecology and ecosystem to save the environment for sustainable development.	3		1			1	2					3	3				3
[1101.2].	Apprehend environmental problems and its linkage to the health and safety of society; think and act with a sense of responsibility, committing to the professional ethics.		3				3		3	2				3		3		3
[1101.3].	Develop the skill of the technique / procedures to predict / qualitatively assess the reduction in the environmental impact for sustainable development.	3	1			3	2	3		1			3	2		2		
[1101.4].	Realise the active involvement of oneself and society in designing the activities / processes with which the environment and ecosystem would be preserved, considering public health and safety.			1	1					3				3		2		3
[1101.5].	Explore the impacts of various man-made activities from an environmental context. Students can demonstrate the knowledge by participating in class debates and presentations on various topics of environmental concern with effective communication.	2			2		3					1	3	2	1	3	3	2

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

B.Tech 1st Year

Course Hand-out

History of Indian Science & Technology | HS1102| 2 Credits | 2 0 0 2

Session: JULY-DEC. 2018 | Faculty Coordinator- Dr Arun Kumar Poonia| Class: B.Tech 1st Year

Introduction: The course is designed to enable students to know and to develop an understanding about the history of Indian science & technology and the contribution of India in the field of science & technology.

A. Course Objectives: At the end of the course, students will be able to

HS1102.1 Identify the contribution of India in the field of science and technology.

HS1102.2 Understand the contribution of ancient Indians in the field of science and technology for answering general knowledge questions during interviews for future employment

HS1102.3 Analyse ancient Indian education system and reasons for its going into oblivion.

HS1102.4 Examine the growth of Indian science and technology in the 20th century A.D.

B. Program Outcomes

[PO.1]. **Engineering knowledge**: Demonstrate and apply knowledge of Mathematics, Science, and Engineering to classical and recent problems of electronic design & communication system.

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

[PO.3]. **Design/development of solutions**: Design a component, system, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

D. Assessment Rubrics:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I	15
	Sessional Exam II	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. Syllabus

An introduction and need to learn History of Indian science and technology; Early civilizations and their impact on development of science and technology; Contribution of Indian science and technology in the fields of mathematics, astronomy, medical science, architecture, metallurgy, agriculture, yoga; Discoveries and inventions; Indian education system; Possible reasons of oblivion; Effect of historical developments (pre and post-independence era), Policy measures; Case studies.

F. TEXT BOOKS

1. Lecture notes

G. REFERENCE BOOKS

1. Indian Science and Technology in Eighteenth century, Dharampal, reprint of first edition (1983), Academy of Gandhian Studies, Hyderabad.

2. The Beautiful Tree: Indigenous Indian Education in the Eighteenth century, Dharampal, second edition (1995) Keerthi Publishing house, Coimbatore

3. India's Glorious Scientific Tradition, Suresh Soni, first edition (2008) Prabhat Prakashan

H. Lecture Plan:

Lecture No	**Topics**	**Session Objective**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing the Outcome**
1	Introduction to the subject	To acquaint and clear teacher's expectations and understand students' expectations.	Lecture, Discussion	1102.1	Quizzes, 1st Sessional, End Term Examination
2	Why History to Engineers?	To ascertain the interest and the understanding of the students with focus on the need of this subject for them and its connection with the existing knowledge.	Lecture, Discussion	1102.1	Quizzes, 1st Sessional, End Term Examination
3	A Brief overview of India's contribution in Various Fields of Studies- I	To know about the scientific developments of the period. To know about the concepts of science, maths, technology, etc. used in the ancient times. To know about the major works of ancient Indians in the field of Science and Maths.	Discussion, Video	1102.1	Quizzes, 1st Sessional, End Term Examination
4	A Brief overview of India's contribution in Various Fields of Studies – II	To know about the scientific developments of the period. To know about the concepts of science, maths, technology, medicine, surgery, language, etc. in the ancient times. To know about the major works of ancient Indians in various fields of studies.	Lecture, PPT, Discussion	1102.1	Quizzes, 1st Sessional, End Term Examination
5	Ancient Civilizations and Science & Technology- With focus on Indus Valley Civilization	To know about the development and extent of Indus Valley Civilization. To know about the use of concepts of science & technology in Indus Valley Civilization.	PPT, Videos	1102.1	Quizzes, 1st Sessional, End Term Examination
6	Detailed Study about some aspects of Indus Valley Civilization	To know about the town planning/buildings/structures of Indus	Lecture, PPT, Discussion	1102.2	Quizzes, 1st Sessional, End

		Valley Civilization. To know and study in detail about the city of Lothal and Harappa.			Term Examination
7	Ancient Indian Education System-1	To know about the educational system of ancient India. To know about the major fields of studies.	Lecture, PPT	1102.3	Quizzes, 1st Sessional, End Term Examination
8	Ancient Indian Education System-2	To know more about the educational system of ancient India. To know about the major fields of studies.	Discussion	1102.3	Quizzes, 1st Sessional, End Term Examination
9	Our ancient Universities- Nalanda and Takshila	To know about the educational system followed at these Universities and the scholars of those times. To know about the major fields of studies offered in these Universities.	PPT, Video	1102.3	Quizzes, 1st Sessional, End Term Examination
10	Probable Reasons for oblivion	To know about the probable reasons that led to the decline/fall of Indian education system.	Discussion	1102.3	Quizzes, 1st Sessional, End Term Examination
11	Contribution of India in the field of mathematics- 1	Significant contributions and achievements of ancient Indian mathematicians in comparison to the rest of the world.	Videos, PPTs	1102.2	Quizzes, 2 Sessional, End Term Examination
12	Contribution of India in the field of mathematics- 2	Significant contributions and achievements of ancient Indian mathematicians in comparison to the rest of the world.	Discussion	1102.2	Quizzes, 2 Sessional, End Term Examination
13	Contribution of India in the field of Astronomy- 1	Significant contributions and achievements of ancient Indian in the field of astronomy.	Videos, PPTs	1102.1	Quizzes, 2 Sessional, End Term Examination
14	Contribution of India in the field of Astronomy- 2	Significant contributions and achievements of ancient Indian in the field of astronomy.	Discussion	1102.1	Quizzes, 2 Sessional, End Term Examination
15	Contribution of India in the field of Architecture- 1	To look into the architectural heritage of India.	Videos and PPTs	1102.2	Quizzes, 2 Sessional, End Term

					Examination
16	Contribution of India in the field of Architecture- 2	To look into the architectural heritage of India.	Discussion	1102.2	Quizzes, 2 Sessional, End Term Examination
17	Contribution of India in the field of Metallurgy- 1	Significant contributions and achievements of ancient Indian metallurgists in comparison to the rest of the world.	Lecture	1102.1	Quizzes, 2 Sessional, End Term Examination
18	Contribution of India in the field of Metallurgy- 2, with special reference about Wootz steel.	A discussion on pioneering steel alloy matrix developed in India called Wootz steel and achievements of India in Zinc smelting by distillation process, first in the world	Lecture	1102.1	Quizzes, 2 Sessional, End Term Examination
19	Contribution of India in the field of Yoga and medicine- 1	Contribution of Indian scientists in plastic surgery and cataract surgery with reference to Sushruta Samhita, Jabamukhi Salaka etc.,	Lecture	1102.2	Quizzes, End Term Examination
20	Contribution of India in the field of Yoga and medicine- 2	Discussion on father of Indian medicine, Charkha and his contributions to ancient science of Ayurveda (Charakhasamhita)	Lecture	1102.2	Quizzes, End Term Examination
21	Indian Science & Technology in 20th Century- Major achievements	Major developments and achievements by indian scientists and researchers.	Lecture	1102.1, 1102.4	Quizzes, End Term Examination
22	Indian Science & Technology in 20th Century- Institutionalization of science	To understand the establishment of the scientific and technological institutes and the gradual proliferation of the scientific bodies and societies.	Lecture	1102.4	Quizzes, End Term Examination
23	Indian Science & Technology after Independence- Scientific internationalism and the Institute that Bhabha built	Understand the robust internationalism and mapping out colonial structures and institutional history of the Tata Institute of Fundamental Research.	Lecture	1102.4	Quizzes, End Term Examination
24	Indian Science & Technology after Independence- Biotechnology in India	Realising the adoption of modern biology and biotechnology including early phase of Department of Biotechnology (DBT), established in 1986.	Lecture	1102.4	Quizzes, End Term Examination
25	Case Study- Jantar-Mantar (Jaipur)			1102.2	End Term Examination

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I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	Correlation with Program Outcomes (POs)											
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
HS1102.1	Identify the contribution of India in the field of science and technology.	1					1	1					1
HS1102.2	Understand the contribution of ancient Indians in the field of science and technology.	1					1	1					
HS1102.3	Analyse ancient Indian education system and reasons for its going into oblivion.	0					1		1				
HS1102.4	Examine the growth of Indian science and technology in the 20th century A.D.	1					1						1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

J. Course Outcome Attainment Level Matrix:

CO	STATEMENT	ATTAINMENT OF PROGRAM OUTCOMES **THRESHOLD VALUE: 35%**												ATTAINMENT OF PROGRAM SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
HS1102.1	Identify the contribution of India in the field of science and technology.															
HS1102.2	Understand the contribution of ancient Indians in the field of science and technology.															
HS1102.3	Analyse ancient Indian education system and reasons for its going into oblivion.															
HS1102.4	Examine the growth of Indian science and technology in the 20th century A.D.															

0-No Attainment; 1- Low Attainment; 2- Moderate Attainment; 3- Substantial Attainment

MANIPAL UNIVERSITY JAIPUR

School of Civil and Chemical Engineering

Department of Civil Engineering
Course Hand-Out

Mechanics of Solids | ES1102|4 Credits |4 0 0 4

Session: January 05–April 26,2019 | Faculty: Prof K. J. Sharma | Class: Core Subject

A. Introduction: This course is offered by Dept. of Civil Engineering as a Core Course for first year students. Mechanics of solids includes important topics from Engineering Mechanics and Strength of Materials. The subject offers a basic understanding of different types of forces acting on rigid bodies at rest and in stage of motion. Most of the fundamentals needed to learn the basics of Engineering Mechanics and strength of materials are discussed in this subject. Strength of materials is a basic course essential for students of all branches of engineering. Modern research and advancement in field of stability, strength and design of structure and machines, dynamic effects. robotics, missiles. Aeroplane and aircraft design, automobiles and automatic control. fluid flow, engine performance, electrical machines, transmission tower, superstructure, heavy earthmoving machines, locomotives, metro railway, supersonic aircrafts, atomic and subatomic behaviour etc are highly dependent on basic principle of Mechanics of Solids In this coursework, students will be trained about methods of analysing forces, determination of centroid and moment of inertia of geometrical figures, determination of various stresses and strains, longitudinal and circumferential stresses and strains due to direct forces , thermal stresses; strains in metallic materials and stresses due to fluid pressures.. Also they will develop skill for testing various building and machinery materials such as- mild steel, cast iron etc. as per Indian standards guidelines. The course will include activities such as- assignments, quizzes, class tests, site visits, projects, focusing on the knowledge of students for lifelong learning and making them employable.

B. Course Outcomes: At the end of the course, students will be able to:

[ES1102.1] Develop the skill to evaluate forces in various engineering elements

[ES1102.2] To locate the centroid and determine the Moment of inertia of various bodies

[ES1102.3] Analysis of dynamics forces to be used in machinery and building component

[ES1102.4] To assess the engineering properties of material subjected to normal, shear and temperature stresses

[ES1102.5] To examine the stress and strain in thin cylinders and pipes along the longitudinal and circumferential direction

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

[PSO.1]. Design economic, environment friendly, sustainable civil engineering structures keeping in view national and social requirements.

[PSO.2]. Conduct investigation, analysis and interpretation of the results using modern scientific tools and technical skills for solving complex civil engineering problem.

[PSO.3]. Manage/ execute civil engineering projects effectively and ethically as a member or/and leader in diverse teams.

[PSO.4]. Communicate effectively with multidisciplinary members with discharge of social responsibilities as a civil engineer and engage in independent and lifelong learning for global betterment

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	15
	Sessional Exam II (Close Book)	15
	In class Quizzes, Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Close Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. SYLLABUS

Mechanics of Rigid Bodies: Introduction, basic principles and concepts, Force systems, resultant of concurrent and non- concurrent coplanar force systems; Equilibrium of concurrent and non-concurrent coplanar force systems. Centroid and Moment of Inertia of simple and composite areas, **Kinetics**:- Applications of D'Alembert's principle, work-energy and Impulse-Momentum principles. **Mechanics of Deformable Bodies**:- Mechanical properties of materials, normal stress and strain, Hooke's law, modulus of elasticity, tension test on ductile and brittle materials, factor of safety, allowable stress, Poisson's ratio, shear stress and shear strain, modulus of rigidity, relation between modulus of elasticity, modulus of rigidity and bulk modulus. Stresses and deformations in tapering bars, stepped bars, thermal stresses, statically indeterminate problems, Stresses on inclined planes, stresses in thin cylindrical pressure-vesse

F. TEXT BOOKS

1. *S.S.Bhavikatti, Engineering Mechanics 6th Edition2018,New Age International Publishers.*
2. *S.S. Bhavikatti, 3rd edition2010, Vikash Publishing HouseEngineering Mechanics*

G. REFERENCE BOOKS

3. *Beer and Johnson; Engineering Mechanics*
4. *R.K.Bansal; Engineering Mechanics, 3rd edition 2013., Laxmi Publication*
5. *Timoshenko; Strength of Materials*
6. *R.K.Rajput; Strength of Materials , 6th edition2o15 , S. Chand Publishing*

H. Lecture Plan:

Lecture No.	Topics to be covered
	PART-I MECHANICS OF RIGID BODIES
1	**Resultant of concurrent and non-concurrent forces:-** Definition of mechanics, force, principle of transmissibility
2	Classification of force system, resultant of concurrent coplanar forced, parallelogram and triangle law of forces, component of a force, resolution of a force, rectangular component of force and oblique components of a force
3	Illustrative Problems
4	Illustrative Problems
5	Illustrative Problems
6	Resultant of coplanar non –concurrent force system, moment of a force, couple, force and couple system, Varignon's theorem, types of loads on beams
7	Illustrative Problems
8	Illustrative Problems
9	**Equilibrium of concurrent and non con-current coplanar force system:** Definition, condition of equilibrium, Lami's theorem , space diagram and Free Body Diagram, types of supports, types of beams and types of loading
10	Problems on equilibrium of coplanar concurrent force system
11	Problems on equilibrium of coplanar concurrent force system
12	Problems on equilibrium of coplanar concurrent force system
13	Problems on resultant of coplanar non-concurrent force system
14	Problems on resultant of coplanar non-concurrent force system
15	Problems on resultant of coplanar non-concurrent force system
16	Tutorials based on L1-L15
17	**Centroid of plane area :-** Definition, derivation of Centroid of rectangle, circle,

18	Semi-circle, quarter circle, triangle, determination of centroid of composite area
19	Problems on determination of centroid of composite area
20	Problems on determination of centroid of composite area
21	Problems on determination of centroid of composite area
22	**Moment of Inertia:-- Definition,** Theorem of parallel and perpendicular axes, Radius of gyration, M. I. of standard plane lamina like rectangle, triangle and quarter circle
23-24	Problems on determination of M.I. for composite areas
25	**Kinetics of rectilinear motion:-** Newton's second law of motion, work energy principle and impulse momentum principle, D' Alembert's principle
26	Problems on kinetics using above methods
27	Problems on kinetics using above methods
	Part –II MECHANICS OF DEFORMABLE BODIES
28	**Simple Stresses and Strains:-** Introduction to mechanics of deformable, normal stress and strains, Hooke's law, modulus of elasticity
29	Tension test on ductile and brittle materials, factor of safety, allowable stress Tapering Problem:------Illustrative problems
30	Tapering bars, Illustrative problems
31	Stepped bars Illustrative problems
32	Shear stress, shear strain single and double shear, modulus of rigidity
33	Poisson's ratio, bulk modulus, relationship between volumetric strain and linear strain
34	Relationship between modulus of elasticity, modulus of rigidity and bulk modulus
35	Illustrative Problems
36	**Statically indeterminate members and thermal stresses:-** Compound bars subjected to external loads
37	Illustrative problems
38	Illustrative problems
39	Illustrative problems
40	Temperature stresses, compound bar subjected to temperature stresses, illustrative problems
41	Illustrative Problems
42	Illustrative Problems
43	**Stresses on inclined plane:-** equation of stresses on inclined planes, condition for maximum and normal stresses on a plane, concept of principal plane and principal stresses, condition for maximum shear stress on plane and plane of maximum shear stress, resultant stress on a plane
44	Illustrative examples
45	Illustrative problems
46	**Stresses in thin cylinder** due to fluid pressure :-Analysis of thin cylinders subjected to fluid pressure- hoop stress, longitudinal stress and strain, joint efficiencies
47	Illustrative problems
48	Illustrative problems and doubt clarification.

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES				
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4	
[ES1102.1]	Develop the skill to evaluate forces in various engineering elements	3	2	2	1	1	1	2	1			1	1	2	2	2		
[ES1102.2]	To locate the centroid and determine the Moment of inertia of various bodies	3	3	2	3	3	2	1	1			1	1	2	2	2		
[ES1102.3]	Analysis of dynamics forces to be used in machinery and building component	3	2	3	3	3	1		1	2	3	1	1	2		1	3	
[ES1102.4]	To assess the engineering properties of material subjected to normal, shear and temperature stresses	3	2	2	2	2	2			2	2		1		1	1	2	
[ES1102.5]	To examine the stress and strain in thin cylinders and pipes along the longitudinal and circumferential direction.	3	2	2	2	2	2		1	2	2	1	1		1	1	1	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

First Year B. Tech.

Programming in C | CS 1101 | 4 Credits | 2 1 2 4

Session: January 2019 – May 2019 | Faculty: Dr. Manoj Kumar Sharma | Class: First Year B. Tech. II Semester

A. Introduction:

The main objective of this course is for students to be aware with basic computer fundamentals, number systems and to enhance problem solving and logic design skills through writing set of instructions to solve a real world problem through C programming. Students will spend a significant time on each topic to understand their essential requirements and to use them differently with distinct programmable problems.

B. Course Outcomes (Cos): At the end of the course, students will be able to

[CS1101.1]: Described a deep knowledge of computer for better understanding of devices, basic fundamental of computer comprises in this course.

[CS1101.2]: Design flow chart, Write algorithm and pseudo code parallel with Control Statements to understand flow of program execution.

[CS1101.3]: Understand bitwise operations and conversion of numbers in different representations through Number System.

[CS1101.4]: Developing skills in students to learn memory oriented operation using pointers and understating programming skills by Array, Structure, Union, Enum and String are added.

[CS1101.5]: Students learned the concept of re-usability by means of functions in C and to illustrate the concept of data base using file handling.

C. Program Outcomes and Program Specific Outcomes

[PO.1]. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations

[PO.6]. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO.11]. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Program Specific Outcomes (PSOs)

The graduation from B.Tech. in Computer Science & Engineering will empowers the student:

[PSO1]: Should be able to know the algorithm writing paradigms and provide algorithmic solutions to real world problems.

[PSO2]: Will be able to design, develop and implement efficient software for a given real life problem.

[PSO3]: Will be able to apply knowledge of AI, Machine Learning and Data Mining in analysing big data for extracting useful information from it and for performing predictive analysis.

[PSO4]: Apply standard Software Engineering practices and strategies in software project development using open-source programming environment to deliver a quality product for business success.

[PSO5]: Be acquainted with the contemporary issues, latest trends in technological development and thereby innovate new ideas and solutions to existing problems.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	15
	Sessional Exam II (Close Book)	15
	In class Quizzes and/ or Assignments , Activity feedbacks (Accumulated and Averaged)	10
End Term Exam (Summative)	End Term Exam (Open Handwritten Notes)	40

Lab	Practical Lab	20
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. Syllabus

CS1101 PROGRAMMING IN C

Computer Fundamentals: The von Neumann Architecture, flowcharts and algorithms, operating system fundamentals (Linux), programs, assembly language, high level programming languages;

Number System: Binary, decimal, octal, hexadecimal.

C Programming: Data types, variables, operators, expressions, statements, control structures, functions, recursion, arrays and pointers, records (structures), files, input/output, standard library functions and elementary data structures.

A. TEXT BOOKS

1. E. Balagurusamy, "Computer Fundamentals & C Programming", TMH, 2008.
2. Y. P. Kanetkar, "Let us C", 12th Edition, BPB Publication, 2014.

B. REFERENCE BOOKS

1. B. W. Kernighan, D. M. Ritchie, "The C Programing Language", 2nd Edition, Prentice Hall of India, 1988.
2. B. Gottfired, "Schaum's Outline Series: Programming with C", 3rd Edition, McGraw Hill Publication, 2004.

F. Lecture Plan

Lecture No.	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1.	Awareness with course objectives, outcomes and applications	Basic Terminology, Flow Chart Designing, Algorithm Writing Styles, Applications of an Algorithm	Practical Applications, Real world problems	[1101.1]	Mid Term - I End Term
2.	The von Neumann Architecture		Lecture	[1101.1]	Mid Term - I End Term
3.	Flowcharts and algorithms		Lecture & Activity	[1101.1]	Mid Term - I End Term
4.			Lecture	[1101.1]	Mid Term - I End Term
5. 6.	Operating system fundamentals (Linux)	Basic terminology, examples and commands	Lecture & Problem Solving Practice	[1101.1]	Mid Term - I End Term
7. 8.	Programs, assembly language, high level programming languages;	Discussion, examples and facts	Lecture & Problem Solving Practice	[1101.1]	Mid Term - I End Term
9.	Data types	Concept discussion, programming examples	Lecture & Problem Solving Practice	[1101.2]	Mid Term - I End Term
10.	Variables			[1101.2]	Mid Term - I End Term
11.	Operators			[1101.2]	Mid Term - I End Term
12.	Expressions	Concept discussion, programming examples	Lecture & Problem Solving Practice	[1101.2]	Mid Term - II End Term
13.	Statements		Lecture & Problem Solving Practice	[1101.2]	Mid Term - II End Term
14. 15. 16. 17. 18. 19.	**Number System:** Binary, decimal, octal, hexadecimal	Concept discussion, number system conversion, programming examples	Lecture & Problem Solving Practice	[1101.3]	Mid Term - I End Term
20. 21. 22.	Control structures	Concept discussion, programming examples	Lecture & Problem Solving Practice	[1101.4]	Mid Term - II End Term

23. 24. 25.	Functions	Function writing, parameter passing, types of functions and their flexible use	Lecture & Problem Solving Practice	[1101.4]	Mid Term - II End Term
26. 27. 28.	Recursion, arrays	Recursive functions and parameter passing, array defining and use	Lecture & Problem Solving Practice	[1101.4]	Mid Term - II End Term
29. 30. 31. 32.	Pointers	Dynamic use of memory address, pointer as array, function argument passing through pointers etc.	Lecture & Problem Solving Practice	[1101.4]	Mid Term - II End Term
33. 34. 35. 36.	Records (structures), files, input/output,	Data file creation, different types of file operations etc.	Lecture & Problem Solving Practice	[1101.4]	Mid Term - II End Term
37. 38. 39. 40. 41. 42.	Standard library functions and elementary data structures	Exploration of inbuilt library functions, user define data structures	Lecture & Problem Solving Practice	[1101.4]	Mid Term - II End Term

G. Course Articulation Matrix (Mapping of COs with POs and PSOs) for Data Communications:

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
1101.1	Described a deep knowledge of computer for better understanding of devices, basic fundamental of computer comprises in this course.	3	3							1	2		1	3	2		
1101.2	Design flow chart, Write algorithm and pseudo code parallel with Control Statements to understand flow of program execution.	2	2	1		1				1	1			3	1		
1101.3	Understand bitwise operations and conversion of numbers in different representations through Number System.	3	2	1							1			2	2	3	
1101.4	Developing skills in students to learn memory oriented operation using pointers and understating programming skills by Array, Structure, Union, Enum and String are added.	2	3	3						1	2	2	2	2	1		
1101.5	Students learned the concept of re-usability by means of functions in C and to illustrate the concept of data base using file handling.	2		2				1	1				1	1	1	3	3

1- Low Correlation : 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Humanities and Social Sciences

DEPARTMENT OF LANGUAGES

Course Hand-out

TECHNCAL COMMUNICATION | EN1111 | 3 Credits | 2 1 0 3

Session: Jan.19 – May 19 | Faculty: Dr Richa Arora | Class: B TECH. I YEAR

A. Introduction: This course is offered by Department of Languages as a compulsory course to the students of B.Tech in I and II Semester. The course offers in-depth knowledge of fundamental principles of effective communication skills. The course aims to develop critical and creative thinking abilities for communicative competence. It aims to organize and express ideas clearly in speech.

B. Course Outcomes: At the end of the course, students will be able to-

[1111.1] Review communication as a process with greater awareness

[1111.2] Display enhanced competence in oral and written communication

[1111.3] Use appropriate communication skills in specific contexts and for specific purposes

[1111.4] Demonstrate meaningful group communication exchanges

[1111.5] Write well organized self-introduction, CV, Resume etc. as required in profession

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]Critical Thinking: Explore, explain and critically evaluate how literary texts and the language in which they are written shape perceptions of students' understanding of social realities and their own selves.

[PO.2] Effective Communication: Articulate ideas and perspectives, by developing and enhancing the communicative skills of listening, speaking, reading, and writing in interpersonal and interactive contexts, in print and in electronic media, for various audiences and purposes.

[PO.3] Social Interaction: Develop competence in understanding, appreciating, and respecting social diversity derived from the representation of points-of-view in literary texts, thereby facilitating conflict resolution, and social harmony.

[PO.4] Effective Citizenship: Inculcate values of patriotism and of unity, and transfer these values to real-life through selfless volunteering and activism, for promoting community welfare.

[PO.5] Ethics: Recognise the diversity and complexity of ethical dilemmas in the real world, and educate oneself to base ones actions on responsibility, and respect for human rights.

[PO.6] Environment and Sustainability: Study and understand Nature and the environment on the basis of important literary texts and researches, so as to initiate responsible individual and collective action, towards sustaining our shared environment.

[PO.7] Self-directed Life-long Learning: Taking initiatives and challenges to choose learning opportunities and programmes, implementing learning goals, and sustaining intellectual growth and excellence in a constantly changing global scenario.

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. Demonstrate knowledge of literary traditions, British Literature, Literatures in English and translations, genres, literary movements, and authors, in classroom discussions and debates.

[PSO.2]. Understand literary, linguistic, and/or rhetorical theories.

[PSO.3]. Critically analyse and interpret texts/characters/themes through close reading, by drawing on relevant linguistic, cultural, and historical information, scholarship, and theories.

[PSO.4]. Write focused and convincingly argued essays, in grammatically correct and appropriate English, giving evidence of students' understanding of the prescribed texts and their contexts.

[PSO.5]. Develop through practice in the controlled technological environment of the Advanced Language Lab, the skills of effective listening, and clear and impactful spoken communication, for various roles, interactions and audiences.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	15
	Sessional Exam II (Open Book)	15
	In class Quizzes	30
End Term Exam (Summative)	End Term Exam (Open Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who miss a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work at home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. SYLLABUS

Communication and Communication Skills (LSRW)- Definition, Process, Features, Types, Barriers, Verbal and Non-verbal communication, General and Technical communication; **Applied Grammar and Usage-** Subject-Verb agreement, Common errors and misappropriations in English, Voice, Determiners, Modals, Jumbled up sentences; **Listening Comprehension**- Hearing and Listening, Types of Listening, Barriers to effective listening, Comprehending conversations and lectures. Role of pronunciation, accent, intonation and voice modulation; **Reading Comprehension**- Skimming and Scanning, Lexical and contextual meaning, Advanced Vocabulary; **Writing Skills**-

Précis, Technical reports, Formal letters and Emails, Job Applications - Resumes and Covering Letters, Content writing (for brochures and websites), Bio-Sketch and Statement of Purpose (SoP); **Using Communication Effectively-** Presentations, Group Discussions and Mock interviews; **Case Studies on Communication** (Two/Semester)

F. Reference Books

1. C Tickoo and J Sasikumar. *Writing with a Purpose.* New Delhi: Oxford University Press, 2000.
2. D Green. *Contemporary English Grammar, Structures and Composition*. Delhi: Macmillan Publications, 2000.
3. D Jones. *English Pronouncing Dictionary*. London: ELBS, 2003.
4. L Bauer. *An Introduction to International Varieties of English*. Edinburgh: Edinburgh University Press, 2002.
5. M M McCarthy. *English Idioms in Use*. London: Cambridge University Press, 2002.
6. M Raman and S Sharma. *Technical Communication: Principles and Practice 2/e*. New Delhi: Oxford University Press, 2013.
7. N D Burton and J B Heaton. *Longman Dictionary of Common Errors*. Harlow: Longman, 1998.
8. N Ezekiel. *Collected Poems*. New Delhi: OUP, 2006.
9. N Krishnaswamy. *Modern English: A Book of Grammar Usage and Composition*. Delhi: Macmillan India, 2000.
10. R Parthasarthy (ed.). *Ten Twentieth Century Indian Poets*. New Delhi: OUP, 2009.
11. S Mishra and C Muralikrishna. *Communication Skills for Engineers*. New Delhi: Pearson Education, 2010.

F. Lecture Plan:

DAY	TOPICS	Programme objective	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
Day 1	Introduction to Communication Skills-LSRW; Definition and process of Communication	Communicate Effectively & Life long learning	Lecture, PPT, Discussion	1111.1	Quizzes, 2 Sessional, End Term Examination
Day 2	Types of Communication features of Communication;	Communicate Effectively& Lifelong learning	Lecture, PPT, Discussion	1111.1	Quizzes, 2 Sessional, End Term Examination
Day 3	Barriers to Communication	Communicate Effectively& Lifelong learning	Lecture, PPT, Discussion	1111.1	Quizzes, 2 Sessional, End Term Examination
Day 4	Verbal and Non-verbal communication	Communicate Effectively& Lifelong learning	Lecture, PPT, Discussion	1111.1	Quizzes, 2 Sessional, End Term Examination
Day 5-6	Difference between General and Technical communication; Revision and Recapitulation of Communication Theory with practical specimens	Communicate Effectively& Lifelong learning	Lecture, PPT, Discussion and problem solving	1111.3	Quizzes, 2 Sessional, End Term Examination
Day 6	Introduction to the basics of English Grammar; Subject-Verb Agreement	Communicate Effectively& Lifelong learning	Lecture, PPT,	1111.2,1111.4	Quizzes, 2 Sessional, End Term Examination

Day 7	Common errors and misappropriations in English	Communicate Effectively& Lifelong learning	Lecture	1111.4	Quizzes, 2 Sessional, End Term Examination
Day 8	Change of Voice	Communicate Effectively& Lifelong learning	Lecture, PPT, Discussion, Exercise	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 9	Determiners and Modals	Communicate Effectively& Lifelong learning	Lecture, PPT, Exercise	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 10-12	Jumbled up sentences and Grammar Practice	Communicate Effectively& Lifelong learning	Lecture, PPT, Exercise	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 13	Distinction between hearing and listening; Types of Listening	Communicate Effectively& Lifelong learning	Exercise	1111.2,1111.4	Quizzes, 2 Sessional, End Term Examination
Day 14	Barriers to effective listening	Communicate Effectively& Lifelong learning	Lecture, PPT, Exercise with audio files	1111.2,1111.4	Quizzes, 2 Sessional, End Term Examination
Day 15	Skills to comprehend conversations and lectures	Communicate Effectively& Lifelong learning	Lecture, PPT, Discussion	1111.2,1111.4	Quizzes, 2 Sessional, End Term Examination
Day 16-18	Role of pronunciation, accent, intonation and voice modulation	Communicate Effectively& Lifelong learning	Videos	1111.2,1111.4	Quizzes, 2 Sessional, End Term Examination
Day 19-20	Practical specimens of correct pronunciation, accent, intonation and voice modulation	Communicate Effectively& Lifelong learning	Practice with video files	1111.2,1111.4	Quizzes, 2 Sessional, End Term Examination
Day 21	Reading Comprehension- An Introduction	Communicate Effectively& Lifelong learning	Lecture, PPT	1111.2,	Quizzes, 2 Sessional, End Term Examination
Day 22	Skimming and Scanning for Reading Comprehension	Communicate Effectively& Lifelong learning	Lecture, PPT, Practice with texts	1111.2	Quizzes, 2 Sessional, End Term Examination
Day 23-24	Lexical and Contextual Meaning in Reading Comprehension	Communicate Effectively& Lifelong	Lecture, PPT, practice with texts	1111.2	Quizzes, 2 Sessional, End Term

		learning			Examination
Day 25	Learning Advanced Vocabulary	Communicate Effectively& Lifelong learning	Worksheet & Exercise	1111.3,1111.4	Quizzes, 2 Sessional, End Term Examination
Day 26	Learning profession specific advance vocabulary	Communicate Effectively& Lifelong learning	Worksheet & Exercise	1111.3,1111.4	Quizzes, 2 Sessional, End Term Examination
Day 27	Introduction to Writing Skills	Communicate Effectively& Lifelong learning	Lecture, PPT,	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 28-29	Précis writing- Theory and practice	Communicate Effectively& Lifelong learning	Lecture, PPT, Exercise	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 30-31	Writing of Technical Reports- Theory	Communicate Effectively& Lifelong learning	Lecture, PPT,	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 32	Formal letter writing- Basics and Practice	Communicate Effectively& Lifelong learning	Lecture, PPT, Home Assignments	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 33	Email Writing- Theory, Practice and etiquette	Communicate Effectively& Lifelong learning	Lecture, PPT, GD	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 34	Resume writing- Theory and Practice	Communicate Effectively& Lifelong learning	Lecture, PPT, Exercise	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 35	Job application & Cover letters- Practice	Communicate Effectively& Lifelong learning	Lecture, Exercise	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 36	Content writing for brochures and websites; Writing Biographical Sketch; Writing Statement of Purpose	Communicate Effectively& Lifelong learning	Lecture, PPT, Exercise	1111.3,1111.5	Quizzes, 2 Sessional, End Term Examination
Day 37	Group Discussion- Theory and Types; Practice	Communicate Effectively& Lifelong learning	Exercise	1111.2,1111.4	Quizzes, 2 Sessional, End Term Examination
Day 38-39	Interview Types, Questions and Etiquettes; Mock	Communicate Effectively&	PPT, GD	1111.3	Quizzes, 2 Sessional, End

	Interviews	Lifelong learning			Term Examination
Day 40	Analysing Case Study and its Practice	contextual knowledge to assess societal, health, safety, legal, and cultural issues	PPT, GD	1111.2	Quizzes, 2 Sessional, End Term Examination
Day 41	PowerPoint Presentations	Communicate Effectively	PPT, GD	1111.2	Quizzes, 2 Sessional, End Term Examination
Day 42	PowerPoint Presentations	Communicate Effectively	PPT, GD	1111.2	Quizzes, 2 Sessional, End Term Examination

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	Correlation with Program Outcomes (POs)											Correlation with Program Specific Outcomes (PSOs)
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
[1111.1]	**Review communication as a process with greater awareness**	**0**	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**1**	**1**
[1111.2]	**Display enhanced competence in oral and written communication**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**
[1111.3]	**Use appropriate communication skills in specific contexts and for specific purposes**	**0**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**
[1111.4]	**Demonstrate meaningful group communication exchanges**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**
[1111.5]	**Write well organized self-introduction, CV, Resume etc. as required in profession**	**0**	**0**	**3**	**0**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

H. Course Outcome Attainment Level Matrix:

CO	STATEMENT	Correlation with Program Outcomes (POs)												Correlation with Program Specific Outcomes (PSOs)		
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
[1111.1]	**Review communication as a process with greater awareness**															
[1111.2]	**Display enhanced competence in oral and written communication**															
[1111.3]	**Use appropriate communication skills in specific contexts and for specific purposes**															
[1111.4]	**Demonstrate meaningful group communication exchanges**															
[1111.5]	**Write well organized self-introduction, CV, Resume etc. as required in profession**															

0-No Attainment; 1- Low Attainment; 2- Moderate Attainment; 3- Substantial Attainment

MANIPAL UNIVERSITY JAIPUR

School of Humanities and Social Sciences

A.

B.

C.

[PO.1]. **Engineering knowledge**: Demonstrate and apply knowledge of Mathematics, Science, and Engineering to classical and recent problems of electronic design & communication system.

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

[PO.3]. **Design/development of solutions**: Design a component, system, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. An ability to understand the concepts of basic Electronics & Communication Engineering and to apply them to various areas like Signal processing, VLSI, Embedded systems, Communication Systems, Digital & Analog Devices, etc.

[PSO.2]. An ability to solve complex Electronics and Communication Engineering problems, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions.

[PSO.3]. Wisdom of social and environmental awareness along with ethical responsibility to have a successful career and to sustain passion and zeal for real-world applications using optimal resources as an Entrepreneur.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	15
	Sessional Exam II (Open Book)	15
	In class Quizzes	30
End Term Exam (Summative)	End Term Exam (Open Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who miss a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that	

	particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work at home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.

E. SYLLABUS

Communication and Communication Skills (LSRW)- Definition, Process, Features, Types, Barriers, Verbal and Non-verbal communication, General and Technical communication; **Applied Grammar and Usage-** Subject-Verb agreement, Common errors and misappropriations in English, Voice, Determiners, Modals, Jumbled up sentences; **Listening Comprehension**- Hearing and Listening, Types of Listening, Barriers to effective listening, Comprehending conversations and lectures. Role of pronunciation, accent, intonation and voice modulation; **Reading Comprehension**- Skimming and Scanning, Lexical and contextual meaning, Advanced Vocabulary; **Writing Skills**- Précis, Technical reports, Formal letters and Emails, Job Applications - Resumes and Covering Letters, Content writing (for brochures and websites), Bio-Sketch and Statement of Purpose (SoP); **Using Communication Effectively-** Presentations, Group Discussions and Mock interviews; **Case Studies on Communication** (Two/Semester)

F. Reference Books

1. C Tickoo and J Sasikumar. *Writing with a Purpose.* New Delhi: Oxford University Press, 2000.
2. D Green. *Contemporary English Grammar, Structures and Composition*. Delhi: Macmillan Publications, 2000.
3. D Jones. *English Pronouncing Dictionary*. London: ELBS, 2003.
4. L Bauer. *An Introduction to International Varieties of English*. Edinburgh: Edinburgh University Press, 2002.
5. M M McCarthy. *English Idioms in Use*. London: Cambridge University Press, 2002.
6. M Raman and S Sharma. *Technical Communication: Principles and Practice 2/e*. New Delhi: Oxford University Press, 2013.
7. N D Burton and J B Heaton. *Longman Dictionary of Common Errors*. Harlow: Longman, 1998.
8. N Ezekiel. *Collected Poems*. New Delhi: OUP, 2006.
9. N Krishnaswamy. *Modern English: A Book of Grammar Usage and Composition*. Delhi: Macmillan India, 2000.
10. R Parthasarthy (ed.). *Ten Twentieth Century Indian Poets*. New Delhi: OUP, 2009.
11. S Mishra and C Muralikrishna. *Communication Skills for Engineers*. New Delhi: Pearson Education, 2010.

F. Lecture Plan:

DAY	TOPICS	Programme objective	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
Day 1	Introduction to Communication Skills-LSRW; Definition and process of Communication	Communicate Effectively & Life long learning	Lecture, PPT, Discussion	1111.1	Quizzes, 2 Sessional, End Term Examination
Day 2	Types of Communication features of Communication;	Communicate Effectively& Lifelong learning	Lecture, PPT, Discussion	1111.1	Quizzes, 2 Sessional, End Term Examination
Day 3	Barriers to Communication	Communicate Effectively& Lifelong	Lecture, PPT, Discussion	1111.1	Quizzes, 2 Sessional, End Term

		learning			Examination
Day 4	Verbal and Non-verbal communication	Communicate Effectively& Lifelong learning	Lecture, PPT, Discussion	1111.1	Quizzes, 2 Sessional, End Term Examination
Day 5-6	Difference between General and Technical communication; Revision and Recapitulation of Communication Theory with practical specimens	Communicate Effectively& Lifelong learning	Lecture, PPT, Discussion and problem solving	1111.3	Quizzes, 2 Sessional, End Term Examination
Day 6	Introduction to the basics of English Grammar; Subject-Verb Agreement	Communicate Effectively& Lifelong learning	Lecture, PPT,	1111.2,1111.4	Quizzes, 2 Sessional, End Term Examination
Day 7	Common errors and misappropriations in English	Communicate Effectively& Lifelong learning	Lecture	1111.4	Quizzes, 2 Sessional, End Term Examination
Day 8	Change of Voice	Communicate Effectively& Lifelong learning	Lecture, PPT, Discussion, Exercise	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 9	Determiners and Modals	Communicate Effectively& Lifelong learning	Lecture, PPT, Exercise	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 10-12	Jumbled up sentences and Grammar Practice	Communicate Effectively& Lifelong learning	Lecture, PPT, Exercise	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 13	Distinction between hearing and listening; Types of Listening	Communicate Effectively& Lifelong learning	Exercise	1111.2,1111.4	Quizzes, 2 Sessional, End Term Examination
Day 14	Barriers to effective listening	Communicate Effectively& Lifelong learning	Lecture, PPT, Exercise with audio files	1111.2,1111.4	Quizzes, 2 Sessional, End Term Examination
Day 15	Skills to comprehend conversations and lectures	Communicate Effectively& Lifelong learning	Lecture, PPT, Discussion	1111.2,1111.4	Quizzes, 2 Sessional, End Term Examination
Day 16-18	Role of pronunciation, accent, intonation and voice modulation	Communicate Effectively& Lifelong learning	Videos	1111.2,1111.4	Quizzes, 2 Sessional, End Term Examination

Day 19-20	Practical specimens of correct pronunciation, accent, intonation and voice modulation	Communicate Effectively& Lifelong learning	Practice with video files	1111.2,1111.4	Quizzes, 2 Sessional, End Term Examination
Day 21	Reading Comprehension- An Introduction	Communicate Effectively& Lifelong learning	Lecture, PPT	1111.2,	Quizzes, 2 Sessional, End Term Examination
Day 22	Skimming and Scanning for Reading Comprehension	Communicate Effectively& Lifelong learning	Lecture, PPT, Practice with texts	1111.2	Quizzes, 2 Sessional, End Term Examination
Day 23-24	Lexical and Contextual Meaning in Reading Comprehension	Communicate Effectively& Lifelong learning	Lecture, PPT, practice with texts	1111.2	Quizzes, 2 Sessional, End Term Examination
Day 25	Learning Advanced Vocabulary	Communicate Effectively& Lifelong learning	Worksheet & Exercise	1111.3,1111.4	Quizzes, 2 Sessional, End Term Examination
Day 26	Learning profession specific advance vocabulary	Communicate Effectively& Lifelong learning	Worksheet & Exercise	1111.3,1111.4	Quizzes, 2 Sessional, End Term Examination
Day 27	Introduction to Writing Skills	Communicate Effectively& Lifelong learning	Lecture, PPT,	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 28-29	Précis writing- Theory and practice	Communicate Effectively& Lifelong learning	Lecture, PPT, Exercise	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 30-31	Writing of Technical Reports- Theory	Communicate Effectively& Lifelong learning	Lecture, PPT,	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 32	Formal letter writing- Basics and Practice	Communicate Effectively& Lifelong learning	Lecture, PPT, Home Assignments	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 33	Email Writing- Theory, Practice and etiquette	Communicate Effectively& Lifelong learning	Lecture, PPT, GD	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 34	Resume writing- Theory and Practice	Communicate Effectively& Lifelong	Lecture, PPT, Exercise	1111.5	Quizzes, 2 Sessional, End Term

		learning			Examination
Day 35	Job application & Cover letters- Practice	Communicate Effectively& Lifelong learning	Lecture, Exercise	1111.5	Quizzes, 2 Sessional, End Term Examination
Day 36	Content writing for brochures and websites; Writing Biographical Sketch; Writing Statement of Purpose	Communicate Effectively& Lifelong learning	Lecture, PPT, Exercise	1111.3,1111.5	Quizzes, 2 Sessional, End Term Examination
Day 37	Group Discussion- Theory and Types; Practice	Communicate Effectively& Lifelong learning	Exercise	1111.2,1111.4	Quizzes, 2 Sessional, End Term Examination
Day 38-39	Interview Types, Questions and Etiquettes; Mock Interviews	Communicate Effectively& Lifelong learning	PPT, GD	1111.3	Quizzes, 2 Sessional, End Term Examination
Day 40	Analysing Case Study and its Practice	contextual knowledge to assess societal, health, safety, legal, and cultural issues	PPT, GD	1111.2	Quizzes, 2 Sessional, End Term Examination
Day 41	PowerPoint Presentations	Communicate Effectively	PPT, GD	1111.2	Quizzes, 2 Sessional, End Term Examination
Day 42	PowerPoint Presentations	Communicate Effectively	PPT, GD	1111.2	Quizzes, 2 Sessional, End Term Examination

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	Correlation with Program Outcomes (POs)												Correlation with Program Specific Outcomes (PSOs)		
		PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
[1111.1]	**Review communication as a process with greater awareness**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**
[1111.2]	**Display enhanced competence in oral and written communication**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**
[1111.3]	**Use appropriate communication skills in specific contexts and for specific purposes**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**
[1111.4]	**Demonstrate meaningful group communication exchanges**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
[1111.5]	**Write well organized self-introduction, CV, Resume etc. as required in profession**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing and IT

Department of Computer and Communication Engg.

Course Hand-out

Data Structures | CS1303 | 4 Credits | 3 1 0 4

Session: 2018-19 | Faculty: Manoj K Bohra | Class: III CCE

A. **Introduction:** This course is offered by Computer Science and Engg. Dept., targeting students who wish to pursue development and research in industries or higher studies in field of Computer Science, IT and Communication Engineering. This course will form the base of computer science and engineering and hence this course is introduced at this level to make the students understand various ways of organizing data and storing it into memory and use the type depending upon the application.

B. **Course Outcomes:** At the end of the course, students will be able to

[CS1303.1] explain basic concepts of various data structures

[CS1303.2] develop the skills to understand and implement arrays, linked lists, stacks, queues, trees and graphs with their representation in memory and operations

[CS1303.3] select and/or apply appropriate data structures to solve problems and assess the trade-offs involved in the design choices.

[CS1303.4] describe and analyze various sorting algorithms like bubble, selection, insertion, merge sort, heap sort and quick sort

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1] Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2] Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3] Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with

appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4] Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5] Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6] The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7] Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8] Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9] Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10] Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11] Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12] Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

[PSO.1] Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

[PSO.2] Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

[PSO.3] Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

[PSO.4] Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	15
	Sessional Exam II (Closed Book)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Closed Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. SYLLABUS

Introduction: Algorithm specification; **Performance Analysis**: Time and Space Complexity, Asymptotic notation; pointer declaration and definition, memory allocation functions, array of pointers; The type definition, enumerated types, accessing structures, complex structures, arrays of structures, structures and functions; Recursive definition & processes, Recursion in

C, writing recursive programs efficiency of recursion, Examples: Tower of Hanoi, GCD, Fibonacci Definition and examples, Representing **Stacks** in C, Evaluation of expressions, multiple stacks and queues; Applications: infix, postfix and prefix and their conversions. **Linked lists** representations, Singly, doubly, header node, circular, Applications: linked stacks and queues, polynomial and long integer arithmetic, union, intersection, Basic terminologies, binary tree representation, recursive/ non recursive, Binary search tree, AVL trees; **Applications**: Expression **Trees**, inserting, deleting, searching, height of BST Terminology and representations, **Graph** operations, spanning trees, minimum cost spanning tree, shortest path and transitive closure, Binary and linear search, insertion, quick, merge, heap, radix sort Static Hashing.

F. TEXT BOOKS

T1. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, *"Fundamentals of Data Structures in C"*, University Press (India) Pvt. Ltd., 2014.

G. REFERENCE BOOKS

R1. Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein, "*Data Structures using C*", Pearson Education, 2013.

R2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "*Data Structures and Algorithms*", Pearson Education, 2012

R3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "*Introduction to algorithms*", PHI, Third Edition, 2009

R4. Seymour Lipschutz, "*Data Structures with C* (Schaum's Outline Series)", McGraw Hill Education Private Limited, 2011.

R5. Mark Allen Weiss, *"Data structures and Algorithm Analysis in C"*, Pearson, Second edition, 2014.

H. LECTURE PLAN

Lec No	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1.	**Introduction**	Introduction to data structures, Algorithm Specifications, How to Write Algorithms	Lecture	CS1303.1	Class Quiz End Term
2.		Performance Analysis- Time and Space Complexity, Asymptotic Analysis, Example , Functions in 'C', Example Programs on Functions	Lecture	CS1303.1 CS1303.1	Class Quiz Home Assignments I Sessional End Term
3.	**Arrays**	Example Programs on Functions, Arrays : Introduction, Single Dimensional Arrays : Declaration, Initialization, Operations (Insertion and Deletion of Element)	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments I Sessional End Term
4.		Searching in Single Dimensional Arrays – Selection Sort, Linear and Binary Search	Lecture	CS1303.2	Class Quiz Home Assignments I Sessional End Term
5.		Multidimensional Arrays, Two Dimensional Arrays : Declaration, Initialization, Addition of Two Matrices, Row Major and Column Major Representation	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments I Sessional End Term
6.		Example Programs on Two Dimensional Arrays, Row Major and Column Major Representation	Lecture	CS1303.2 CS1303.3	Class Quiz Home Assignments I Sessional End Term
7.		Pointers : Introduction, Example Programs on Pointers, Pointers and Arrays, Dynamic Memory Allocation	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments I Sessional End Term

8.		Dynamic Memory Allocation: Dynamic Array creation, Dynamic structure creation.	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments I Sessional End Term
9.		Problems solving by students on array	Tutorial	CS1303.3	Class Quiz Home Assignments I Sessional End Term
10.		Problems solving by students on array	Tutorial	CS1303.3	Class Quiz Home Assignments I Sessional End Term
11.	**Linked List**	Linked List : Introduction, Basic Terminologies, Advantages over Arrays, Applications, Structures in 'C', Example Programs on Structures and pointer to Strucutre	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments I Sessional End Term
12.		Passing Structures to Functions, Singly Linked List : Introduction , Operations	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments I Sessional End Term
13.		Singly Linked List : Operations (Continued)	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments I Sessional End Term
14.		Circular Linked List : Introduction, Operations	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments I Sessional End Term
15.		Doubly Linked List : Introduction, Operations	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments I Sessional End Term
16.		Some Example Programs on Linked List	Lecture	CS1303.3	Class Quiz

					Home Assignments I Sessional End Term
17.		Problems solving by students on linked list	Tutorial	CS1303.3	Class Quiz Home Assignments I Sessional End Term
18.		Problems solving by students on linked list	Tutorial	CS1303.3	Class Quiz Home Assignments I Sessional End Term
19.	**Stacks**	Recursive Functions, Example Programs on Recursive Functions, Stack : About, Applications	Lecture/ Expert-Lecture	CS1303.1 CS1303.3	Class Quiz Home Assignments II Sessional End Term
20.		Stack : Operations, Implementation of Stack using Array and Linked List	Lecture/ Expert-Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments II Sessional End Term
21.		Expression Notations : Polish Notation, Reverse Polish Notation, Infix Notation, Evaluation of Expression written in Polish Notation	Lecture	CS1303.3	Class Quiz Home Assignments II Sessional End Term
22.		Evaluation of Expression written in Reverse Polish Notation Evaluation of Expression written in Infix Notation	Lecture	CS1303.3	Class Quiz Home Assignments II Sessional End Term
23.		Conversion of Expression from one Notation to Another	Lecture	CS1303.3	Class Quiz Home Assignments II Sessional End Term
24.		Conversion of Expression from one Notation to Another	Lecture	CS1303.3	Class Quiz Home Assignments

					II Sessional End Term
25.		Problems solving by students on stack applications	Tutorial	CS1303.3	Class Quiz Home Assignments II Sessional End Term
26.	**Queues**	Linear Queue : Introduction, Applications, Operations, Implementation using Array and Linked List	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments II Sessional End Term
27.		Circular Queue : About, Applications, Operations, Implementation using Array and Linked List	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments II Sessional End Term
28.		Priority Queue and Deques : About, Applications, Operations, Implementation using Array and Linked List	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments II Sessional End Term
29.		Problems solving by students on queue applications	Tutorial	CS1303.3	Class Quiz Home Assignments II Sessional End Term
30.	**Trees**	Trees : Introduction , Basic Terminology, Types of Trees, Binary Search Tree : Creation, : Searching an Element , Insertion of Node	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments II Sessional End Term
31.		Binary Search Tree : Deletion of Node, Determining Height	Lecture	CS1303.2	Class Quiz Home Assignments II Sessional End Term
32.		Binary Search Tree : Traversal (In-order, Pre-order and Post-order)	Lecture	CS1303.2	Class Quiz Home Assignments II Sessional

					End Term
33.		Threaded Binary tree : Introduction, Creation , Insertion of Node, Deletion of Node and Traversal of Tree	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments End Term
34.		AVL Tree : Introduction , Applications Creation , Searching an Element, Insertion of Node	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments End Term
35.		AVL Tree : Deletion of Node	Lecture	CS1303.2	Class Quiz Home Assignments End Term
36.		Heaps : Insertion of Node , Binary Heap: Creation, Insertion of Element, Deletion of Element	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments End Term
37.		Problems solving by students on tree and its use	Tutorial	CS1303.3	Class Quiz Home Assignments End Term
38.		Problems solving by students on tree and its use	Tutorial	CS1303.3	Class Quiz Home Assignments End Term
39.	**Graphs**	Graphs : Introduction, Basic Terminology, Applications, Representation of Graphs : Adjacency Matrix Representation	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments End Term
40.		Representation of Graphs : Adjacency List Representation	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments End Term
41.		Graph Traversal : Breadth First Traversal, Depth First Traversal	Lecture	CS1303.2	Class Quiz Home Assignments End Term
42.		Minimum Spanning Tree, Prims Algorithm, Kruskal's Algorithm	Lecture	CS1303.2	Class Quiz Home Assignments End Term
43.		Shortest Path Algorithms: Dijkstra's Algorithm, Floyd's Algorithm	Lecture	CS1303.2	Class Quiz Home Assignments

					End Term
44.		Problems solving by students on graph algorithms	Tutorial	CS1303.3	Class Quiz Home Assignments End Term
45.		Problems solving by students on graph algorithms	Tutorial	CS1303.3	Class Quiz Home Assignments End Term
46.	**Searching & Sorting**	Sorting : Introduction, Bubble Sort, Insertion Sort	Lecture	CS1303.1	Class Quiz Home Assignments End Term
47.		Sorting (Continued) : Quick Sort, Merge Sort	Lecture	CS1303.1 CS1303.4	Class Quiz Home Assignments End Term
48.		Sorting (Continued) : Radix Sort , Heap Sort	Lecture	CS1303.1 CS1303.4	Class Quiz Home Assignments End Term
49.		Hashing : Introduction, Applications, Hash Functions	Lecture	CS1303.1 CS1303.2 CS1303.4	Class Quiz Home Assignments End Term
50.		Hash Collisions, Collision Resolution : Open Addressing, Chaining	Lecture	CS1303.1 CS1303.2	Class Quiz Home Assignments End Term
51.		Problems solving by students on soring and its application	Tutorial	CS1303.3	Home Assignments End Term
52.		Problems solving by students on soring and its application	Tutorial	CS1303.3	Home Assignments End Term

A. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CS 1303.1	explain basic concepts of various data structures	3	2										2	3			1
CS 1303.2	develop the skills to understand and implement arrays, linked lists, stacks, queues, trees and graphs with their representation in memory and operations		1	2									2		2	2	
CS 1303.3	select and/or apply appropriate data structures to solve problems and assess the trade-offs involved in the design choices.		1	2									2		2	2	
CS 1303.4	describe and analyze various sorting algorithms like bubble, selection ,insertion, merge sort, heap sort and quick sort		1	2									2	2		1	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing and IT

Department of Computer and Communication Engineering
Course Hand-out

Computer Organisation and Architecture | CS 1301 | 4 Credits | 3 0 1 4

Session: 2018-19 | Faculty: Dr. T. Gopalakrishnan| Dr. Kusum Lata Jain| Mr. Rahul Dixit | Class: III Semester

A. Introduction: This course is offered by Dept. of Computer and Communication Engineering for third semester students. The core objective of this course is to describe the general organization and architecture of a computer system. It covers in detail various functional units of a computer system, machine instructions, addressing techniques and instruction sequencing. It provides a detailed coverage of logic circuits to perform various arithmetic operations and use of pipelining in the design of high-performance processors.

B. Course Outcomes: At the end of the course, students will be able to

CS 1301.1	Describe the interconnection between various functional units of a computer system and able to assess the performance of a computer.
CS 1301.2	Describe various data representations and analyse the design of fast arithmetic circuits.
CS 1301.3	Formulate assembly language programs for a given high level language construct.
CS 1301.4	Describe various parts of a system memory hierarchy and caching techniques.
CS 1301.5	Evaluate the performance of CPU, memory and I/O operations.
CS 1301.6	Build the required skills to read and research the current literature in computer architecture for enhancing the Entrepreneurship.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1] Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2] Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3] Design/development of solutions: Design solutions for complex engineering problems and design system components or processes_that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4] Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5] Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools_including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6] The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues_and the consequent responsibilities relevant to the professional engineering practice

[PO.7] Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8] Ethics: Apply ethical principles and commit to professional ethics_and responsibilities and norms of the engineering practices

[PO.9] Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10] Communication: Communicate effectively_on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11] Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12] Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Program Specific Outcomes (PSOs)

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Date	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	Sept 10 – Sept 12	15
	Sessional Exam II (Closed Book)	Oct 25 – Oct 27	15
	Quizzes and Assignments (Accumulated and Averaged)	Regularly	30
End Term Exam (Summative)	End Term Exam (Closed Book)	Nov 28 – Dec 12	40
	Total		100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.		

E. SYLLABUS

Basic Structure of computers: Computer types, functional units, basic operational concepts, bus structures, software, performance; **Machine Instructions and programs**: Numbers, arithmetic operations and characters, Memory locations and addresses; Memory operations, Addressing modes; **Arithmetic**: Addition and subtraction of signed numbers, Adders, ALU design, Bit slice processor, Multiplication of positive numbers Signed operand multiplication, Fast multiplication, Integer division, Floating point numbers and operations; **Memory Systems**: Introduction, Basic concepts, Design methods; RAM memories, Read only memories, Speed size and cost, Cache memories, Performance considerations, Virtual memories, Memory, Management Requirements, Secondary storage; **Input / Output organization**: Accessing I/O devices, Interrupts, Direct memory access, Buses, Interface circuits; **Introduction to Parallel Processing:** Flynn Classification**,** Multi-Core Architecture, Pipelining.

F. TEXT BOOKS

T1. C. Hamacher, Z. Vranesic, S. Zaky, *"Computer Organization",* Tata McGraw Hill (TMH), 5th Edition, 2002.

T2. M. Morris Mano, *"Computer System Architecture"*, Pearson, 3rd Edition Revised, 2017.

G. REFERENCE BOOKS

R1. W. Stallings, *"Computer Organization and Architecture –Designing for Performance",* PHI, 2009.

R2. David A. Patterson, John L. Hennessy, *"Computer Organization and Design: The Hardware/Software Interface",* Morgan Kauffmann, 4th Edition, 2010.

R3. John P. Hayes, *"Computer Architecture and Organization",* TMH, 3rd Edition, 1998.

Lecture Plan:

Lectures	Major Topics	Topics	Sessional Outcomes	Mode of Delivery	Corresponding CO	Mode Of Assessing C
1.	Basic Structure of Computers (1-6 Lecture)	Introduction to basic structure of computers	Understand basic structure of computer	Lecture	1301.1	Mid Term I, Quiz & En
2.		Functional units	Describe the functions of individual functional units	Lecture	1301.1	Mid Term I, Quiz & En Term
3.		Basic operational concepts	Define the basic terminologies of operational concepts	Lecture	1301.1	Mid Term I, Quiz & En Term
4.		Bus structures, software	Conceptualize on the various types of Buses used in the	Lecture	1301.1	Mid Term I, Quiz & En Term
5.		Performance	Identify the metrics to calculate the performance of the system	Flipped Class	1301.1	Mid Term I, Quiz & En Term
6.		Tutorial	NA	Activity	1301.1, 1301.5	Mid Term I, Quiz & En Term
7.	Machine Instructions and Programs (7-18 Lecture)	Numbers, Arithmetic Operations And Characters	Perform arithmetic evaluation's	Flipped Class	1301.2	Mid Term I, Quiz & En Term
8.		Memory Locations and Addresses, Memory Operations	Clarify on the how the storage memory is functioning	Lecture	1301.2	Mid Term I, Quiz & En Term
9.		Instructions and Instruction Sequencing	Examine the use of instructions	Lecture	1301.2 & 1301.3	Mid Term I, Quiz & En Term
10.		Register Transfer Notation, Assembly Language Notation	Understand on the registers and assemply language	Lecture	1301.2	Mid Term I, Quiz & En Term
11.		Basic Instruction Types, Instruction Execution and Straight-Line Sequencing	Classify the types of instructions used	Lecture	1301.2 & 1301.3	Mid Term I, Quiz & En Term

12.		Branching, Condition Codes, Generating Memory Addresses methods	Perform the extensive advantage of branching instructions	Lecture	1301.2	Mid Term I, Quiz & En Term
13.		Addressing Modes, Implementation of Variables and Constants, Indirection and Pointers	Understand the various addressing modes	Flipped Class	1301.2	Mid Term I, Quiz & En Term
14.		Indexing and Arrays, Relative Addressing	Understand the various addressing modes	Lecture	1301.2	Mid Term I, Quiz & En Term
15.		Additional Modes	Understand the various addressing modes	Lecture	1301.2	Mid Term I, Quiz & En Term
16.		Basic I/O operations, Additional Instructions	Perform basic I/O operations	Lecture	1301.2 & 1301.3	Mid Term I, Quiz & En Term
17.		Example programs	Will carry out sample real time programs	Lecture	1301.2 & 1301.3	Mid Term I, Quiz & En Term
18.		Tutorial	NA	Activity	1301.2	Mid Term I, Quiz & En Term
19.		Addition and Subtraction of Signed Numbers	Perform Addition and Subtraction of Signed Numbers	Flipped Class	1301.2	Mid Term I, Quiz & En Term
20.	Arithmetic (19-33 Lecture)	Design of Fast Adders	Describe Fast adders	Lecture	1301.2 & 1301.6	Mid Term II, Quiz & Er Term
21.		Carry Look Ahead Adders- Bit Stage Cell,4 Bit CLA	Describe the advantages of CLA	Lecture	1301.2 & 1301.5	Mid Term II, Quiz & Er Term
22.		Carry Look Ahead Adders 16 Bit	Describe the advantages of CLA	Lecture	1301.2 & 1301.5	Mid Term II, Quiz & Er Term
23.		Tutorial	NA	Activity	1301.2	Mid Term II, Quiz & Er Term

24.		Multiplication of Positive Numbers-Array Sequential Circuit	Perform Multiplication of Positive Numbers	Flipped Class	1301.2 & 1301.5	Mid Term II, Quiz & Er Term
25.		Signed Operand Multiplication-Booth Algorithm	Perform Multiplication of any numbers	Lecture	1301.2	Mid Term II, Quiz & Er Term
26.		Fast Multiplication-Bit Pair Recoding Of Multipliers	Perform fast Multiplication of any numbers	Lecture	1301.2	Mid Term II, Quiz & Er Term
27.		Carry-save addition of summands	Examine the time reduction to perform normal multiplication	Flipped Class	1301.2	Mid Term II, Quiz & Er Term
28.		Integer Division-Restoring	Perform Integer Division-Restoring	Lecture	1301.2	Mid Term II, Quiz & Er Term
29.		Integer Division- Nonrestoring	Perform Integer Division-Non-Restoring	Lecture	1301.2	Mid Term II, Quiz & Er Term
30.		Floating Point Numbers & Operation-Standards Exceptions, check to uncheck Exception	Perform arithmetic operations on Floating point numbers	Lecture	1301.2	Mid Term II, Quiz & Er Term
31.		Arithmetic Operations on Floating Point Numbers	Perform arithmetic operations on Floating point numbers	Lecture	1301.2	Mid Term II, Quiz & Er Term
32.		Examples on Arithmetic Operation on Floating Point Numbers	Perform arithmetic operations on Floating point numbers	Lecture	1301.2	Mid Term II, Quiz & Er Term
33.		Tutorial	NA	Activity	1301.2	Mid Term II, Quiz & Er Term
34.	Memory Systems	Memory Systems: Basic Concepts	Understand the basic memory concepts	Flipped Class	1301.4	Mid Term II ,Quiz & End Term

35.	(34-42 Lecture)	Speed, Size & Cost	Compare the basic parameters for the memory arrangement	Lecture	1301.4 & 1301.5	Mid Term II ,Quiz & End Term
36.		Cache Memories- Mapping Functions	Describe the concept of Cache Memory	Lecture	1301.4 & 1301.5	Mid Term II ,Quiz & En Term
37.		Replacement Algorithms	Suggest the better memory replacement algorithm	Lecture	1301.4 & 1301.5	Mid Term II ,Quiz & En Term
38.		Example Of Mapping Techniques	Suggest the better memory replacement algorithm	Flipped Class	1301.4	Mid Term II , Quiz & End Term
39.		Performance Considerations: Hit Rate & Miss Penalty, Caches on Processor Chip	Identify the various parameters for memory performance measurements	Lecture	1301.4 & 1301.5	Mid Term II , Quiz & End Term
40.		Virtual Memories	Describe on advantages of VM	Lecture	1301.4 & 1301.6	Mid Term II , Quiz & End Term
41.		Address Translation	Describe on operations of VM	Lecture	1301.4	Mid Term II , Quiz & End Term
42.		Tutorial	NA	Activity	1301.4	Quiz & End Term
43.	Input / Output Organization (43-46 Lecture)	Accessing I/O Devices, Interrupts	Explain how the I/O devices are accessed.	Lecture	1301.5	Quiz & End Term
44.		Interrupt H/W, Enabling Disabling Interrupts	Provide the basic idea on Interrupts	Lecture	1301.5	Quiz & End Term

45.		Handling Multiple Devices, Controlling Device Requests, Exceptions	Explain how the I/O devices are accessed and controlled over the system	Lecture	1301.5	Quiz & End Term
46.		Use of interrupts in Operating Systems, Direct Memory Access	Describe the use of interrupts in DMA	Lecture	1301.5	Quiz & End Term
47.	Introduction to Parallel Processing (47-53 Lecture)	Flynn Classification, Multi-Core Architecture	Define the various flynns classification based on the architecture	Lecture	1301.5 &1301.6	Quiz & End Term
48.		Pipelining	Explain about the pipelining	Flipped Class	1301.5	Quiz & End Term
49.		Data Hazards	Define Data Hazard	Lecture	1301.5	Quiz & End Term
50.		Instruction Scheduling: Static and Dynamic	Explain on both static and dynamic scheduling	Lecture	1301.5 & 1301.6	Quiz & End Term
51.		Control Hazard	Define control Hazard	Lecture	1301.5	Quiz & End Term
52.		Branch Prediction	Explain the needs branch prediction	Lecture	1301.5	Quiz & End Term
53.		Tutorial	NA	Activity	1301.5	Quiz & End Term

H. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CS 1301.1	Describe the interconnection between various functional units of a computer system and able to assess the performance of a computer.	2	1										1	2	1		
CS 1301.2	Describe various data representations and analyse the design of fast arithmetic circuits.	3	2										1	1			
CS 1301.3	Formulate assembly language programs for a given high level language construct.	2	2	1									1	1			
CS 1301.4	Describe various parts of a system memory hierarchy and caching techniques.	3	2										2			1	
CS 1301.5	Evaluate the performance of CPU, memory and I/O operations.	3	2	1									2	1	1	2	
CS 1301.6	Build the required skills to read and research the current literature in computer architecture for enhancing the Entrepreneurship.												2	1			

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer and Communication Engineering
Course Hand-out

Switching Theory & Logic Design | CS 1302 | 4 Credits | [L T P C]: [3 1 0 4]

Session: 2018-19| Course: B.Tech. 2nd Year III Semester

A. Introduction: This course allows students to obtain a basic level of Digital Electronics knowledge and set the stage to perform analysis and design of complex digital electronic circuits. Students will learn combinational and sequential circuit design techniques, which will enable them to analyze digital systems in terms of state machines.

B. Course Objectives: At the end of the course, students will

CS1302.1: Be able to understand the skills for illustrating the numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray, and BCD.

CS1302.2: Be able to describe simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.

CS1302.3: Be able to design and analyze small combinational circuits, to use standard combinational functions/building blocks to build larger more complex circuits.

CS1302.4: Be able to design, analyse and evaluate small sequential circuits and devices, to use standard sequential functions/building blocks to build larger more complex circuits.

CS1302.5: Be able to understand working and use of logic families like BJT, MOSFET etc. for employability.

C. Program Outcomes and Program Specific Outcomes:

[PO.1]. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2].Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4].Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

D. PROGRAM SPECIFIC OUTCOMES

- **PSO1**. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.
- **PSO2**. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.
- **PSO3**. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.
- **PSO4**. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

E. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	15
	Sessional Exam II (Closed Book)	15
	In class Quizzes and Assignments (video assignments/software simulation assignments)	30
End Term Exam (Summative)	End Term Exam (Closed Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to get eligible for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class should report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	

F. Syllabus

Introduction to logic circuits: Variables and functions, Inversion, Truth tables, Logic gates and networks, Boolean algebra, Introduction to VHDL. **Optimized implementation of logic functions:** Synthesis using AND OR and NOT gates, Karnaugh map, Strategy for minimization, Minimization of POS forms, Incompletely Specified Functions, Multiple output circuits NAND and NOR logic networks, multilevel NAND and NOR circuits, Analysis of multilevel circuits. **Number representation and**

arithmetic circuits: Positional number representation, Addition of unsigned numbers, Signed numbers, Fast adders, Design of arithmetic circuits using VHDL, BCD representation. **Combinational-Circuit building blocks:** Multiplexer, decoder, Encoder, Code converter, Arithmetic comparison circuits, VHDL for Combinational Circuits; Flip Flops, Registers, Counters. **Overview of semiconductor diode:** BJT, MOSFET, TTL–standard, High speed, low-power, low-power schottky, CMOS logic-NAND, NOR

G. Text Books

T1. S. Salivahanan, S. Arivazhagan,"Digital Circuit and Design" Fourth Edition, 2012.
T2. M. Morris Mano, Michael D. Ciletti, "Digital Design", *Prentice Hall of India Pvt. Ltd.*, 2008.

H. Reference Books

R1. P. Leach, A. Malvino, G. Saha, "*Digital Principles and Applications"*, TMH, 6th Edition, 2006.
R2. Brian Holdsworth, Clive Woods, "Digital Logic Design", *Elsevier India Pvt. Ltd.*, 2005.

I. Lecture Plan

Lecture No.	Topic(s) to be covered	Mode of Delivery	Session Outcome	Corresponding CO	Mode of Assessing the Outcome
1	Number System: Binary, Decimal, Octal ,Hexadecimal	Lecture	To acquaint and refresh fundamentals of number system	1302.1	NA
2	1's and 2's Complements and 9's and 10's Complements	Lecture	To recall number system complements and to describe their need.	1302.1	In Class Quiz (Not Accounted)
3	Binary Coded Decimal (BCD): BCD Addition and Subtraction	Lecture	To identify different formats of representing binary numbers and corresponding arithmetic operations	1302.1	In Class Quiz End Term
4	Introduction, Development of Boolean Algebra	Lecture	To explain and recall Boolean theorems and algebra.	1302.2	Home Assignment End Term
5	Boolean Logic Operation: Logical AND, Logical OR and Logical Complementation(Inversion)	Lecture	To recall basic boolean logics	1302.2	In Class Quiz End Term
6	Boolean Addition, Boolean Multiplication, Properties of Boolean Algebra and Principle of Duality.	Lecture	To understand Boolean arithmetic	1302.2	Class Quiz Mid Term I End Term
7	Demorgan's Theorems, Minimization of Boolean expression using algebraic method	Lecture	To understand minimization of boolean expression using Boolean theorems	1302.2	Class Quiz Mid Term I End term
8	Sum of Products and Product of Sums : Minterm, Maxterm	Lecture	Introduction to different representations of Boolean expressions.	1302.2	Home Assignment Class Quiz Mid Term I End Term
9	Deriving Sum of Products	Lecture	Introduction to different	1302.2	Class Quiz

	(SOP) Expressions from a Truth Table, Deriving Product of Sum (POS) Expressions from a Truth Table		representations of Boolean expressions.		Mid Term I End Term
10	Karnaugh Map :Two-variable map, Three-variable map	Lecture	Understanding design principles of K-map to minimize Boolean expression	1302.1,1302.2	Class Quiz Mid Term I End Term
11	Four-variable map	Lecture	Understanding design principles of K-map to minimize Boolean expression	1302.1,1302.2	Class Quiz End Term
12	Five- variable map	Lecture	Understanding design principles of K-map to minimize Boolean expression	1302.1,1302.2	Class Quiz Mid Term I End Term
13	Quine-McCluskey or Tabular Method of Minimization of Logic Functions	Lecture	Understanding design principles of Tabular method to minimize Boolean expression	1302.1,1302.2	Class Quiz Mid Term I End Term
14	Examples of Tabular Method	Lecture	Understanding design principles of Tabular method to minimize Boolean expression	1302.1,1302.2	Class Quiz Mid Term I End Term
15	Examples of Tabular Method	Lecture	Understanding design principles of Tabular method to minimize Boolean expression	1302.1,1302.2	Class Quiz Mid Term I End Term
16	Logic Gates: OR, AND, NOT, NAND, NOR	Lecture	To recall basic logic gates	1302.1,1302.2	Class Quiz End Term Mid Term II
17	Universal Gates: Realisation of logic function using NAND gates	Lecture	To recall universal logic gates	1302.1,1302.2	Class Quiz End Term Mid Term II
18	Realisation of logic function using NOR gates	Lecture	To understand realization of logic functions using universal gates	1302.1,1302.2	Class Quiz End Term Mid Term II
19	Exclusive-OR (Ex-OR) Gate, Exclusive-NOR (Ex-NOR) Gate	Lecture	To recall other logic gates	1302.3	Class Quiz End Term Mid Term II

20	Arithmetic Circuits: Half Adder, Full Adder , K-Map Simplification	Lecture	To design and implement combinational circuits	1302.3	Class Quiz End Term Mid Term II
21	Half Subtractor , Full Subtractor	Lecture	To design and implement combinational circuits	1302.3	Class Quiz End term Mid Term II
22	4-bit Parallel Adder/Subtractor	Lecture	To design and implement combinational circuits	1302.3	Class Quiz Mid Term II
23	Fast Adder	Lecture	To design and implement combinational circuits	1302.3	Class Quiz Mid Term II End Term
24	BCD Adder	Lecture	To design and implement combinational circuits	1302.3	Class Quiz Mid Term II End Term
25	Binary Multiplier	Lecture	To design and implement combinational circuits	1302.3	Class Quiz Mid Term II End Term
26	Combinational Circuits: Multiplexers – Basic Four input Multiplexer	Lecture	To design and implement combinational circuits	1302.3	Class Quiz End Term Mid Term II
27	Implementation of Boolean Expression using Multiplexers	Lecture	To design and implement combinational circuits	1302.3	Class Quiz End Term Mid Term II
28	Demultiplexers : 1-to-4 Demultiplexer, 1-to-8 Demultiplexer,	Lecture	Understand integration of IoT in safety application	1302.3	Class Quiz End Term Mid Term II
29	Decoders: Basic Binary Decoder, 3-to-8 Decoder	Lecture	To design and implement combinational circuits	1302.3	Class Quiz End Term
30	4-to-16 Decoder	Lecture	To design and implement combinational circuits	1302.3	Class Quiz End Term
31	Encoders: Octal-to-Binary Encoder	Lecture	To design and implement combinational circuits	1302.3	Class Quiz End Term
32	Decimal-to-BCD Encoder	Lecture	To design and implement combinational circuits	1302.3	NA

33	Code Converters: BCD-to-Binary Converters	Lecture	To design and implement combinational circuits	1302.3	In Class Quiz (Not Accounted)
34	Binary-to-Gray Code Converters	Lecture	To design and implement combinational circuits	1302.3	In Class Quiz End Term
35	Gray Code-to-Binary Converters	Lecture	To design and implement combinational circuits	1302.3	Home Assignment End Term
36	Flip-Flops: Latches	Lecture	To understand basic sequential elements	1302.4	In Class Quiz End Term
37	S-R Flip-Flop, D Flip-Flop	Lecture	To understand basic sequential elements	1302.4	Class Quiz End Term
38	J-K Flip-Flop, T Flip-Flop	Lecture	To understand basic sequential elements	1302.4	Class Quiz End term
39	Triggering of Flip-Flop: Level Triggering	Lecture	To understand basic sequential elements	1302.4	Home Assignment Class Quiz End Term
40	Edge Triggering	Lecture	To understand basic sequential elements	1302.4	Class Quiz End Term
41	Master Slave Flip-Flop	Lecture	To understand basic sequential elements	1302.4	Class Quiz End Term
42	Realisation of One Flip-Flop using other Flip-Flops.	Lecture	To design and implement sequential circuits	1302.4	Class Quiz End Term
43	Counters: Asynchronous (Ripple or Serial) Counter	Lecture	To design and implement sequential circuits	1302.4	Class Quiz End Term
44	Ripple Counter with Decoded Outputs	Lecture	To design and implement sequential circuits	1302.4	Class Quiz End Term
45	Ripple Counters with Modulus<2^n	Lecture	To design and implement sequential circuits	1302.4	Class Quiz End Term
46	Asynchronous Down Counter	Lecture	To design and implement sequential circuits	1302.4	Class Quiz End Term
47	Up-Down Counter	Lecture	To design and implement sequential circuits	1302.4	Class Quiz End Term
48	Design of Synchronous Counters	Lecture	To design and implement sequential circuits	1302.4	Class Quiz End Term
49	Registers: Shift Register	Lecture	To design and implement sequential circuits	1302.4	Class Quiz End Term
50	Shift Register Counters: Ring Counter	Lecture	To design and implement sequential circuits	1302.4	Class Quiz End Term

51	Johnson Counter	Lecture	To design and implement sequential circuits	1302.4	Class Quiz End Term
52	Overview of semiconductor diode: BJT, MOSFET,	Lecture	To understand transistor basics for VLSI applications	1302.5	Class Quiz End Term
53	TTL–standard, High speed, low-power, low-power schottky	Lecture	To understand logic families	1302.5	Class Quiz End Term
54	CMOS logic-NAND, NOR	Lecture	To design and implement CMOS logic gates	1302.5	Class Quiz End Term

J. Course Articulation Matrix: (Mapping of COs with POs and PSOs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CS 1302.1:	Be able to manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray, and BCD.	2	2	1		1	1	1	1	1	1	1	3	3	3	3	1
CS 1302.2:	Be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.		2				1	1		1	1		3	3	3	3	1
CS 1302.3:	Be able to design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.	2	2	1	1	1		1	1			1	3	3		3	1
CS 1302.4:	Be able to design and analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.					1	1	1	1	1			3	3		3	1
CS 1302.5:	Be able to understand working and use of logic families like BJT, MOSFET etc. for employability.	2	1			1	1			1	1	1	3	3		3	1

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER & COMMUNICATION ENGINEERING
COURSE HAND-OUT

OBJECT ORIENTED PRCOMMUNIOCOGRAMMING USING JAVA|| CS1332|| 1 Credits|| [0 0 2 1]
SESSION: 2018-19 | FACULTY NAME: HEMLATA GOYAL|| CORE

A. Introduction:

This course will introduce the basic principles of object oriented programming. It will cover the basic programming principle of java. It will introduce the concept of classes and object, Multi-threading, Graphical user interface and Event driven programming.

B. Course Outcomes: At the end of the course, students will be able to

[CS1304.1]:	Identify basic programming construct of java language
[CS1304.2]:	Identify and develop different classes based on real world scenario.
[CS1304.3]:	To identify and experiment with different class to demonstrate polymorphism and inheritance and exception handling model
[CS1304.4]:	Understand Multi-threading Model and built classes to demonstrate multi-threading programming
[CS1304.5]:	Analyse real world problem and model Graphical user interface to solve problem, hence improve employbility skills.

C PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analysing, the B Tech CCE graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are called society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES(PSOs)

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Weekly evaluation (record+execution+viva)	50
	Mini project	20
End Term Exam (Summative)	End Term Exam	30
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

E. SYLLABUS

Control statements and arrays, Stacks and Lists, Strings, Classes and methods, Inheritance, Packages, Interfaces, Exception Handling, Threads, Input/Output, Event Handling, Applets, involving AWT, Programs involving AWT.

F TEXT BOOK

T1. Java: The Complete Reference (9th Edition), By Herbert Schildt, McGraw Hill Education, ISBN-10:0071808558, ISBN-13: 978-0071808552

G REFERENCE

R1. Java Concepts (4th Edition), Bt Cay horstmann, Wiley India, ISBN-10:0471697044, ISBN-13:978-0471697046, (Year:2005)

H . Lecture Plan

Lec No	**Topics**	**Session Outcome**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing the Outcome**
1-2	Introduction to Eclipse IDE and Java Basics	Understand project structure of eclipse and learn how to compile and run java program.	Lecture	CS1332.1	Continuous Evaluation, Project
3-4	Reading Inputs and Basics of Class Design	Demonstrate the use of class and Build class to model real world object and their behaviour	Lecture Demonstration	CS1332.1 CS1332.2	Continuous Evaluation, Project
5-6	Packages, Arrays and Vectors in Java Inheritance in Java	Understand polymorphism and experiment with different class to model inheritance	Demonstration	CS1332.2 CS1332.3	Continuous Evaluation, Project
7-8	Exception Handling in Java , String Handling in Java	Analyze different exception classes and experiment with different construct to handle them.	Lecture Demonstration	CS1332.2 CS1332.3	Continuous Evaluation, project, End Term
9-10	Multithreading in Java	Illustrate multithreading programming and solve real world problem using multithreading model	Lecture Demonstration	CS1332.2 CS1332.3 CS1332.4	Continuous Evaluation, project, End Term
11-12	Collections Framework in Java	Analyze real world scenario and develop GUI and event handler to solve problem	Lecture Demonstration	CS1332.2 CS1332.3 CS1332.5	Continuous Evaluation, project, End Term

I Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PS04
[CS1332.1]:	Understand basic programming construct of java language	1				1	1	1	1	1	1	1	1	1	1	1	1
[CS1332.2]:	Identify and develop different classes based on real world scenario.	1	1	1		1			1		1			1	1	1	1
[CS1332.3]:	To identify and experiment with different class to demonstrate polymorphism and inheritance and exception handling model	1	2	2	1	1	1	1	1	1	1			2	1	1	1
[CS1332.4]:	Understand Multi-threading Model and built classes to demonstrate multi-threading programming	1	2	2	1	1		1	1	1	1	1	1	2	1	1	1
[CS1332.5]:	Analyse real world scenario and model Graphical user interface to solve problem , hence improve employbility skills.	1	2	2	1	1			1	1				2	1	1	1

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer and Communication Engineering

Course Hand-out

Object-Oriented Programming Using Java | CS 1304 | 4 Credits | 3 1 0 4

Session: 2018-19 | Faculty: Hemlata Goyal | Class: III Sem | Sec-A & C

A. Introduction: Object oriented techniques have revolutionized the software development process and are used Tremendously in IT industry to develop software products of various kinds. The course is designed to give students an in-depth understanding of the basic concepts of object-oriented programming such as encapsulation, inheritance and polymorphism using Java programming language as an aid tool. The course curriculum and structure has been divided into eight basic modules which covers the programming aspects related with object oriented domain such as exception handling, multithreading, GUI programming, event handling etc. The course will be taught with the help of several teaching aides such as power point presentation and via live debugging and execution demonstrations of several programming problems using Eclipse tool.

The main objective of the course are as follows:

- To teach students about the basics of classes and objects using Java programming language
- To enable the students to properly use the basic object oriented pillars such as encapsulation, inheritance and polymorphism.
- To enable the students to understand the basic difference between a class and an interface.
- To teach students about the implementation aspect of various basic data structures such as Linked Lists and Arrays using object oriented techniques
- To teach students how to provide various types of inheritance and polymorphism using classes and interfaces
- To introduce students about the role of modern programming constructs such as exceptions in modern programming languages
- To teach students about the basic of Multithreading, GUI Programming and Event handling

B. Course Outcomes: At the end of the course, students will be able to

[1304.1]. Understand and learn the skills to compile and execute a simple as well as complex Java Application using Command Based Interface as well as using Eclipse Tool.

[1304.2]. Learn and apply the concepts of encapsulation and abstraction using class, objects and interfaces.

[1304.3]. Describe and Implement various inheritance and polymorphism forms using Java Classes and Interfaces.

[1304.4]. Learn and Implement various collection data structure such as linked lists, queues, stacks using Java's collection framework

[1304.5]. Understand, Learn and finally Implement the use of advanced programming constructs/features such as exception handling, multithreading and event handling in real-life programming domains.

[1304.6]. Visualize a real world problem in the form of various collaborating classes and objects for employability.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: the sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analyzing the B Tech CCE graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are terms society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

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PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

D. Program Specific Outcomes (PSOs)

On successful completion of B.Tech. in Computer and Communication Engineering (CCE), the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

E. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	15
	Sessional Exam II (Open Book)	15
	In class Quizzes	30
End Term Exam (Summative)	End Term Exam (open Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

F. SYLLABUS

The History and Evolution of java: The Creation of Java, how java changed the internet, Java's Magic, Servlets, The java Buzzwords; An Overview of Java, arrays; **Introduction to classes**: Class fundamentals, declaring objects, Assigning Object reference variables, Introduction to methods, Constructors, this keyword, Garbage collection, finalize() method, Overloading, objects as parameters, argument passing, returning objects, recursion, access control, final, nested and inner classes, string class; **I/O Basics:** Reading Console Input, Writing Console Output, Files, Applet fundamentals; **Inheritance**: basics, super, multilevel hierarchy, overriding, abstract classes, final with inheritance; Packages and Interfaces, Exception Handling, Multithreaded programming; **String Handling**, Applet Class, **Event Handling**; **Introduction to AWT**: Classes, component, Container, Panel, Window, frame, Canvas, working with frame, working with Graphics, using AWT Controls.

G. TEXT BOOKS

T1. Java: The Complete Reference (9th Edition), By Herbert Schildt, McGraw Hill Education, ISBN-10:0071808558, ISBN-13: 978-0071808552

H. REFERENCE BOOKS

R1. Core Java Volume I—Fundamentals (10th Edition), By Cay Horstmann, Prentice Hall, ISBN-10:0134177304, ISBN-13: 978-0134177304, Year(2|06)

R2. Object-Oriented Programming in Java: A Graphical Approach (Preliminary Edition), By KE Sanders and AV Dam, Pearson Education, ISBN-10:0321245741, ISBN-13:978-0321245748, Year 2015

R3. Java Concepts (4th Edition), Bt Cay horstmann, Wiley India, ISBN-10:0471697044, ISBN-13:978-0471697046, (Year:2005)

I. Lecture Plan:

Lectures	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode Of Assessing CO
1.	Introduction and Course Hand-out briefing			NA	
2.	C, C++ and Java Comparison, Java Byte Code ,Java Buzzwords, Java SE 8	Recall the concept of C and understand		1304.1	Mid Term I, Quiz & End Term
3.	Lexical issues, java keywords	Explain different java keyword and their purpose	Lecture	1304.1	Mid Term I, Quiz & End Term
4.	OOP Programming, First Simple program	Illustrate simple programming construct	Lecture, Practice questions	1304.1	Mid Term I, Quiz & End Term
5.	Control Statements	Compare and Construct different control flow statements	Lecture, Practice questions	1304.1	Mid Term I, Quiz & End Term
6.	Operators	Define different operators and their working	Lecture, Practice questions	1304.1	Mid Term I, Quiz & End Term
7.	Tutorial	Apply the concept of control flow statements and loops in programming	Practice questions	1304.1	Mid Term I, Quiz & End Term
8.	Primitive Types, Floating point, Characters, Booleans	Explain different data	Lecture	1304.1	Mid Term I, Quiz & End Term
9.	Literals, Variables, Type Conversion and casting, wrapper classes , Boxing and Unboxing	Demonstrate the conversion of one data	Lecture, Practice questions	1304.1	Mid Term I, Quiz & End Term
10.	1D Arrays, 2D Array, multi dimension Array, Variable Length Array	Illustrate the use of array and varag methods	Lecture, Practice questions	1304.1	Mid Term I, Quiz & End Term
11.	Tutorial	Built different type of array and solve programming problem	Activity	1304.1	Mid Term I, Quiz & End Term
12.	Class Fundamentals, Declaring Objects	Demonstrate the use of class and relationship between class and real world object	Lecture, Practice questions	1304.2 & 1304.6	Mid Term I, Quiz & End Term
13.	Methods in Classes, returning values, parameterized methods	Illustrate the use of methods and develop	Lecture, Practice questions	1304.2 & 1304.6	Mid Term I, Quiz & End Term
14.	Constructors, parameterized constructors	Show the working of	Lecture, Practice	1304.2 & 1304.6	Mid Term I, Quiz & End Term

15.	This keyword, This Constructor, Constructor Chaining	Explain flow of control among constructor and	Lecture, Practice questions	1304.2	Mid Term I, Quiz & End Term
16.	Tutorial	Analyse real world scenario and experiment with different classes	Activity	1304.2	Mid Term I, Quiz & End Term
17.	Garbage Collection, finalize() method	Understand how	Lecture	1304.2	Mid Term I, Quiz & End Term
18.	Overloading Methods, Using Objects as parameters, Argument passing, Returning Objects	Understand polymorphism and experiment with different scenario of overloading	Lecture, Practice questions	1304.2	Mid Term I, Quiz & End Term
19.	Recursion, Access Control	Illustrate the working of different access modifier	Lecture, Practice questions	1304.2 & 1304.3	Mid Term I, Quiz & End Term
20.	Tutorial	Analyse real world scenario and experiment with different classes	Practice questions	1304.2	Mid Term I, Quiz & End Term
21.	Static, final keyword	Explain static and final keyword s	Lecture, Practice questions	1304.2 & 1304.3	Mid Term II, Quiz & End Term
22.	Nested and Inner class	Demonstrate the use of inner class and relationship with real	Lecture, Practice questions	1304.2 & 1304.3	Mid Term II, Quiz & End Term
23.	Tutorial	Experiment with different access modifier and inner class	Practice questions	1304.2 & 1304.3	Mid Term II, Quiz & End Term
24.	Using Command line arguments ,I/O Basics, reading Console Input and Writing Console Output	Illustrate different input mechanism	Flipped classroom	1304.1 & 1304.2	Mid Term II, Quiz & End Term
25.	PrintWriter Class, Scanner Class			1304.1 & 1304.2	Mid Term II, Quiz & End Term
26.	reading and Writing Files, Closing files			1304.1 , 1304.2 &1304.5	Mid Term II, Quiz & End Term
27.	Inheritance Basics, Using Super, Creating multilevel hierarchy	Demonstrate the concept of generalization and specialization	Lecture, Practice questions	1304.3	Mid Term II, Quiz & End Term
28.	Method overriding, Dynamic method dispatch, Using			1304.3	Mid Term II, Quiz & End Term
29.	Tutorial			1304.3	Mid Term II, Quiz & End Term

30.	Packages, Access protection, Importing packages, static import	Built their own package show how to use predefine package	Lecture, Practice questions	1304.3	Mid Term II, Quiz & End Term
31.	Interfaces, default Interface methods	Demonstrate the use of interface and relationship between interface and real world object	Lecture, Practice questions	1304.3	Mid Term II, Quiz & End Term
32.	Comparator and comparable interface			1304.3	Mid Term II, Quiz & End Term
33.	static methods in interfaces			1304.3	Mid Term II, Quiz & End Term
34.	Tutorial			1304.3	Mid Term II, Quiz & End Term
35.	Fundamentals, Exception types, Uncaught Exceptions,	Understand the concept of exception and demonstrate different handling mechanism	Lecture, Practice questions	1304.2 & 1304.6	Mid Term II, Quiz & End Term
36.	Using try and catch, multiple catch clauses, nested try			1304.2 & 1304.6	Mid Term II, Quiz & End Term
37.	Throw, throws, finally, built-in exceptions, creating own exception Sub classes			1304.2 & 1304.6	Mid Term II, Quiz & End Term
38.	Tutorial			1304.5	Mid Term II, Quiz & End Term
39.	Thread Model: thread priorities, synchronization, messaging	Understand the concept of parallel programming and Experiment with multi thread model	Lecture, Practice questions	11304.2 & 1304.6	Quiz & End Term
40.	main thread, creating single thread and multiple threads, using isAlive(), join()			1304.2 & 1304.6	Quiz & End Term
41.	Interthread communication, suspending, resuming and stopping threads, using multithreads			1304.2 & 1304.6	Quiz & End Term
42.	Tutorial			1304.5	Quiz & End Term
43.	String class and it's methods	Illustrate the use of string and experiment with different string	Flipped classroom	1304.4	Quiz & End Term
44.	Character extraction, comparision, searching and			1304.4	Quiz & End Term
45.	String Buffer Class			1304.4	Quiz & End Term
46.	Collection framework, Arraylist ,	Recall different user define data structure and experiment with pre define java class to implement data	Lecture, Practice questions	1304.4	Quiz & End Term
47.	LinkList, HashMap,Vector			1304.4	Quiz & End Term
48.	Making own generics class			1304.4	Quiz & End Term
49.	Tutorial			1304.4	Quiz & End Term
50.	GUI lifecycle, Events, Events listener, adapter classes	Understand Event – listner and built GUI for real world problem	Lecture, Practice questions, flipped classroom	1304.4 & 1304.5	Quiz & End Term
51.	Different Event classes			1304.4 & 1304.5	Quiz & End Term
52.	Event Listener Interfaces			1304.4 & 1304.5	Quiz & End Term

B. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PS04
CS 1304.1	Students will be able to understand and learn how to compile and execute a simple as well as complex Java Application using Command Based Interface as well as using Eclipse Tool.	**1**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**1**	**1**	**1**	**2**	**-**	**-**	
CS 1304.2	Learn and apply the concepts of encapsulation and abstraction using class, objects and interfaces.	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**1**	**2**	**-**	**-**	
CS 1304.3	Students will be able to develop and Implement various inheritance and polymorphism forms using Java Classes and Interfaces.	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**1**	**3**	**-**	**-**	
CS 1304.4	Student will be able to Implement various collection data structure such as linked lists, queues, stacks using Java's collection framework.	**3**	**2**	**2**	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**1**	**2**	**-**	**-**	
CS 1304.5	Student will be able to understand, learn and finally Implement the use of advanced programming constructs/features such as exception handling, multithreading and event handling in real-life programming domains.	**3**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**1**	**2**	**-**	**-**	
CS 1304.6	Visualize a real world problem in the form of various collaborating classes and objects for employability.	**1**	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**2**	**3**	**-**	**-**	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing and IT

Department of Computer and Communication Engg.

Course Hand-out

Design & Analysis of Algorithm Lab | CS1530 | 1 Credit | 0 0 2 1

Session: 2018-19| Dr. Sunil Kumar/Dr. Manoj Sharma | Class: V CSE

1. Introduction**:** This course is offered by Computer Science and Engg. Dept., targeting students who wish to learn new technologies, idea and research in industries or higher studies in field of Computer Science, IT and Communication Engineering. This course is designed to develop analytical skills to enable students design algorithms for various applications, and to analyze the algorithms. The mathematical analysis of algorithms is also discussed.

2. **Course Outcomes:** At the end of the course, students will be able to

   [CS1530.1] Implement algorithms in computer language efficiently.

   [CS1530.2] Analyze the algorithm time complexity and correlate it with the time profile of the code.

   [CS1530.3] Design and implement divide and conquer algorithms like merge sort, heap sort and quick sort etc. and analyze different cases.

   [CS1530.4] Design and implement greedy, dynamic and graph based algorithms and compare the time complexities wherever possible, hence develop employability skills.

3. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

   [PO.1] E**ngineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

   [PO.2] Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

   [PO.3] Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

   [PO.4] Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and

   [PO.5] Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

   [PO.6] The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7] Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8] Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9] Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10] Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11] Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12] Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

4. Program Specific Outcomes (PSOs)

At the end of the B Tech CCE program, the student:

[PSO 1]. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

[PSO 2]. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

[PSO 3]. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

[PSO 4]. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

5. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Continuous Assessments	70
Exam(Summative)	Exam (Small Project/Exam)	30
	Total	100
Attendance	A minimum of 75% Attendance is required to be maintained by a	

(Formative)	student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.

6. SYLLABUS

Review of Algorithm and write programs on Sorting Method, Greedy approach, Dynamic programming, Trees, Graphs, Branch & Bound using C language.

7. Text Books:

1. E. Horowitz, S. Sahni and S. Rajasekaran, *"Computer Algorithms"*, 2nd Edition, University Press, 2007.

2. T. H. Cormen, C. E. Leiserson, R.L.Rivest, and C. Stein, "*Introduction to Algorithms*", 3rd Edition, MIT press, 2009.

8. Reference Book:

A. V. Aho, J. E. Hopcroft and J. D. Ullman, "*The Design and Analysis of Computer Algorithms*", 1st Edition, Pearson Education, 1999.

9. LAB PLAN

Lec No	**Topics**	**Session Outcome**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing the Outcome**
a)	**Searching**	Programs based on Iterative Binary Search	Lab	CS1530.1 CS1530.3	Internal Evaluation Home Assignments External Evaluation
b)		Programs based on Recursive Binary Search	Lab	CS1530.1 CS1530.3	Internal Evaluation Home Assignments External Evaluation
c)	**Sorting**	Programs to implement Insertion Sort	Lab	CS1530.1 CS1530.3	Internal Evaluation Home Assignments External Evaluation
d)		Programs to implement Selection Sort	Lab	CS1530.1 CS1530.3	Internal Evaluation Home Assignments External Evaluation
e)		Programs to implement Merge Sort	Lab	CS1530.1 CS1530.3	Internal Evaluation Home Assignments External Evaluation
f)		Programs to implement Quick Sort	Lab	CS1530.1 CS1530.3	Internal Evaluation Home Assignments External Evaluation
g)	**Heap**	Programs to implement sorting a given list of elements in ascending order using the following sorting methods. HeapSort – MAX Heap and MIN Heap	Lab	CS1530.1 CS1530.3	Internal Evaluation Home Assignments External Evaluation
h)		Programs based on Priority Queue	Lab	CS1530.1 CS1530.3	Internal Evaluation Home Assignments External Evaluation
i)	**Greedy**	Programs to implement knapsack problem using greedy	Lab	CS1530.4	Internal Evaluation Home Assignments

	method	method.			External Evaluation
j)		Programs to implement the single source shortest path problem using greedy method. (Dijkstra's).	Lab	CS1530.4	Internal Evaluation Home Assignments External Evaluation
k)	**Spanning Trees**	Programs to implement following algorithms: a. Prim's b. Kruskal's	Lab	CS1530.4 CS1530.2	Internal Evaluation Home Assignments External Evaluation
l)	**Graph**	Programs to implement following algorithms: a. Breadth first search b. Depth first search	Lab	CS1530.4 CS1530.2	Internal Evaluation Home Assignments External Evaluation
m)	**Dynamic Programming**	Write a program to implement following algorithms: a. Fibonacci series dynamic programming using top-down approach. b. Fibonacci series dynamic programming using bottom-up approach.	Lab	CS1530.4	Internal Evaluation Home Assignments External Evaluation
n)		Write a program to implement longest integer sequence LIS.	Lab	CS1530.4	Internal Evaluation Home Assignments External Evaluation
o)		Write a program to implement longest common subsequence LCS.	Lab	CS1530.4	Internal Evaluation Home Assignments External Evaluation
p)		Write a program to implement Binomial Coefficient using Dynamic Programming.	Lab	CS1530.4	Internal Evaluation Home Assignments

					External Evaluation
q)		Write a program for solving travelling sales person problem using dynamic programming.	Lab	CS1530.4	Internal Evaluation Home Assignments External Evaluation
r)	**Backtracking**	Consider the problem of eight queens on a chess board. Two queens are said to attack each other if they are on the same row, column or diagonal. Write a program that implements back tracking algorithm to solve the problem i.e., place eight non-attacking queens on the board.	Lab	CS1530.2	Internal Evaluation Home Assignments External Evaluation
s)	**Randomization**	Write a program to implement Randomized Quick sort.	Lab	CS1530.2	Internal Evaluation Home Assignments External Evaluation
t)		Write a program to implement Graph Coloring Problem.	Lab	CS1530.2	Internal Evaluation Home Assignments External Evaluation

10. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
[CS1530.1]	Implement algorithms in computer language efficiently.	3	1		2	3	2	0	0	2	1	0	3	3			
[CS1530.2]	Analyze the algorithm time complexity and correlate it with the time profile of the code.		2	2											2	1	
[CS1530.3]	Design and implement divide and conquer algorithms like merge sort, heap sort and quick sort etc. and analyze different cases.		1	2										1		2	
[CS1530.4]	Design and implement greedy, dynamic and graph based algorithms and compare the time complexities wherever possible.		1	2	2											3	2

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer and Communication Engineering
Course Hand-out

Internet of Things| CC 1653 | 3 Credits | 2 1 0 3

Session: January 18 – June 18 | Faculty: Dr Kusum Lata Jain | Class: Department Elective

A. Introduction: The future Internet will comprise not only millions of computing machines and software services but also billions of personal and professional devices, diminutive sensors and actuators, robots, and so on, and trillions of sentient, smart, and digitized objects. It is an overwhelmingly accepted fact that the fast-emerging and evolving Internet of Things (IoT) idea is definitely a strategic and highly impactful one to be decisively realized and passionately sustained with the smart adoption of the state of-the-art information communication technology (ICT) infrastructures, a bevy of cutting-edge technologies, composite and cognitive processes, versatile and integrated platforms, scores of enabling tools, pioneering patterns, and futuristic architectures. Industry professionals and academicians are constantly looking out for appropriate use and business and technical cases in order to confidently and cogently proclaim the transformational power of the IoT concept to the larger audience of worldwide executives, end users, entrepreneurs, evangelists, and engineers.

B. Course Outcomes: At the end of the course, students will be ableto

[1653.1 (CO 1)]. To explain the vision of IoT from a global context
[1653.2 (CO 2)]. To demonstrate sensors and embedded systems work
[1653.3 (CO 3)]. To demonstrate how the IoT devices communicate
[1653.4 (CO 4)]. To explain storage, analysis and visualize sensor data
[1653.5 (CO 5)]. To design end-to-end IoT applications

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems

[PO.2]. **Problem analysis**: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

[PO.3]. **Design/development of solutions**: Upon analysing, the B Tech CCE graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

[PO.4]. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

[PO.6]. **The engineer and society**: The engineers are called society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

[PO.7]. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

[PO.8]. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

[PO.9]. **Individual and team work**: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[PO.10]. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO.11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

[PSO.1]. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

[PSO.2]. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

[PSO.3]. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

[PSO.4]. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	15
	Sessional Exam II (Closed Book)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Closed Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

E. SYLLABUS

Introduction: read data sheet, analog and digital signals, serial communication, RF and sensors; Introduction to JSON/XML; **Database Basics**: create database, tables, SQL queries; **Programming on Development Boards:** Understanding of the board, tool chain and development environment setup; **Sensors and Actuators:** Understanding and using analog, digital, SPI, UART, I2C; **Nodes and communication protocols:** Understanding usage of nodes and gateways for sensor communication and external communication, RF, Zigbee, BT, WI-FI, GSM; IoT Cloud Platform, Cloud using Web Services, Cloud Computing Services for Sensor Management, Python Script; **Big Data Analytics:** Mongo DB, Map Reduce, Using cloud APIs for analytics, Visualization, NVD3, Mobile interfacing.

F. TEXT BOOKS

1. V. Madisetti, A. Bahga, "Internet of Things: A Hands-On- Approach", 1st Edition, VPT, 2014.

G. REFERENCE BOOKS

1. Rajkumar Buyya, Amir Vahid Dastjerdi, "Internet of Things Principles and Paradigms", 2016.

2. Hwaiyu Geng, “Internet of Things Principles and Data Analytics Handbook”, Wiley, 2017.

3. Pethuru Raj, Anupama C. Raman, “The Internet of Things Enabling Technologies, Platforms, and Use Cases”, CRC Press, 2017.

H. Lecture Plan:

Lectures	Major Topics	Topics	Sessional Outcomes	Mode of Delivery	Corresponding CO	Mode Of Assessing CO
1.	Introduction (Lecture 1-7)	Introduction to IoT, definition and characteristics of IoT	To Define IoT	Lecture	1653.1	Mid Term I, Quiz & End Term
2.		Physical design of IoT, Things in IoT, IoT Protocols	To Identify Physical Design of IoT	Lecture	1653.1	Mid Term I, Quiz & End Term
3.		Logical design of IoT, IoT Functional Blocks, IoT Communication Models	To Identify Logical and Functional Design of IoT	Lecture	1653.1	Mid Term I, Quiz & End Term
4.		IoT Communication APIs, Brief about IoT Enabling Technologies-Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems	To Explain Basic Components of IoT	Lecture	1653.1	Mid Term I, Quiz & End Term
5.		IoT Levels and Deployment Templates, IoT Level 1, IoT Level 2, IoT Level 3, IoT Level 4, IoT Level 5, IoT Level 6.	To Identify Level of IoT	Lecture	1653.1	Mid Term I, Quiz & End Term
6.		Domain Specific IoTs & their applications- Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle.	To Explain IoT Application	Flipped Class	1653.1	Mid Term I, Quiz & End Term
7.		Domain Specific IoTs: Agriculture, Industry, Health and Lifestyle.	To Explain IoT Application	Flipped Class	1653.1	Mid Term I, Quiz & End Term
8.	Introduction to M2M & Design Methodology (8-12)	Introduction, Difference between IoT and M2M	To Explain M2M	Lecture	1653.2	Mid Term I, Quiz & End Term
9.		SDN and NFV for IoT	To Explain SDN and NFV	Lecture	1653.2 & 1653.3	Mid Term I, Quiz & End Term
10.		IoT Design Methodology- Purpose and Requirements Specifications, Process Specification	To identify Purpose and Requirement	Lecture	1653.3& 1653.5	Mid Term I, Quiz & End Term
11.		IoT Level Specification, Functional View Specification, Operational View Specification,	To define Level Specification , Functional and operational view	Lecture	1653.3& 1653.5	Mid Term I, Quiz & End Term

		Device and Component Integration,				
12.		Application Development & Introduction to Node	To define Application development for IoT and Node requirement	Lecture	1653.3& 1653.5	Mid Term I, Quiz & End Term
13.	Python & Exemplary Devices (13-25)	IoT Systems- Logical Design using Python, Python Data Types and Data Structure	To define python data type & structure	Lecture	1653.3& 1653.5	Mid Term I, Quiz & End Term
14.		Python control flow, functions, packages, File Handling, Date/Time Operations.	To define Operations in Python	Lecture	1653.3& 1653.5	Mid Term I, Quiz & End Term
15.		Python Packages of Interest for IoT : JSON, XML, HTTPLib & URLLib, SMTPLib	To describe python packages for IoT	Activity	1653.3& 1653.5	Mid Term I, Quiz & End Term
16.		Arduino. Arduino Interfaces: Serial	To demonstrate Ardunio	Lecture & Activity	1653.3& 1653.5	Mid Term I, Quiz & End Term
17.		Programming Arduino: Controlling LED, Interfacing various sensors with Arduino	To programme Ardunio	Lecture & Activity	1653.3& 1653.5	Mid Term II, Quiz & End Term
18.		Interfacing various sensors with Arduino	To Demonstrate interfacing of sensor with Ardunio	Lecture & Activity	1653.3& 1653.5	Mid Term II, Quiz & End Term
19.		Interfacing various sensors with Arduino	To Demonstrate interfacing of sensor with Ardunio	Lecture & Activity	1653.3& 1653.5	Mid Term II, Quiz & End Term
20.		Raspberry pi. Raspberry pi Interfaces: Serial, SPI,I2C	To demonstrate Raspberry Pi	Lecture & Activity	1653.3& 1653.5	Mid Term II, Quiz & End Term
21.		Raspberry pi Interfaces: Serial	To demonstrate Raspberry Pi Interfacing	Lecture & Activity	1653.3& 1653.5	Mid Term II, Quiz & End Term
22.		Interfaces: I2C	To demonstrate Raspberry Pi Interfacing	Lecture & Activity	1653.3& 1653.5	Mid Term II, Quiz & End Term
23.		Programming Raspberry pi: Controlling LED	To programme Raspberry pi	Lecture & Activity	1653.3& 1653.5	Mid Term II ,Quiz & End Term
24.		Interfacing various sensors with Raspberry pi	To Demonstrate interfacing of sensor with Raspberry pi	L Lecture & Activity	1653.3& 1653.5	Mid Term II ,Quiz & End Term

25.		Interfacing various sensors with Raspberry pi	To Demonstrate interfacing of sensor with Raspberry pi	Lecture & Activity	1653.3& 1653.5	Mid Term II ,Quiz & End Term
26.	IoT Physical Servers & Cloud Offering (26-33 Lecture)	Introduction to cloud storage	To define Cloud Storage	Lecture	1653.4	Mid Term II , Quiz & End Term
27.		Cloud storage models	To explain storage Model	Lecture	1653.4	Mid Term II , Quiz & End Term
28.		communication APIs	To explain communication API	Lecture	1653.4	Mid Term II , Quiz & End Term
29.		ThinkSpeak, Xively, AWS, Azure	To explain communication API	Lecture	1653.4	Mid Term II , Quiz & End Term
30.		Python Web Application Framework- Django, MongoDB	To Explain Web Application Framework	Lecture	1653.4	Quiz & End Term
31.		Django Architecture and development with Django	To Explain Web Application Framework	Lecture	1653.4	Quiz & End Term
32.		Amazon Web Services for IoT	To Explain Web Service for IoT	Lecture	1653.4	Quiz & End Term
33.		Amazon Web Services for IoT	To Explain Web Service for IoT	Lecture	1653.4	Quiz & End Term
34.	Data Analysis for IoT (34-35 Lecture)	Data Analytics for IoT: Apache Hadoop, MapReduce programming Model	To Explain Data Analytics	Lecture	1653.4	Quiz & End Term
35.		Different tools for IoT: Chef	To Explain Data Analytics	Lecture	1653.4	Quiz & End Term
36.	Case Study of IoT Design (35-39 Lecture)	Case Study of IoT Design- Home Automation, Cities, Environment,	To Identify IoT design	Flipped Class	1653.5	Quiz & End Term
37.		Case Study of IoT Design Energy, Retail, Logistics, Agriculture,	To Identify IoT design	Flipped Class	1653.5	Quiz & End Term
38.		Case Study of IoT Design- Industry, Health and Lifestyle.	To Identify IoT design	Flipped Class	1653.5	Quiz & End Term
39.		Conclusion and Course Summarization	NA		All	

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CC 1653.1	To explain the vision of IoT from a global context.	3		3		1								3			
CC 1653.2	To demonstrate sensors and embedded systems work	3	3	2	3										2	3	
CC 1653.3	To demonstrate how the IoT devices communicate			3	3	3								1	3	2	
CC 1653.4	To explain storage, analysis and visualize sensor data																
CC 1653.5	To design end-to-end IoT applications			3												2	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing and IT

Department of Computer and Communication Engg.

Course Hand-out

Data Structures Lab | CS1331 | 1 Credit | 0 0 2 1

Session: July 18 – Nov 18 | Faculty: Manoj K Bohra | Class: III CCE

A. Introduction: This course is offered by Computer Science and Engg. Dept., targeting students who wish to pursue development and research in industries or higher studies in field of Computer Science, IT and Communication Engineering. This course will form the base of computer science and engineering and hence this course is introduced at this level to make the students understand various ways of organizing data and storing it into memory and use the type depending upon the application.

B. Course Outcomes: At the end of the course, students will be able to

[CS1331.1] explain basic concepts of various data structures

[CS1331.2] describe how arrays, linked lists, stacks, queues, trees and graphs are represented in memory and their operations

[CS1331.3] select and/or apply appropriate data structures to solve problems.

[CS1331.4] Implement various sorting and searching algorithms

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1] Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2] Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3] Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4] Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5] Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6] The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7] Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8] Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9] Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10] Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11] Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12] Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

[PSO.1] Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information

sharing, signal processing, web based systems, smart devices and communication technology.

[PSO.2] Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

[PSO.3] Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

[PSO.4] Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Continuous Assessments	70
Exam (Summative)	Exam (Small Project/Exam)	30
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a lab will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 2 throughout the entire semester.	

E. SYLLABUS

Review of C and programs on Recursion, Stacks, Stacks, Queues, lists, Trees, Graphs, using C language.

F. TEXT BOOKS

T1. Ellis Horowitz, Sartaj Sahni and Susan Anderson-Freed, *"Fundamentals of Data Structures in C"*, University Press (India) Pvt. Ltd., 2014.

G. REFERENCE BOOKS

R1. Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein, "*Data Structures using C*", Pearson Education, 2013.

R2. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "*Data Structures and Algorithms*", Pearson Education, 2012

R3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, " *Introduction to algorithms*", PHI, Third Edition, 2009

R4. Seymour Lipschutz, "*Data Structures with C* (Schaum's Outline Series)", McGraw Hill Education Private Limited, 2011.

R5. Mark Allen Weiss, *"Data structures and Algorithm Analysis in C",* Pearson, Second edition, 2014.

H. LAB PLAN

Lec No	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1.	**Arrays**	Programs based on 1-D array operations	Lab	CS1331.1 CS1331.3	Internal Evaluation Home Assignments External Evaluation
2.		Programs based on 2-D array operations	Lab	CS1331.1 CS1331.3	Internal Evaluation Home Assignments External Evaluation
3.		Programs based on 2-D array operations with pointer notations	Lab	CS1331.1 CS1331.2	Internal Evaluation Home Assignments External Evaluation
4.	**Linked List**	Programs to implement singly linked-list list operations	Lab	CS1331.2 CS1331.3	Internal Evaluation Home Assignments External Evaluation
5.		Programs to implement Circular Linked list and Doubly-linked list operations	Lab	CS1331.1 CS1331.2	Internal Evaluation Home Assignments External Evaluation
6.	**Stacks**	Programs to implement stack and its operations	Lab	CS1331.2 CS1331.3	Internal Evaluation Home Assignments External Evaluation
7.		Programs based on implementation of stack	Lab	CS1331.1 CS1331.2	Internal Evaluation Home Assignments External Evaluation
8.	**Queue**	Programs based on implementation of queue and its operations	Lab	CS1331.2 CS1331.3	Internal Evaluation Home Assignments External Evaluation

9.	**Tree**	Programs to implement tree and its operations	Lab	CS1331.1 CS1331.2 CS1331.3	Internal Evaluation Home Assignments External Evaluation
10.		Programs based on implementation of trees	Lab	CS1331.3	Internal Evaluation Home Assignments External Evaluation
11.	**Graph**	Programs to implement graph and its operations	Lab	CS1331.1 CS1331.2	Internal Evaluation Home Assignments External Evaluation
12.		Programs based on implementation of graphs	Lab	CS1331.2 CS1331.3	Internal Evaluation Home Assignments External Evaluation
13.	**Sorting and Searching**	Programs to perform sorting using different sorting techniques over data	Lab	CS1331.2 CS1331.4	Internal Evaluation Home Assignments External Evaluation

A. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CS 1331.1	explain basic concepts of various data structures	3	2		1		1	1	1		1		2	3			1
CS 1331.2	describe how arrays, linked lists, stacks, queues, trees and graphs are represented in memory and their operations		1	2	1	1	1	1		1	1	1	2		2	2	
CS 1331.3	select and/or apply appropriate data structures to solve problems.		1	2		1	1	1	1	1	1	1	2		2	2	
CS 1331.4	Implement various sorting and searching algorithms		1	2			1		1	1		1	2	2		1	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology.

Department of Computer and Communication Engineering

Course Hand-out

Value, Ethics & Governance BB1101[2 Credits] [2 0 0 2]

Session: 2018-19| Faculty: | Class:

Introduction: The course is offered to understand Moral Values and Ethics in personal as well as professional life. It is basic requirement of every human to be a good human being and a good citizen. It further imparts him basics of corporate governance so as to empower him to work technically and professionally in any organization with confidence and conviction and at the same time with honesty & integrity.

A. Course Objectives: At the end of the course, students will be able to

[1101.1] Understand meaning and relevance of Value and Ethics and apply in personal & professional life.
[1101.2] Understand and describe the importance of three Gunas for self-development, lifelong learning & growth.
[1101.3] Understand the issues and identify solutions related to Public & Private Governance systems.
[1101.4] Realize the relevance of Company's Act 2013 with reference to corporate world.
[1101.5] Recognize role and key objectives of organizational governance in relation to ethics and law.
[1101.6] Commit and assess for social & environmental responsibilities of corporate for sustainability, harmony and employability.

B. Program Outcomes and Program Specific Outcomes

PROGRAM OUTCOMES

[PO.1]. Engineering knowledge: Demonstrate and apply knowledge of Mathematics, Science and Engineering to classical and recent problems of electronic design & communication system.

[PO.2]. Problem ana lys is : Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of so lutio ns : Design a component system, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.

[PO.4]. Conduct investigatio ns of co mplex problems : Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environment.

[PO.12]. Life- long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. An ability to understand the concepts of basic Electronics & Communication Engineering and to apply them to various areas like signal processing, VLSI, Embedded systems, Communication Systems, Digital & Analog Devices, etc.

[PSO.2]. An ability to solve complex Electronics Communication Engineering problems, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions.

[PSO.3]. Wisdom of social and environmental awareness along with ethical responsibility to have a successful career and to sustain passion and zeal for real applications using optimal resources as an Entrepreneur.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Mid Sem Exam I (Close Book)	15
	Mid Sem Exam II (Close Book)	15
	In class Quizzes Assignments	5 (15 marks) 6 (15 marks)
End Term Exam (Summative)	End Term Exam (Open Book)	40

	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

D. Syllabus:

Values: Relevance of Value Education in day-to-day life. Mantra for success - Value, Moral and Ethics.
Determinants of human nature (Three Gunas) and its impact on human life.
Relevance of traits like Personality, Attitude, Behaviour, Ego, Character, introspection, Motivation, Leadership and 4 Qs with relevant Case Studies*.
Governance: Understanding of Public and Private sector Governance systems; Courts & CAG.
Public Sector Governance: Need, relevance, stakeholders.
Private Sector Governance: Proprietary, Partnership, Company (Pvt Ltd & Ltd), Company' Act 2013, Board of Directors; its Roles and Responsivities. Regulatory bodies; its role in ethical governance.
Projects on PPP mode-relevance & prospects.
CSR: Relationship with Society, Philanthropy and Business strategy, CSR Policy, Triple Bottom Line

E. Text / Reference Books:

1. Gaur R.R., Sangal R. and. Bagaria, G.P:"A Foundation Course in Human Values Professional Ethics," Excel Books, 2010.
2. Sadri S & Sadri, J Business Excellence through Ethics & Governance, 2nd edition, 2015.
3. Mathur, U C Corporate Governance and business ethics, MacMillan India Ltd, 2009.
4. Baxi, C V: Corporate Governance, Excel Books, 2009
5. Sadri S, Sinha A K and Bonnerjee, P: Business Ethics: concepts and cases, TMH, 1998.

F. Lecture Plan:

Lec No	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	Introduction: Values: Meaning & Relevance of value education	To acquaint and clear teacher's expectations and understand student expectations. Basics of	Lecture	BB 1101.1	In class Quiz Mid Term I End Term Exam

		Value Education			
2	Success: Meaning in perspective of morals & ethics	To understand the concept of success achieved with or without morals / ethics/ values	Lecture, case study	BB 1101.1	In class Quiz Mid Term I End Term Exam
3	Professional Ethics & ethical dilemmas	To understand the role of professional ethics in the life & deal with dilemmas	Lecture	BB 1101.1	In class Quiz, assignment Mid Term I End Term Exam
4,5	Three Gunas and their relevance, Nature and kinds of value	Understand basic traits in one's personality, its causes and relevance with value based living.	Lecture	BB 1101.2	In Class Quiz, Mid Term I End Term
6,7	Relevance of traits of individual like Personality, Attitude, Behaviour	To acquaint & develop positive traits of personality in oneself	Short stories, Lecture	BB 1101.2	Class Quiz assignment Mid Term I End Term
8.9	Ego, Character, introspection, Motivation	To acquaint & develop positive traits of personality in oneself and understand negative traits	Lecture Short stories	BB 1101.2	In Class Quiz Mid Term I End Term
10,11	Leadership traits & 4Qs	To realize importance of leadership and to imbibe in life	Lecture Short stories	BB 1101.2	In Class Quiz assignment Mid Term I End Term
12	Governance & its relevance	To acquaint with the concept of Governance	Lecture	BB 1101.3	In Class Quiz Mid Term II End Term
13, 14	Public Sector Governance: Need, relevance, stakeholders	Understand various aspects of public sector governance	Lecture	BB 1101.3	Class Quiz, Mid Term II End Term
15	Public Finance, Audit & Control	Understand basics of Public Finance, Check & balance	Lecture Case study	BB 1101.3	Class Quiz, assignment Mid Term II End Term
16,17	Private Sector Governance, proprietary & partnership firms and corporate, PPP mode projects	Understand meaning of proprietary & partnership in a firm / company and perspective in PPP mode	Lecture Short stories	BB 1101.3 & 1101.4	Class Quiz Mid Term II End term
18, 19	Company' Act 2013 : Roles & Responsibilities of Directors & regulatory authorities	Explain various Regulations and practices of Corporate Governance internationally & understand key role of directors	Lecture	BB 1101.4	Class Quiz Mid Term II End Term
20	Role of Ethics in Governance	Recognize the necessity of ethics & transparency in Governance	Movie : Gandhi	BB 1101.5	Class Quiz, assignment Mid Term II End Term
21, 22	CSR: Relationship with Society, Philanthropy and Business strategy	To understand the relevance of giving back to society by a corporate & its importance in society	Lecture, case study	BB 1101.6	Class Quiz, End Term
23, 24	CSR Policy, Triple Bottom Line	Understand the concept of TBL in organizational frameworks	Lecture case study	BB 1101.6	Class Quiz assignment End Term

25,26	Case studies	Recall contents and their importance through case studies.	Flipped Class	ALL	Class Quiz End Term

Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATI ON WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PS04
BB1101.1	Understand meaning and relevance of Value and Ethics and apply in personal & professional life.	3							1			2					
BB1101.2	Understand and describe the importance of three Gunas for self-development, lifelong learning & growth.		1	2	1	1			1	1	1		2	2	1	1	1
BB1101.3	Understand the issues and identify solutions related to Public & Private Governance systems.	2					2	1		1	2	2					
BB1101.4	Realize the relevance of Company's Act 2013 with reference to corporate world.		1			1			1	2				2			1
BB1101.5	Recognize role and key objectives of organizational governance in relation to ethics and law.			3				3	2	1			1			1	
BB1101.6	Commit and assess for social & environmental responsibilities of corporate for sustainability, harmony. growth and employability.							1				1	1			3	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

2-

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer & Communication Engineering
Course Hand-out

Relational Database Management Systems| CS 1402 | 4 Credits | 3 1 0 4

Session: 2018-19| Faculty: Dr. V. P. S. Dhaka, Dr. Arvind Dhaka, | Class: B.Tech. 2nd Year IV Semester (Core Course)

A. Introduction: This course introduces the concepts of Relational Database Management Systems. More emphasis will be given to understanding the internal working of database management systems and development of database application. Database Management System will be taught using MySQL and ERD plus.

B. Course Outcomes: At the end of the course, students will be able to

CS1402.1: Classify, Compare & recall different file based system, Data Model.

CS1402.2: Interpret and design Entity Relationship Model and illustrate the concept of cardinality, mapping and various constraints.

CS1402.3: Interpret different query language SQL, Relation Algebra, calculus and apply the techniques and rules in different problems.

CS1402.4: Compare different normalization technique for optimizing database and analyse database design

CS1402.5: Interpret and use the skills for transaction processing, concurrency and recovery techniques

CS1402.6: Apply the Database techniques in real life problems for developing the entrepreneurship skills.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations

[PO.6]. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Program Specific Outcomes (PSOs)

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	15
	Sessional Exam II (Closed Book)	15
	5 Quizzes (Open Book Mode), 1 MOOC, Video Assignments (Accumulated and Averaged)	20+5+5
End Term Exam (Summative)	End Term Exam (Closed Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. SYLLABUS

Introduction: Data, data processing requirement, traditional file based system, Def of database, database management system, 3-schema architecture, Benefits of DBMS. Database system applications, Purpose of database systems, Different database users. DBMSs, data driven development, OLAP, OLTP. **Data Modelling and ER/EER diagrams:** Conceptual data model, Conceptual data modelling using E-R data model, entities, attributes, relationships,

Generalization, specialization, specifying constraints. **Relational Algebra and Calculus:** Selection and projection set operations, renaming - Joins – Union, intersection, Division, Examples of Algebra overviews, Relational calculus, Tuple relational Calculus, Domain relational calculus, Expressive Power of Algebra and calculus. **Relational Model, ER mapping to corresponding relational models & Relational Algebra:** the relational data model, relational constraints and the relational algebra, relational model concepts, relational constraints and relational database schemas, update operations and dealing with constraints violations, basic relational algebra operations, additional relational operations, examples of queries in relational database design using ER-to-Relational Mapping**. SQL:** Data definition, Constraints and schema changes in SQL2, Basic queries in SQL, more complex SQL queries, Insert, Delete and Update statements in SQL, Views (Virtual tables) in SQL, Specifying General Constraints as assertion, Additional features of SQL. **Database Design & Normalisation :** Def of relation, relational model operators, Keys, relational model integrity rules, Functional dependencies and normalization for relational databases :Informal design guidelines for schemas, functional dependencies, Normal forms based on Primary keys, General definitions of second and third normal forms, Boyce-Codd normal form, Relational database algorithms and further dependencies: Algorithms for relational database schema design, multivalued dependencies and fourth normal form. **Transaction Processing & Management:** Transaction concept &State, Concurrency Control: Lock Based Protocols, Multiple granularity, Deadlocks. **Recovery:** Recovery & Atomicity, Log based Recovery. **Concurrency control mechanisms:** concurrency control techniques: Locking techniques for concurrency control techniques, concurrency control based on Timestamp ordering, multiversion concurrency control techniques, validation (optimistic) concurrency for concurrency control in indexes, some other concurrency control issues. **File Storage,** Indexing & Hashing: File structures, RAID Level, Order indices, B+-Tree Indices File, B+-Tree extensions, Multiple Key Access, Static Hashing and Dynamic Hashing.

F. TEXT BOOKS

1. Avi Silberschatz, Henry F. Korth, S. Sudarshan, “Database System Concepts”, TMH, New Delhi, 2006
2. R. Elmasri, S. B. Navathe, “Fundamentals of Database Systems”, Addison & Weisely, New Delhi, 2008

G. REFERENCE BOOKS

1. C. J. Date, “Database Systems”, Prentice Hall of India, New Delhi, 2012
2. Raghu Ramakrishnan, “Database Management Systems (2nd Ed)”, McGraw Hill, 2000.
3. Ivan Bayross, “Introduction to SQL”, Tata McGraw, 2010.

H. Lecture Plan: 54 Lectures

Lectures	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode Of Assessing CO
1.	Introduction to Data, data processing requirement, desirable characteristics of an ideal data processing system.	Classify, Compare & recall different file based system, Data Model.	PPT, Lecture, Class Notes	1402.1	N. A.
2.	Traditional file based system, its drawback, File processing systems versus database management systems.	Compare file systems and DBMS	PPT, Lecture, Class Notes	1402.1	Mid Term I, Quiz & End Term
3.	Data Models, Schemas and Instances. Categories of Data Models.	Classify and Compare different Data Model.	PPT, Lecture, Class Notes	1402.1	Mid Term I, Quiz & End Term
4.	Three Schema Architecture, Data Independence (Logical & Physical).	Classify and Compare various architectures and data independence.	PPT, Lecture, Class Notes	1402.1	Mid Term I, Quiz & End Term
5.	Benefits of DBMS. Database system applications, Purpose of database systems, Different database users.	Classify, Compare & recall different file based system, Data Model.	PPT, Lecture, Class Notes	1402.1	Mid Term I, Quiz & End Term
6.	Conceptual data model, Conceptual data modelling using E-R data model.	Understand and design Entity Relationship Model and illustrate the concept of cardinality, mapping and various constraints.	PPT, Lecture, Class Notes	1402.1 & 1402.2	Mid Term I, Quiz & End Term
7.	Entity Types, Entity Sets, Attributes, Keys and Weak Entity type.	Understand and design Entity Relationship Model and illustrate the concept of cardinality, mapping and various constraints.	PPT, Lecture, Class Notes	1402.1 & 1402.2	Mid Term I, Quiz & End Term
8.	Relationship Types, Relationship Sets, Roles, and Structural Constraints.	Understand and design Entity Relationship Model	PPT, Lecture, Class Notes	1402.1 & 1402.2	Mid Term I, Quiz & End Term

		and illustrate the concept of cardinality, mapping and various constraints.			
9.	Enhanced Entity-Relationship (EER) Model: Subclass, Super classes and Inheritance.	Understand and design Entity Relationship Model and illustrate the concept of cardinality, mapping and various constraints.	PPT, Lecture, Class Notes	1402.1 & 1402.2	Mid Term I, Quiz & End Term
10.	Specialization and Generalization, Constraints and characteristics of Specialization and Generalization Hierarchies.	Understand the concepts of generalization and specialization and various constraints associated.	PPT, Lecture, Class Notes	1402.1 & 1402.2	Mid Term I, Quiz & End Term
11.	Relational Model Concepts: Domain, Attributes, Tuples and Relations.	Understand the concepts of relational model	PPT, Lecture, Class Notes	1402.1 & 1402.2	Mid Term I, Quiz & End Term
12.	Relational Model Constraints and Relational Database Schema: Domain Constraints, Key Constraints and Constraints on NULL Values.	Understand and design Entity Relationship Model and illustrate the concept of NULL values.	PPT, Lecture, Class Notes	1402.1 & 1402.2	Mid Term I, Quiz & End Term
13.	Entity Integrity, Referential Integrity and Foreign Keys.	Understand various concepts of key constraints.	PPT, Lecture, Class Notes	1402.1 & 1402.2	Mid Term I, Quiz & End Term
14.	Relational database design using ER-to-Relational Mapping.	Understand mapping of ER models into relations	PPT, Lecture, Class Notes	1402.1 & 1402.2	Mid Term I, Quiz & End Term
15.	Mapping EER Model constructs to Relations.	Understand mapping of EER models into relations	PPT, Lecture, Class Notes	1402.1 & 1402.2	Mid Term I, Quiz & End Term
16.	Relational Algebra: Unary Relational Operations SELECT and PROJECT.	Understand unary relational operations like SELECT and PROJECT	PPT, Lecture, Class Notes	1402.3	Mid Term I, Quiz & End Term
17.	Sequences of Operations and the RENAME Operation.	Understand the sequences of operations and the RENAME Operation.	PPT, Lecture, Class Notes	1402.3	Mid Term I, Quiz & End Term
18.	Relational Algebra Operation from Set Theory: UNION, INTERSECTION, CARTESIAN PRODUCT (CROSS PRODUCT) Operations.	Interpret different Relational Algebra operations and apply the techniques and rules in different problems	PPT, Lecture, Class Notes	1402.3	Mid Term I, Quiz & End Term

19.	Binary Relational Operations: JOIN and DIVISION Operation	Interpret JOIN and DIVISON operations and apply the techniques and rules in different problems.	PPT, Lecture, Class Notes	1402.3	Mid Term I, Quiz & End Term
20.	Variations of JOIN: THETA JOIN, EQUI JOIN, NATURAL JOIN, INNER JOIN and OUTER JOIN	Interpret different types of JOIN operations and apply the techniques and rules in different problems	PPT, Lecture, Class Notes	1402.3	Mid Term I, Quiz & End Term
21.	Additional Relational Operations: Generalized Projection, Aggregate Functions and Grouping.	Interpret additional Relational Algebra operations and apply the techniques and rules in different problems	PPT, Lecture, Class Notes	1402.3	Mid Term II, Quiz & End Term
22.	Tuple Relational Calculus: Tuple Variable and Range Relations, Expressions and Formulas in tuple relational calculus.	Interpret different Relational Calculus operations and apply the techniques and rules in different problems	PPT, Lecture, Class Notes	1402.3	Mid Term II, Quiz & End Term
23.	The Existential and Universal Quantifiers, Safe Expressions.	Understand existential and universal and existential quantifiers.	PPT, Lecture, Class Notes	1402.3	Mid Term II, Quiz & End Term
24.	Domain Relational Calculus.	Understand concepts of domain relational calculus.	PPT, Lecture, Class Notes	1402.3	Mid Term II, Quiz & End Term
25.	SQL Data Definition and Data Types, Specifying Constraints in SQL, Schema change statements in SQL.	Understand fundamentals of SQL	PPT, Lecture, Class Notes	1402.3	Mid Term II, Quiz & End Term
26.	Basic queries in SQL, More complex SQL queries: Comparisons involving NULL and Three-Valued Logic, Nested Queries, Tuples, and Set/Multiset Comparisons.	Interpret SQL and apply the techniques and rules in different problems	PPT, Lecture, Class Notes	1402.3	Mid Term II, Quiz & End Term
27.	Correlated Nested Queries, EXISTS and UNIQUE functions in SQL.	Interpret SQL and apply the techniques and rules in different problems	PPT, Lecture, Class Notes	1402.3	Mid Term II, Quiz & End Term
28.	Joined tables in SQL and Outer Joins, Aggregate functions in SQL.	Interpret SQL and apply the techniques and rules in	PPT, Lecture, Class Notes	1402.3	Mid Term II, Quiz & End Term

		different problems			
29.	GROUP BY, HAVING Clauses, INSERT, DELETE, AND UPDATE Statements in SQL.	Interpret SQL and apply the techniques and rules in different problems	PPT, Lecture, Class Notes	1402.3	Mid Term II, Quiz & End Term
30.	Views (Virtual tables) in SQL, Specifying General Constraints as assertion and Triggers, Additional features of SQL.	Interpret SQL and apply the techniques and rules in different problems	PPT, Lecture, Class Notes	1402.3	Mid Term II, Quiz & End Term
31.	Database Design: Redundant information in tuples and update anomalies, insertion anomalies, deletion anomalies and modification anomalies.	Understand the concepts of different anomalies and how they can be removed	PPT, Lecture, Class Notes	1402.4	Mid Term II, Quiz & End Term
32.	Properties of Relational Decompositions: Dependency preservation and Lossless join property of a decomposition.	Understand concepts of relational decompositions	PPT, Lecture, Class Notes	1402.4	Mid Term II, Quiz & End Term
33.	Functional Dependencies: Definition of functional dependencies, Inference rules for functional dependencies.	Understand concepts of functional dependencies	PPT, Lecture, Class Notes	1402.4	Mid Term II, Quiz & End Term
34.	Equivalence of sets of functional dependencies, Minimal sets of functional dependencies.	Understand the process of finding out equivalence among given sets of FDs and finding out minimal sets of functional dependencies	PPT, Lecture, Class Notes	1402.4	Mid Term II, Quiz & End Term
35.	Normal forms based on Primary keys, Normalization of relations, Definition of Super Key and Candidate Key. Definition of Prime and Non-Prime Attribute.	Understand different normalization techniques for optimizing database and analyse database design	PPT, Lecture, Class Notes	1402.4	Mid Term II, Quiz & End Term
36.	Normal Forms: First normal form, Second normal form.	Understand 1NF and 2NF	PPT, Lecture, Class Notes	1402.4	Mid Term II, Quiz & End Term
37.	Third normal form and Boyce-Codd normal form.	Understand 3NF and BCNF	PPT, Lecture, Class Notes	1402.4	Mid Term II, Quiz & End Term
38.	Multivalued dependencies and fourth normal form.	Understand concepts of multivalued dependencies	PPT, Lecture, Class Notes	1402.4	Mid Term II, Quiz & End Term

39.	Introduction to transaction processing, Desirable properties of transactions.	Understand and summarize transaction processing	PPT, Lecture, Class Notes	1402.5	Quiz & End Term
40.	Characterizing schedules based on recoverability.	Understand and summarize concepts of recoverability of schedules	PPT, Lecture, Class Notes	1402.5	Quiz & End Term
41.	Characterizing schedules based on Serializability: Serial, Nonserial and conflict serializable schedules.	Understand and summarize concepts of schedules	PPT, Lecture, Class Notes	1402.5	Quiz & End Term
42.	View equivalence and View Serializability.	Understand and summarize concepts of serializability	PPT, Lecture, Class Notes	1402.5	Quiz & End Term
43.	Concurrency control techniques: Two Phase locking Techniques (Binary Lock, Shared/Exclusive Lock).	Understand and summarize concurrency control techniques.	PPT, Lecture, Class Notes	1402.5	Quiz & End Term
44.	Basic 2PL, Strict 2PL, Rigorous 2PL.	Understand the concepts of locking for concurrency control	PPT, Lecture, Class Notes	1402.5	Quiz & End Term
45.	Deadlock prevention protocol (Wait-Die, Wound-Wait), Deadlock detection and starvation.	Understand different strategies of deadlock prevention and detection strategies	PPT, Lecture, Class Notes	1402.5	Quiz & End Term
46.	Concurrency control based on Timestamp Ordering (Basic TO, Strict TO and Thomas's Write Rule.	Understand concurrency control based on timestamp ordering.	PPT, Lecture, Class Notes	1402.5	Quiz & End Term
47.	Granularity of Data items and Multiple Granularity Locking.	Understand concepts of multiple granularity locking	PPT, Lecture, Class Notes	1402.5	Quiz & End Term
48.	Database Recovery Techniques: Recovery Concepts, Recovery Technique based on Deferred Update.	Understand and summarize recovery techniques.	PPT, Lecture, Class Notes	1402.5	Quiz & End Term
49.	Recovery Technique based on Immediate Update, Recovery Systems Check pointing and Shadow paging.	Understand and summarize recovery techniques.	PPT, Lecture, Class Notes	1402.5	Quiz & End Term
50.	File Storage: File structures (Fixed Length Record, Variable Length Record), Record Blocking and Spanned versus Un-spanned Records.	Explain different database storage structure and access technique	Lectures, Flipped Classroom	1402.6	Quiz & End Term
51.	RAID organization and Levels, Hashing	Explain RAID organization	Lectures, Flipped	1402.6	Quiz & End Term

	Techniques (Internal and External Hashing).	and Hashing techniques	Classroom		
52.	Indexing Structure: Single Level ordered indexes (Primary, Clustering, and Secondary).	Explain different indexing techniques	PPT, Lecture, Class Notes	1402.6	Quiz & End Term
53.	Multilevel Indexes, Dynamic multilevel indexes using B-Trees.	Explain different indexing techniques	PPT, Lecture, Class Notes	1402.6	Quiz & End Term
54.	Dynamic multilevel indexes using B+-Trees.	Explain different indexing techniques	PPT, Lecture, Class Notes	1402.6	Quiz & End Term

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CS 1402.1:	Classify, Compare & recall different file based system, Data Model	1												1			
CS 1402.2:	Understand and design Entity Relationship Model and illustrate the concept of cardinality, mapping and various constraints	3	3	2	2	1		1	1		1			2	2		1
CS 1402.3:	Interpret different query language SQL, Relation Algebra, calculus and apply the techniques and rules in different problems	2		1	3	1			1	1				2	2	1	
CS 1402.4:	Understand different normalization technique for optimizing database and analyse database design	2		3			2					1	1	2	3	1	1
CS 1402.5:	Interpret and use the skills for transaction processing, concurrency and recovery techniques	2	2	1		1	1							3	2		
CS 1402.6:	Apply the Database techniques in real life problems for developing the entrepreneurship skills.	1		1		1								2		1	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY
JAIPUR

SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER & COMMUNICATION ENGINEERING
COURSE HAND-OUT

Operating System Lab| CS 1431 | 1 Credit | 0 0 2 1

Session: 2018-19| Faculty: Dr. Ghanshyam Raghuwanshi, Dr. Geeta Rani, Dr. Pradeep Kumar

Class: B.Tech. 2nd Year IV Semester (Core Course)

A. Introduction:

The objective of this lab is to provide students practical knowledge of Unix Commands, various scheduling page replacement and deadlock handling algorithms and also to familiarize the students with the fundamental concepts, techniques and implementation details of operating systems. Participation in this course will enable students to compare the working behaviour and functions of different operating systems.

B. Course Outcomes: At the end of the course, students will be able to

[CS1431.1]: Explain basic Unix commands and write shell Scripts.

[CS1431.2]: Write system programs using file and process system calls and PThread API.

[CS1431.3]: Compare various algorithms used for process scheduling.

[CS1431.4]: Describe concepts related to concurrency and achieve the same for cooperating processes, develop skills to apply various deadlock handling strategies to solve resource allocation problems.

[CS1431.5]: Evaluate the performance of different memory management techniques and page replacement algorithms, hence develop employability skills.

C PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analysing, the graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are called society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to

assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Internal Assessment (Summative)	Continuous evaluation (Record+Execution+Viva)	60
	Lab project	10
End Term Exam (Summative)	End Term Exam (CLOSED BOOK)	30
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of	

	leaves including medical leaves.

D. SYLLABUS

Testing the use of UNIX commands, UNIX shell commands, Basics of Shell Programming, UNIX System Calls, CPU Scheduling Algorithms, Deadlock Detection Algorithms, Deadlock Avoidance Algorithms, Page Replacement Algorithms, Memory Allocation Algorithms, Disk Scheduling Algorithms, and UNIX Inter Process Communication

E. Text Books

T1. Das, S., Unix Concepts and Applications, (4e), Tata McGraw-Hill Publications, 2017.
T2. Silberschatz, A. and Galvin, P. B., Operating System Concepts, (8e), International student version, John Wiley & Sons, 2009.

Reference Books

R1. Blum, R., and Bresnahan, C., Linux Command Line and Shell Scripting Bible, (3(e), Wiley india Pvt. Ltd, 2015.

R2. Maurice J. Bach, "The Design of the UNIX Operating System", Pearson Education

F. Lecture Plan

Lab No.	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1,2,3	**Introduction to Kernel and Shell Script**	Intro to System Concept	Lecture Demonstration at system	CS1431.1	Continuous Evaluation End Term Examination
		Kernel Data Structures			
		Basic Unix Commands			
		Implementaion of different Shell Script			
4	**Internal Representation of Files**	Inodes	Lecture Demonstration at system	CS1431.1	Continuous Evaluation End Term Examination
		Structure of regular file, Directories			
		Conversion of Path name to an Inode, Super Block			
		Inode assignment to a new file			
		Allocation of Disk Blocks & other file types			
5,6	**System Call for the File System**	Open, Read, Write	Lecture Demonstration at system	CS1431.2	Continuous Evaluation End Term
		File & Record Locking, Adjusting the Position of File			

		Close, File Creation			Examination
		Creation of Special Files, Change Directory & Change root			
		Change owner & Change mode, STAT & FSTAT, Pipes			
		DUP, Mounting & Unmounting File System			
7,8	**Process Control**	Process Creation	Lecture Demonstration at system	CS1431.2	Continuous Evaluation End Term Examination
		Process Termination			
		Inter-Process Communication, Zombie and Orphan Process, Creation Zombie			
		System calls related to process (fork, exex,wait,signal,sleep)			
9	**Process Scheduling**	Process Scheduling	Lecture Demonstration at system	CS1431.3	Continuous Evaluation End Term Examination
		Implementation CPU Scheduling Algorithms viz. FCFS,SJF,Priority and Round Robin			
10	**Thread**	Creation, Utility of thread in Multiprocessing	Lecture Demonstration at system	CS1431.2	Continuous Evaluation End Term Examination
		Implementation of Multi-Threading			
11	**Deadlock**	Implementation of Bankers Algorithm	Lecture Demonstration at system		Continuous Evaluation End Term Examination
12	**Process Sychronization**	Demnostrate the Implementation of Producer-Consumer Problem Implementation of Semaphore	Lecture Demonstration at system	CS1431.4	Continuous Evaluation End Term Examination
13	**Memory Management Policies**	Swapping	Lecture Demonstration at system	CS1431.5	Continuous Evaluation End Term Examination
		Demand Paging			
		Illustration of Page Repalcement Algorithms: FIFO, Optimal and LRU			
		Illustration of memory allocation strategies: First Fit, Best Fit, Next Fit and Worst Fit			

I Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CS1431.1]:	Explain basic Unix commands and write shell Scripts	3	1	1	1	1				2	1		1	3			3
[CS1431.2]:	Write system programs using file and process system calls and PThread API.	2	1	1	1	1	3		3	2	1		1		3		
[CS1431.3]:	Compare various algorithms used for process scheduling.	1	1	1	1					2	1		1				
[CS1431.4]:	Describe concepts related to concurrency and achieve the same for cooperating processes, develop skills to apply various deadlock handling strategies to solve resource allocation problems	2	2	3	1	1			2	3	3		1			3	
[CS1431.5]:	Evaluate the performance of different memory management techniques and page replacement algorithms.	2	3	1	1		1			2	1		3				

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER & COMMUNICATION ENGINEERING
COURSE HAND-OUT

Relational Database Management Systems Lab| CS 1432 | 1 Credit | 0 0 2 1

Session: 2018-19| | Class: B.Tech. 2nd Year IV Semester (Core Course)

A. Introduction:

To familiarize the students with the fundamental concepts, techniques and tools of Relational DBMS. Participation in this course will enable students to better use Database in many application areas and will prepare them to take advanced courses in more specific areas of Database.

B. Course Outcomes: At the end of the course, students will be able to

[CS1432.1]:	Develop and demonstrate the concepts and skills pertaining to ER, EER diagrams and introduction to SQL
[CS1432.2]:	Demonstrate the concepts and queries of DDL
[CS1432.3]:	Demonstrate the concepts and queries of DML
[CS1432.4]:	Demonstrate the concepts and queries of DCL
[CS1432.5]:	Demonstrate the concepts of triggers in database
[CS1432.6]:	Demonstrate the concepts of stored procedures and transaction

C PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analysing, graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are called society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in thefield of computer based Communication/networking, information sharing, signal processing, webbased systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer andCommunication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and proposethe best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing andcommunication to assess social, health, safety and cultural issues and endure the consequentresponsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Continuous evaluation (Record+Execution+Viva)	60
	Lab project	10
End Term Exam (Summative)	End Term Exam (CLOSED BOOK)	30
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

E. SYLLABUS

DB application development with MS Access, Experiments on DDL and Basic SQL, Advanced SQL, ER diagrams using DIA tool, Data Integrity Constraints and Built-in Functions, Design and Implementing the data requirements of a simple DB application, Experiments on Basic PL/SQL, PL/SQL Exceptions and Transactions, PL/SQL Cursors, PL/SQL Procedures, Functions and Packages, DB application development with Java as front end

F. Text Books

T1."Teach yourself SQL & PL/SQL using Oracle 8i & 9i with SQLJ", Ivan Bayross, BPB Publications, 2010

G. Reference Books

R1. AviSilberschatz, Henry F. Korth, S. Sudarshan, "Database System Concepts", TMH, New Delhi, 2006

H .Lecture Plan

Lab No.	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	• Introduction to basic DDL, DML and DCL commands and domain types in SQL. • DDL statements to create, drop, alter, view and rename the Database.	• Understand basic concepts of DDL, DML and DCL • Demonstrate working of various DDL statements	Lecture Demonstration at system	CS1432.1 CS1432.2	Continuous Evaluation End Term Examination
2	• Write DML statements to insert the values into the tables. Use variants to insert values such as insert multiple records and insert records resulting from a select query. • Write statements to add and delete a column in a table which is pre-existent. • Write DML statements to update a table for single and multiple field updation. • Write DML statements to delete single or multiple record(s) from a table.	• Demonstrate working of various DML statements	Lecture Demonstration at system	CS1432.2	Continuous Evaluation End Term Examination
3-4	• Add primary key constraint to a pre-existent table. • Add NOT NULL / UNIQUE constraint to a pre-existent column. • Define the foreign key constraint. Show the errors returned by Database when: • a) FK constraint is violated • b) A referenced item is deleted	• Understand use of different types of constraints	Lecture Demonstration at system	CS1432.1 CS1432.2	Continuous Evaluation End Term Examination

	• Define and demonstrate cascading effect in foreign key referenced tables. • Define, add and drop the check/default constraint. • Define auto increment arguments/attributes of a table.				
5-6	• Practice SELECT query with following options: Distinct, order by, between, top/max/min and other aggregation keywords, group by, having, wild card matching, exists • Nested subqueries	Demonstrate nested subqueries and different DML statements	Lecture Demonstration at system	CS1432.3	Continuous Evaluation Project End Term Examination
7-8	• Write a query to create INNER JOIN / LEFT JOIN / RIGHT JOIN / FULL JOIN in two tables.	Demonstrate different JOIN operations	Lecture Demonstration at system	CS1432.3	Continuous Evaluation Project End Term Examination
9	• Write a query to create/delete VIEW from two tables including some selection criteria. • Write a query to create and delete clustered/non-clustered index for a table.	Demonstrate the use of VIEW and indexing	Lecture Demonstration at system	CS1432.3	Continuous Evaluation Project End Term Examination
10-11	• To implement the concept of trigger in database: ▪ How to apply database triggers ▪ Types of database triggers ▪ Create/delete database triggers ▪ Create trigger to demonstrate magic tables (INSERTED and	Demonstrate use of TRIGGERS	Lecture Demonstration at system	CS1432.5	Continuous Evaluation Project End Term Examination

	DELETED). ▪ Create a hypothetical situation to undo the changes in a table via Trigger (Max credit limit reached/ Balance insufficient etc.).				
12-13	• Write some stored procedures to cover the following problems: ▪ Demonstrate Control structures ▪ Swap two numbers ▪ Find the sum of digits ▪ Calculate grades etc. • Define Transaction, demonstrate the Commit and Rollback operations using hypothetical situations.	Demonstrate stored procedures and transaction	Lecture Demonstration at system	CS1432.4 CS1432.6	Continuous Evaluation Project End Term Examination

I Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CS1432.1]:	Develop and demonstrate the concepts and skills pertaining to ER, EER diagrams and introduction to SQL	1	1	2	2	1	1		1	1		1		1	1		
[CS1432.2]:	Demonstrate the concepts and queries of DDL	3	1	1		3								1			
[CS1432.3]:	Demonstrate the concepts and queries of DML	1	3	1	3	3							1	1	3	1	1
[CS1432.4]:	Demonstrate the concepts and queries of DCL	1		3					1	1	1	1		3			1
[CS1432.5]:	Demonstrate the concepts of triggers in database	1	1	2	1	1				1		1		1		1	
[CS1432.6]:	Demonstrate the concepts of stored procedures and transaction	1	1	2	1	1						1		1			1

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer and Communication Engineering
Course Hand-out

Microprocessor & Microcontrollers Lab| CS1433 | 3 Credits | 00 01

Session: 2018-19 | Class: B.Tech.IIndYear (4thSemester)

A. **Introduction:** The objective of this lab is to have a basic understanding of microprocessor & microcontrollers and explore a 16-bit platform for software point of view. The major focus would be on addressing modes, instruction sets that deals with arithmetic, logical and string operations. The design aspects of a micro-computer system comprising of various peripherals would be another major area of discourse.

B.

Course Outcomes: At the end of the course, students will be able to

CS1433.1: Interpret and illustrate the basic addressing modes and their incurrence in programming of 16-bit 8086 Microprocessors by virtual emulator software& its need.

CS1433.2: Understand & Apply basic instruction set of 8086 to write the assembly language programming.

CS1433.3: Analyse and Implement various instruction timing, delay loops, Procedures and Macros.

CS1433.4: Understand and programming 8086 using assembler directives.

CS1433.5: Become proficient at working on 16-Bit microcontroller based systems that would enhance employability opportunities.

C. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

[PO.1]. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations

[PO.6]. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technologicalchange

The graduation from B.Tech in Computer &Communication Engineering will empowers the student:

[PSO1]. Will be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

[PSO2]. Will be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

[PSO3]. Will be able to identify the existing open problems in the field of computing and propose the best possible solutions.

[PSO4]. Will be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Internal Assessment (Summative)	Lab continuous evaluation(1,II and III) (Closed Book)	30
	Midterm Exam 1 (ClosedBook)	20
	Evaluation of Project	20
End Term Exam (Summative)	End Term lab Exam (ClosedBook)	30
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

E. SYLLABUS

Data and Address transfer Instructions, Simple and advanced Arithmetic Instructions, BIT Manipulation Instructions, Simple and advanced Program execution transfer Instructions,Array operations, String Operations, Projects.

F. TEXT BOOKS

1. D. V. Hall, "Microprocessors and Interfacing", TMH, Revised Second Edition, 2006.
2. N. S. Kumar, M. Saravanan, et. al. "Microprocessors and Microcontrollers", Oxford Higher Education, 2015.
3. C. Hamacher, Z. Vranesic, "Computer Organization", TMH, 2002.
4. Y. Liu, G.A. Gibson, "Microcomputer Systems- The 8086/8088 Family", PHI Learning private Ltd., 2011.

G. REFERENCE BOOKS

1. B. B. Brey, "*The Intel Microprocessors*", Seventh Edition, Prentice Hall India, 2005.
2. A. Clements, "*Microprocessor system design 68000 Hardware", Software, and Interfacing*, PWS Publishing Company, Third Edition, 1997.

H. Lab Plan:

Weak No.	Topic	Experiments
1.	Data and Address transfer Instructions	1. Write an Assembly language program to copy contents of one register from another. 2. Write an Assembly language program to copy contents of one register to a specific memory location. 3. Write an Assembly language program to copy contents of one memory location to another memory location.
2.	Simple Arithmetic Instructions	1. Write an Assembly language program to Add 2 8-bit numbers. 2. Write an Assembly language program to Add 2 16-bit numbers.

		3. Write an Assembly language program to Subtract 2 8-bit numbers. 4. Subtraction of 2 16-bit numbers. 5. Negation and comparison.
3	Arithmetic Instructions (contd.)	1. Multiplication of two 16 bit numbers. 2. Write an Assembly language Program to multiply two 8 bit numbers. 3. Division of two 16 bit numbers. 4. Write an Assembly language program to divide two 8 bit numbers.
4.	Arithmetic Instructions (contd.)	1. Compute ((AL+BL)*BH)+CX 2. Multiplication using repetitive addition 3. Division using repetitive subtraction 4. Implement fast multiplication using SHIFT and ADD
5.	BIT Manipulation Instructions:	1. Write an Assembly language program to compute 1's and 2's complement of a number. 2. Write a program for right shift and left shift of a 16 bit and 8 bit numbers.
6.	Program execution transfer Instructions	1. Write a program to find out whether a number is even or odd. 2. Write a program to find out a year is leap or not.
7.	Program execution transfer Instructions (Contd.)	1. Write a program to calculate the sum of the number range from 1 to 10. 2. Write a program to calculate sum of the digits of a given number.
8.	Program execution transfer Instructions (Contd.)	1. Find the number of bits equal to 1 2. To get 10 hex-digit input and find the

		minimum 3. Search for an element using SCASB
9.	Array operations	1. Write a program to show how to declare an array and calculate the sum of the elements of the array. 2. Write a program to search for an element in an Array.
10	Array operations (Contd.)	1. Move content of array in reverse order 2. Compare two arrays using CMPSB
11.	String Operations	1. Write a program to find out the length of a string. 2. Write a program to reverse a string. 3. Write a program to copy string from one location to other.
12.	Project	1. Signed Multiplication and Division
13.	Project	1. Write a program to sort the array elements. 2. Displaying the Character on Led Display
14.	Project	1. Write a program for implementing a traffic control system.

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CS 1433.1:	Interpret and illustrate the basic addressing modes and their incurrence in programming of 16-bit 8086 Microprocessors by virtual emulator software& its need.	1	2	1				1		1	1			1	2		
CS 1433.2:	Understand & Apply basic instruction set of 8086 to write the assembly language programming.	2		1		1			1		1	1	3	1		2	
CS 1433.3:	Analyse and Implement various instruction timing, delay loops, Procedures and Macros.		2				1		1	1				2			1
CS 1433.4:	Understand and programming 8086 using assembler directives.	1	1					1			1	1	2	1	2		2
CS 1433.5:	Become proficient at working on 16-Bit microcontroller based systems that would enhance employability opportunities.	1		1	2											2	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

J. Course Outcome Attainment Level Matrix:

CO	STATEMENT	ATTAINMENT OF PROGRAM OUTCOMES **THRESHOLD VALUE: 40%**													ATTAINMENT OF PROGRAM SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3	PSO 4
CS 1403.1:	Interpret and illustrate the basic addressing modes and their incurrence in programming of 16-bit 8086 Microprocessors by virtual emulator software& its need.																
CS 1403.2:	Understand & Apply basic instruction set of 8086 to write the assembly language programming.																
CS 1403.3:	Analyse and Implement various instruction timing, delay loops, Procedures and Macros.																
CS 1403.4:	Understand and programming 8086 using assembler directives.																
CS 1403.5:	Become proficient at working on 16-Bit microcontroller based systems that would enhance employability opportunities.																

0-No Attainment; 1- Low Attainment; 2- Moderate Attainment; 3- Substantial Attainment

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer and Communication Engineering

Course Hand-out

Microprocessors and Microcontrollers| CS 1403 | 3 Credits | 3 0 0 3

Session: 2018-19| | Class: CORE

A. Introduction: The objective of this course is to have a basic understanding of microprocessor & microcontrollers and explore a 16-bit platform for hardware and software point of view. The major stress would be on architectural aspects and the programmer's model with an intensive coaching on assembly programming. The design aspects of a micro-computer system comprising of various peripherals would be another major area of discourse.

B. Course Objectives: At the end of the course, students will be able to

[CS1403.1]. Interpret and illustrate the basic architecture of 16-bit 8086 Microprocessors & its need.

[CS1403.2]. Implement the assembly language programs using the instruction set of 8086.

[CS1403.3]. Analyse and implement timing & delay loops, Procedures and Macros.

[CS1403.4]. Compare the internal architecture and interfacing of different peripheral devices with 8086 microprocessor.

[CS1403.5]. Design and develop solutions based on 16-bit microcontroller based systems impacts and hence develop employability skills..

C. Program Outcomes and Program Specific Outcomes

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health

and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal,

health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in

societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

[PSO.1]. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

[PSO.2]. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

[PSO.3]. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

[PSO.4]. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	15
	Sessional Exam II (Open Book)	15
	In class Quizzes(20) and Video Assignments(5), Activity feedbacks (5)(Accumulated and Averaged)	30
	End Term Exam (Closed Book)	40
	Total	100
End Term Exam (Summative)	Sessional Exam I (Closed Book)	15
	Sessional Exam II (Open Book)	15
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	

Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.

E. Syllabus

8086: internal architecture, programming the 8086, Addressing modes, Flags; Instruction Set: assembler and Assembler directives, Simple sequence programs, Jumps and conditional jumps, Loop instructions, Instruction timing and delay loops; String instructions, Writing and Using Procedures and Macros, 8255: Programmable Parallel ports and Handshake Input/ Output; Interrupts and Interrupt Responses: 8259 Priority Interrupt Controller, 8254 Software-Programmable Timer/counter; Software interrupts, Intel 8096-16-bitMicrocontroller: Overview; Instruction Set and Programming; Hardware features, , iRMX, ARM processor, Real-Time Executive: iRTX

F. Text Books

T1. Douglas V. Hall, "Microprocessors and Interfacing", TMH, Revised Second Edition, 2006.

G. Reference Books

R1. B. B. Brey, "*The Intel Microprocessors*", Seventh Edition, Prentice Hall India, 2005.

R2. A. Clements, "*Microprocessor system design 68000 Hardware", Software, and Interfacing*, PWS Publishing Company, Third Edition, 1997.

R3. N. S. Kumar, M. Saravanan, et. al. "Microprocessors and Microcontrollers", Oxford Higher Education, 2015.

R4. C. Hamacher, Z. Vranesic, "Computer Organization", TMH, 2002.

R5. Y. Liu, G.A. Gibson, "Microcomputer Systems- The 8086/8088 Family", PHI Learning private Ltd., 2011.

R6. K M Bhurchandi, A K Ray, "Advanced Microprocessor and Peripherals", McGraw Hill Education Private Ltd., 3rd Edition, 2015

R7. Steve Furber, "ARM System -on- Chip Architecture", Pearson, 2nd Edition

H. Lecture Plan:

Lec. No.	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	Introduction- Microprocessor and Microcontroller	Basic understanding of the course, practicality of the microprocessor and microcontroller	Lecture	1403.1 1403.5	NA
2	Segmentation, Physical Address Calculation	Understanding the memory organization of 8086	Lecture	1403.1	In Class Quiz Mid Term I End Term
3-4	Detailed System Architecture	Identifying the building blocks of system architecture and their functions	Lecture	1403.1	In Class Quiz Mid Term I End Term
5-6	Addressing modes	Understanding the structure of instructions	Lecture, Practice questions	1403.1 1403.2	Home Assignment Mid Term I End Term
7	Introduction to Programming- Data Transfer Instructions	Understanding the assembly language programming and 8086 instruction set	Lecture, Practice questions	1403.2	In Class Quiz Home Assignment Mid Term I End Term
8	Stack Instructions and I/O	Understanding the working of stack instructions	Lecture, Practice questions	1403.2	In Class Quiz Home Assignment Mid Term I End Term
9	Arithmetic Instructions	Understanding the working of arithmetic instructions	Lecture, Practice questions	1403.2	In Class Quiz Home Assignment Mid Term I End Term
10	BCD Arithmetic Instructions	Understanding the working of BCD arithmetic instructions	Lecture, Practice questions	1403.2	In Class Quiz Home Assignment Mid Term I End Term
11	Logical Instructions	Understanding the working of logical instructions	Lecture, Practice questions	1403.2	In Class Quiz Home Assignment Mid Term I End Term
12	Flag Controlling Instructions and Branching Instructions	Understanding the working of flag and branching instructions	Lecture, Practice questions	1403.2	In Class Quiz Home Assignment Mid Term I End Term
13	Loop Instructions	Understanding the working of loop	Lecture,	1403.2	In Class Quiz

Lec. No.	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
		instructions	Practice questions		Home Assignment Mid Term I End Term
14	Instruction timing and delay loops	Understanding the working of delay loops and timing of instructions	Lecture, Practice questions	1403.2	In Class Quiz Home Assignment Mid Term I End Term
15	Assembler Directives	Use of assembler directives	Lecture, Practice questions	1403.2	In Class Quiz Home Assignment Mid Term I End Term
16	String Instructions	Working of string instructions	Lecture, Practice questions	1403.2	In Class Quiz Home Assignment Mid Term I End Term
17	Writing and Using Procedures	Implementing procedures in 8086 assembly programs	Lecture, Practice questions	1403.3	In Class Quiz Home Assignment Mid Term II End Term
18	Macros	Implementing macros in 8086 assembly programs and difference between procedure and macros	Lecture, Practice questions	1403.3	In Class Quiz Home Assignment Mid Term II End Term
19-22	8255: Programmable Parallel ports and Handshake Input/ Output	Understand the internal architecture and interfacing of 8255 with 8086	Lecture	1403.4	In Class Quiz Home Assignment Mid Term II End Term
23	Interrupts and Interrupt Responses	Understanding the concept of interrupts and interrupt responses	Lecture	1403.4	In Class Quiz Home Assignment Mid Term II End Term
24-27	8259 Priority Interrupt Controller	Understand the internal architecture and interfacing of 8259 with 8086	Lecture	1403.4	In Class Quiz Home Assignment Mid Term II End Term
28-31	8254 Software-Programmable Timer/counter; Software interrupts	Understand the internal architecture and interfacing of 8254 with 8086	Lecture	1403.4	In Class Quiz Home Assignment Mid Term II End Term
32-36	Intel 8096-16-bit Microcontroller: Overview; Instruction Set and Programming; Hardware	Understand the basic architecture of 16-bit microcontroller & its need.	Lecture	1403.5	In Class Quiz Home Assignment

Lec. No.	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
	features				End Term
37	ARM processor, Real-Time Executive: iRTX	Understand the basic architecture of ARM processor & its need.	Lecture, Hands on session	1403.5	In Class Quiz Home Assignment End Term

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CS1403.1	Interpret and illustrate the basic architecture of 16-bit 8086 Microprocessors & its need.	2	1	1		1	1						1	1	1	1	
CS1403.2	Implement the assembly language programs using the instruction set of 8086.	2	1	1	1	1							1	1			
CS1403.3	Analyse and implement timing & delay loops, Procedures and Macros.		1		1		1						1	1			
CS1403.4	Compare the internal architecture and interfacing of different peripheral devices with 8086 microprocessors.	2	1			1							1	1			
CS1403.5	Design and develop solutions based on 16-bit microcontroller based systems impacts and hence develop employability skills..			1	1		1						1	1	1	1	

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer and Communication Engineering

Course Hand-out

Operating Systems| **CS 1401**| 4 Credits | 3 0 1 4

Session: 2018-19 | Class: IV Semester (Program Core)

A. Introduction: This course is offered by Dept. of Computer and Communication engineering as a department core subject. The course provides a comprehensive understanding of Operating System principles, techniques and approaches used for designing the software. The focus of the course is to make the students understand how various components of operating system interact and provides services for execution of application software. Student will be apprised of process management, deadlock, concurrency control, memory management, file management and I/O management in detail, which will be beneficial for software development.

B. Course Outcomes: At the end of the course, students will be able to

[1401.1]. Describe the objectives, structure, functionality and types of operating systems.

[1401.2]. Write System programs for process and thread creation, execution, inter-process communication.

[1401.3]. Compare various algorithms used for process scheduling and develop the skills for optimizing these scheduling algorithm.

[1401.4] Apply the concepts of deadlock to solve resource allocation problems

[1401.5] Evaluate the performance of different memory management techniques.

[1401.6] Describe disk scheduling and various storage strategies

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

- **[PO.5]. Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
- **[PO.6]. The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice
- **[PO.7]. Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
- **[PO.8]. Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices
- **[PO.9]. Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

- **[PO.10] Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
- **[PO.11]. Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
- **[PO.12]. Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

D. PROGRAM SPECIFIC OUTCOMES

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.
PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

E. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	15
	Sessional Exam II (Open Book)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Open Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who miss a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

F. SYLLABUS

Introduction: Operating system structure, Operating system operations, Process management, Memory management Storage management, Protection and security, Special purpose systems. **System structure:** Operating system services, User operating system interfaces System calls, Types of system calls, System programs Operating system structure, Virtual machines, System boot. **Process:** Process Concept, Process scheduling Operations on processes Inter-process Communication, Unix Pipes. **Multithreaded Programming:** Overview, multithreaded models Thread libraries Programs using Pthreads. **Process scheduling:** Basic concepts, scheduling criteria. **Process Synchronization:** Background, Critical section problem Peterson's solution Synchronization Hardware, Semaphores Classical problems of synchronization Classical problems of synchronization. Programs using PThreads. **Deadlocks:** System model, Deadlock Characterization Methods for handling deadlocks, Deadlock prevention Deadlock avoidance Deadlock detection, Recovery from deadlock. **Memory Management :** Background (Address Binding, Logical vs Physical Address Space, Dynamic Loading, Dynamic Linking and Shared Libraries, Overlays) Swapping, Contiguous Memory Allocation, PAGING, Structure of Page Table Segmentation, Demand Paging, Page Replacement Policies Allocation of Frames , Thrashing**. File System Interface and Implementation :** File Concept, Access Methods, Directory and Disk Structure, File System Mounting, File System Structure Space Allocation Methods for Files (Contiguous, Linked , Indexed), Free Space Management (Bit Vector, Linked List, Grouping, Counting), **Disk Management:** Disk Scheduling Algorithms, Disk Management, Swap Space

Management **Protection and Security**: Goals of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, The Security Problem, User Authentication, Program Threats, System Threats Intrusion Detection.

G. TEXT BOOKS

A. Silberschatz, P. B. Galvin and Greg Gagne, “Operating System Concepts”, Eighth Edition, Wiley.

H. REFERENCE BOOKS

A.S. Tanenbaum, “Modern Operating Systems”, III Edition, Prentice Hall India.

William Stallings, “Operating Systems”, VII Edition, Pearson.

I. Lecture Plan:

LEC NO	TOPICS		Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	**Introduction to Operating Systems**	Operating system structure	Understanding basic concepts of OS.	Lecture	1401.1	Class Quiz, Video Assignment, Assignment, Mid Term 1, Mid Term 2, End Term Examination.
2		Operating system operations, Process management, Memory management		Lecture	1401.1	
3		Storage management, Protection and security, Special purpose systems		Lecture	1401.1	
4	**System Structure**	Operating system services, User operating system interfaces	Identify use of system calls as per requirement and write programs for executing system calls.	Lecture	1401.1	
5		System calls, Types of system calls, System programs		Demonstration	1401.2	
6		Operating system structure, Virtual machines, System boot		Demonstration	1401.2	
7	**Process**	Process Concept	To use pipes for establishing IPC.	Lecture	1401.1	
8		Process scheduling		Lecture	1401.1	
9		Operations on processes		Lecture	1401.1	
10		Inter-process Communication, Unix Pipes		Demonstration	1401.2	
11		Pipes		Demonstration	1401.2	
12	**Multithreaded Programming**	Overview	Apply concept of threading for parallel programming.	Lecture	1401.1	
13		Multithreaded models		Lecture	1401.1	
14		Thread libraries		Lecture	1401.1	
15		Programs using Pthreads		Demonstration	1401.2	
16		Programs using Pthreads (cont..)		Demonstration	1401.2	

17	**Process scheduling**	Basic concepts, Scheduling criteria, Scheduling algorithms	To compare various scheduling algorithms.	Lecture and learning by solving	1401.1	
18		Scheduling algorithms		Lecture and learning by solving	1401.3	
19		Scheduling algorithms		Lecture and learning by solving	1401.3	
20		Scheduling algorithms		Lecture and learning by solving	1401.3	
21	**Process Synchronization**	Background, Critical section problem	To apply concepts for synchronisation.	Lecture and learning by solving	1401.1	
22		Peterson's solution		Lecture and learning by solving	1401.1	
23		Synchronization Hardware		Lecture and learning by solving	1401.1	
24		Semaphores		Lecture and learning by solving	1401.1	
25		Classical problems of synchronization		Lecture and learning by solving	1401.1	
26		Classical problems of synchronization (Contd...)		Lecture and learning by solving	1401.1	
27		Synchronization Programs using PThreads		Lecture and learning by solving	1401.2	
28		Semaphores		Lecture and learning by solving	1401.1	
29		Classical problems of synchronization		Lecture and learning by solving	1401.1	
30	**Deadlock**	Methods for handling deadlocks,	To identify the state of	Lecture and learning by	1401.4	

		Deadlock prevention	deadlock, and apply knowledge for resolving the problem of deadlock.	solving		
31		Deadlock avoidance		Lecture and learning by solving	1401.4	
32		Deadlock detection Recovery from deadlock		Lecture and learning by solving	1401.4	
33		Recovery from deadlock		Lecture and learning by solving	1401.4	
34	**Memory Management**	Address Binding, Logical vs Physical Address Space	To understand the concept of memory management. To solve the problems related to memory management.	Lecture and learning by solving	1401.5	
35		Dynamic Loading, Dynamic Linking		Lecture and learning by solving	1401.5	
36		Shared Libraries, Overlays		Lecture and learning by solving	1401.5	
37		Swapping, Contiguous Memory Allocation		Lecture and learning by solving	1401.5	
38		PAGING		Lecture and learning by solving	1401.5	
39		Structure of Page Table		Lecture and learning by solving	1401.5	
40		Segmentation		Lecture and learning by solving	1401.5	
41		Demand Paging, Page Replacement Policies		Lecture and learning by solving	1401.5	
42		Allocation of Frames , Thrashing		Lecture and learning by solving	1401.5	
43	**File System Interface and**	File Concept, Access Methods,	To understand the file handling.	Lecture	1401.5	

44	**Implementation**	Directory and Disk Structure		Lecture	1401.5	
45		File System Mounting		Lecture	1401.5	
46		File System Structure		Lecture	1401.5	
47		File System Implementation		Lecture	1401.5	
48		Space Allocation Methods for Files (Contiguous, Linked , Indexed)		Lecture	1401.5	
49		Free Space Management (Bit Vector, Linked List, Grouping, Counting)		Lecture	1401.5	
50	**Disk Management**	Disk Scheduling Algorithms	To implement the disk scheduling algorithms.	Lecture and learning by solving	1401.6	
51		Disk Management, Swap Space Management		Lecture and learning by solving	1401.6	

J. Course Articulation Matrix: (Mapping of COs with POs and PSOs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CS 1401.1	Able to describe the objectives and functions of modern operating systems.	3	2	1		2	1						1	2	1	0	2
CS 1401.2	Compare various algorithms used for process scheduling and develop the skills for optimizing these scheduling algorithm.	2	2	2								1	1	2	1	3	0
CS 1401.3	Able to use various system calls to design functionality of operating systems.	2	2	3				1					1	1	2	2	0
CS 1401.4	Apply the concepts of deadlock to solve resource allocation problems	2	2	3			2		2	3			2	1	1	2	1

CS 1401.5	Evaluate the performance of different memory management techniques.	2	2	2	1					1	1		2	1	2	2	0
CS 1401.6	Describe disk scheduling and various storage strategies	3	2	2									2	1	2	2	0

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

K. Course Outcome Attainment Level Matrix:

0-No Attainment; 1- Low Attainment; 2- Moderate Attainment; 3- Substantial Attainment

MANIPAL UNIVERSITY JAIPUR
School of Humanities and Social Sciences

Department of Economics
Course Hand-out

Economics | HS 1401 | 3 Credits | 3 0 0 3

Session: 2018-19| Faculty: Dr. Manas Roy | Class: B. Tech | Semester IV

A. Introduction: This course is offered by Dept. of Economics to the Engineering departments, targeting students to give basic understanding in the concept of economics. It mainly deals with economic issues related to consumer behaviour, firms, industries and business organizations to make aware the students regarding economic environment. This course also discusses the preliminary concepts associated with macroeconomic variable like GDP inflation, balance of payments etc. It explores various possibilities emerging in an economy and the role of economic policy in this context.

B. Course Outcomes: At the end of the course, students will be able to
[1401.1] Describe the basic principles of micro and macroeconomic analysis.
[1401.2] Interpret and illustrate decision making process in practical life and develop the skills for solving the real life problems.
[1401.3] Aware of the tools and techniques of economics for real world. [1401.4] Recognize the problems and give solutions to it.
[1401.5] Recall the assumptions that underpin the Micro/Macro model.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO1]. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

[PO2]. **Problem analysis**: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

[PO3]. **Design/development of solutions**: Upon analysing, graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

[PO4]. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

[PO5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

[PO6]. **The engineer and society**: The engineers are called society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

[PO7]. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

[PO8]. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

[PO9]. **Individual and team work**: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[PO10]. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO11]. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

[PO12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. ASSESSMENT PLAN:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I	15
	Sessional Exam II	15
	Assignments , Activity, etc.	30
End Term Exam (Summative)	End Term Exam	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

E. SYLLABUS

Definition, nature and scope of economics; Introduction to micro and macroeconomics; law of demand and supply; elasticity of demand and supply; cardinal and ordinal approaches of utility; production, laws of production; cost and revenue analysis; various market situations; Break even analysis; Capital budgeting Macro Economics: National income and its concepts, value of money and its changes; foreign exchange rate; monetary and fiscal policies and other macro concepts (Balance of payments, Business cycles etc.)

F. TEXT BOOKS

- P. Samuelson and Nordhaus, Economics, 19th Edition, Tata McGraw-Hill, 2008.
- Dornbusch, Fischer and Startz, Macroeconomics, McGraw Hill, 2010
- H C Peterson, Managerial economics, Pearson, 9th Edition, 2012

G. REFERENCE BOOKS

- P L Mehta, Managerial Economics, S Chand and company pvt. limited, New Delhi, 2012
- H L Ahuja, managerial economics, S Chand and company pvt. Limited,2010
- H.L.Ahuja, Advanced Economic Theory: Microeconomic Analysis, S. Chand and Co. Limited, New Delhi, 2007
- Lipsey & Chrystal, Economics, Oxford University Press, 2011.
- Richard T. Froyen, Macroeconomics, Pearson Education Asia, 2005

H. LECTURE PLAN:

Lec No	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	Overview of the course structure	To acquaint and clear the overview of the course	Lecture	NA	NA
2	Objective of the course	Discussion of the objective of the course for the engineers	Lecture	NA	NA
3,4	Definition, nature and scope of economics, introduction to micro and macroeconomics	Describe the concept given by different economists, its scope, differences between micro and macro economics	Lecture	1401.1	Class Test Mid Term I
5,6,7,	Cardinal approaches of utility	Describe the concept of cardinal approach of utility, Law of DMU and equi marginal utility	Lecture	1401.1	Class Test Mid Term I
8,9,10,11	Law of demand and supply, elasticity of demand and supply	Describe the concept of demand, supply, elasticity of demand and supply with examples, conceptual questions	Lecture	1401.1	Class Test Mid Term I
12	Revision of previous lectures	Recall all the concepts discussed in previous classes	Lecture	1401.5	Class Test Mid Term I End Term
13	Discussion of the topics related to assignment	Discussion about the assignment topics	Lecture, Activity		Home Assignment Mid Term 1 End term
14,15,16	Ordinal approaches of utility	Recall of the differences between the concept of the cardinal approach and ordinal approach of utility , IC analysis, Consumers equilibrium, IE,SE,PE	Lecture	1401.5	Class Test Mid Term I End Term
17,18,19	Production, laws of production	Discussion of the concept of production, recognize production function, producers	Lecture	1401.4	Class Test Mid Term II End Term

		equilibrium, RTS			
20,21	Cost and revenue analysis	Discussion of the concept of cost and cost function, recognize SR and LR cost curves, revenues	Lecture	1401.4	Class Test Mid Term II End Term
22,23	Various market situations; Break even analysis	Aware of market morphology with examples, Interpret and illustrate BEA	Lecture	1401.3	Class Test Mid Term II End Term
24	Revision of previous lectures	Recall all the concepts discussed in previous classes	Lecture	1401.5	Class Test Mid Term II End Term
25	Discussion of the topics related to assignment	Recall the discussion about the assignment topics	Lecture, Activity	1401.5	Home Assignment Mid Term II End term
26	Capital budgeting	Interpret and illustrate the concept of CB and various tools	Lecture	1401.2	Home Assignment Class Test End Term
27,28	Macro Economics: National income and its concepts	Interpret and illustrate the concept of NI,GDP,GNI,PI etc., circular flow	Lecture	1401.2	Home Assignment Class Test End Term
31,32,33	Monetary and fiscal policies	Concept of monetary and fiscal policies, Aware of its instruments, importance and limitations	Lecture	1401.3	Home Assignment Class Test End Term
34,35	Inflation	Concept of inflation, Aware of demand pull and cost push inflation	Lecture	1401.3	Home Assignment Class Test End Term
36,37	Various macro concepts: Balance of payments, Business cycles	Aware of the concept of BOP, Business cycles	Lecture	1401.3	Home Assignment Class Test End Term
38	Discussion of the topics related to end sessional examination	Recall the discussion about the assignment topics	Lecture	1401.5	End Term
39	Conclusion and Course Summarization	Recall all the concepts discussed in previous classes	Lecture	1401.5	End Term

I. Course Articulation Matrix: (Mapping of COs with POs and PSOs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
HS 1401.1	Describe the basic principles of micro and macroeconomic analysis	1								1		2	2			1	
HS 1401.2	Interpret and illustrate decision making process in practical life			1			1	3	2	2	2		2	1	1		1
HS 1401.3	Aware of the tools and techniques of economics for real world	1	1			1				2		2	2				
HS 1401.4	Recognize the problems and give solutions to it			1	1			2		2		2	2	1	1	2	2
HS 1401.5	Recall the assumptions that underpin the Micro/Macro model.						1			2	2		2			1	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

J. Course Outcome Attainment Level Matrix:

CO	**STATEMENT**	ATTAINMENT OF PROGRAM OUTCOMES **THRESHOLD VALUE: 40%**												ATTAINMENT OF PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
HS 1401.1	Describe the basic principles of micro and macroeconomic analysis																
HS 1401.2	Interpret and illustrate decision making process in practical life and develop the skills for solving the real life problems.																
HS 1401.3	Aware of the tools and techniques of economics for real world																
HS 1401.4	Recognize the problems and give solutions to it																
HS 1401.5	Recall the assumptions that underpin the Micro/Macro model.																

0-No Attainment; 1- Low Attainment; 2- Moderate Attainment; 3- Substantial Attainment

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer & Communication Engineering
Course Hand-out

Engineering Mathematics-IV| MA 1406 | 3 Credits | 3 0 0 3

Session: 2018-19 | Faculty: Dr Kalpna Sharma | Class: Regular (CCE)

A. Introduction: This course is offered by Dept. of Mathematics & Statistics as a regular course, targeting students who wish to pursue B.Tech., in Computer Science and Engineering & Information Technology. It offers basic/introductory knowledge of Numerical methods, Fourier series, Fourier transforms, Probability, random variables, Laplace transforms and Stochastic Process. Students are expected to have background knowledge on Permutations and Combinations, and school level mathematics.

B. Course Outcomes: At the end of the course, students will be able to

[1406.1]. Apply numerical methods to obtain approximate solutions to mathematical problems

[1406.2]. Recognise even and odd functions and use the skills for the simplifications of Fourier series and transforms

[1406.3]. Calculate the Laplace transform of standard functions, Find the Laplace transform of derivatives, integrals and periodic functions. Use the method of Laplace transforms to solve initial-value problems for linear differential equations with constant coefficients. Use the method of Laplace transforms to solve systems of linear first-order differential equations

[1406.4]. Apply the fundamentals of probability theory and random processes to practical engineering problems

[1406.5]. Create mathematical models for practical design problems and determine theoretical solutions to the created models. Acquire skills for applying the mathematical vision in the real life problems.

[1406.6]. Specify a given discrete time Markov chain in terms of a transition matrix and a transition diagram. Calculate n-step transition probabilities. Define and explain basic concepts in the theory Markov processes, M/M/1 and M/M/c queueing systems

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]. **Engineering knowledge**: Apply the knowledge of basic science and fundamental computing in solving complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

[PO.3]. **Design/development of Computing solutions**: Design solutions for complex IT engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the Information oriented public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use IT domain research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse IT teams, and in multidisciplinary settings.

[PO.10]. **Communication**: Communicate effectively on complex computing engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

[PSO1]. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

[PSO2]. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

[PSO3]. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

[PSO4]. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	15
	Sessional Exam II (Close Book)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Close Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. SYLLABUS

Probability random variables, Moment generating functions, probability distributions: binomial, Poisson, normal, gamma and exponential distributions. , F and t distributions, stochastic processes, Markov chain, Queuing Theory. **Laplace Transforms**: Transforms of elementary functions, inverse transforms, convolution theorem. Application of Laplace transforms in the solution of differential equations, Fourier series, Fourier transforms and its applications. **Numerical Methods:** Interpolation, Numerical differentiation, Numerical integration: Trapezoidal, Simpson's 1/3 and 3/8 Rule, Weddle Rule. Solution of system of linear algebraic equations: Gauss Jacobi, Gauss Seidel.

F. TEXT BOOKS

1. V. Sundarapandian, "Probabilty, Statistics and Queuing Theory", PHI, 2013.
2. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, Delhi, 2006
3. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India Eastern, 2006

G. REFERENCE BOOKS

1. Srimanta Pal, Subhdh C. Bhunia, "Engineering Mathematics", Oxford University Press, 2015.
2. Babu Ram, "Engineering Mathematics", Vol. I & II, Pearson, 2012.
3. P. Kousalya, "Probability, Statistics and Random Processes", Pearson, 2013.
4. Richard A. Johnson and C.B. Gupta, "Probability and Statistics for Engineers", Pearson Education, 2009.
5. S. S. Sastry, "Introductory Methods of Numerical Analysis", PHI, 2005

H. Lecture Plan:

Lecture No	Topic
1,2,3	Numerical Methods: Introduction to numerical methods, Finite differences, Forward, Backward and Central finite differences, Relation among the difference operators
4, 5, 6	Interpolation with equal intervals, Newton's Interpolation formula for forward and backward differences, Stirling's Interpolation formula for central difference, their Application
7, 8	Numerical Differentiation
9, 10, 11	Numerical Integration, Introduction, Simpson's 1/3 rule, Simpson's 3/8 rule, Trapezoidal rule, Weddle's rule.
12, 13, 14	Solution of Algebraic equations by using Gauss's Jacobian and Gauss's Seidel rule
15	**Laplace Transform:** Introduction, Laplace Transform of some Elementary functions
16, 17, 18	Properties of the Laplace Transform, their applications in Numerical Problems, Differentiation, Integration Formulae and related problems
19	Inverse Laplace Transform, their Properties,
20, 21	Convolution Theorem, Numerical Problems
22	Solution of Differential equation by using the Laplace Transform
23, 24	Fourier Transforms and Applications
25, 26	Fourier Series
27, 28	Probability, Addition Law, Multiplication Law, Conditional Probability and related problems
29	Bayes' Theorem, related problems,
30, 31	Random Variables, Mathematical Expectation, Moments, Moment Generating Function
32, 33	Probability distribution, Binomial , Poisson's and gamma and exponential distributions
34, 35	Normal Distribution
36, 37	Stochastic processes, Markov chain
38, 39	Queuing theory, study of two Models
40	f-distribution , t-distribution, related problems

I. Course Articulation Matrix: (Mapping of COs with POs and PSOs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
MA1406.1	Apply numerical methods to obtain approximate solutions to mathematical problems	3	1	2	1	1						1	1	3	1	1	1
MA1406.2	Recognise even and odd functions and use the resulting simplifications for Fourier series and transforms	3	2	2	1								1	1	1	1	1
MA1406.3	Calculate the Laplace transform of standard functions, Find the Laplace transform of derivatives, integrals and periodic functions. Use the method of Laplace transforms to solve initial-value problems for linear differential equations with constant coefficients. Use the method of Laplace transforms to solve systems of linear first-order differential equations	3	3	3	1		1	1	1	1	1	1	1	1	1	1	1
MA1406.4	Apply the fundamentals of probability theory and random processes to practical engineering problems	3	2	1	1	3	1						2	2	3	3	2
MA1406.5	Create mathematical models for practical design problems and determine theoretical solutions to the created models. Acquire skills for applying the mathematical vision in the real life problems.	3	1	1	3	1			1	1	1	1	1	1	1	1	1
MA1406.6	Specify a given discrete time Markov chain in terms of a transition matrix and a transition diagram. Calculate n-step transition probabilities. Define and explain basic concepts in the theory Markov processes, M/M/1 and M/M/c queueing systems	3	2	2	1	2							1	2	1	1	2

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

J. Course Outcome Attainment Level Matrix:

CO	STATEMENT	ATTAINMENT OF PROGRAM OUTCOMES **THRESHOLD VALUE: 40%**												ATTAINMENT OF PROGRAM SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
MA1406.1	Apply numerical methods to obtain approximate solutions to mathematical problems															
MA1406.2	Recognise even and odd functions and use the skills for the simplifications of Fourier series and transforms															
MA1406.3	Calculate the Laplace transform of standard functions, Find the Laplace transform of derivatives, integrals and periodic functions. Use the method of Laplace transforms to solve initial-value problems for linear differential equations with constant coefficients. Use the method of Laplace transforms to solve systems of linear first-order differential equations															
MA1406.4	Apply the fundamentals of probability theory and random processes to practical engineering problems															
MA1406.5	Create mathematical models for practical design problems and determine theoretical solutions to the created models															
MA1406.6	Specify a given discrete time Markov chain in terms of a transition matrix and a transition diagram. Calculate n-step transition probabilities. Define and explain basic concepts in the theory Markov processes, M/M/1 and M/M/c queueing systems															

0-No Attainment; 1- Low Attainment; 2- Moderate Attainment; 3- Substantial Attainment

MANIPAL UNIVERSITY
JAIPUR

SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY
DEPARTMENT OF COMPUTER & COMMUNICATION ENGG.
COURSE HAND-OUT

WIRELESS COMMUNICATION | SUBJECT CODE: CC1601 |3 01 4
Session: 2018-19 | Faculty NAME: Dr. Gulrej Ahmed | Class: CORE

Introduction: Details about overall course

The objective of this course is to introduce the concepts of wireless communication using cellular environment.The course is designed to impart in-depth understanding of technologies & contribution of wireless communication to overall scientific growth.

The main objectives of the course are as follows:

- To provide the knowledge of the different types of wireless communication systems, requirements for the wireless services&cellular radio fundamental concepts.
- To review the analog/digital modulation &different types of signal processing techniques like equalization, diversityused in wireless communication.
- To analyse the advanced transceiver schemes; Cellular Code Division Multiple Access systems, Orthogonal Frequency Division Multiplexing, 3rdGeneration wireless networks & standards.

Course Outcomes: At the end of the course, students will be able to

[1601.1]. To obtain the knowledge about the various types of wireless services& technical challenges for the wirelesscommunication systems.

[1601.2]. To understand the concept of the cellular radio fundamentalssuch as frequency reuse, handoff, Co-channel interference and capacity of cellular systems.

[1601.3]. To formulate the radio propagation models, path loss models, signal fading and large scale effects of radio propagation in many operating environment.

[1601.4]. To analyse modulation/demodulation & structure of communication link in wireless systems.

[1601.5]. To develop required skills of applying Signal Processing in Wireless Systems for solving real life problems.

[1601.6]. To analyse the wireless transceiver schemes; Cellular Code Division Multiple Access systems, Orthogonal Frequency Division Multiplexing,3rd Generation networks & standards.

PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: the sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analyzing the graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are terms society builders and transformers.
B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: United we grow, divided we fall is a culture at MUJ that an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	15
	Sessional Exam II (Closed Book)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Closed Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

SYLLABUS

Introduction: Types of Services, Requirements for the services, Multipath propagation, Parameters of mobile multipath channels, Spectrum Limitations, Noise and Interference limited systems, Principles of Cellular networks, Multiple Access Schemes. Large scale path loss, Path Loss Models, Signal Fading: Fast Fading, Slow Fading, Fading due to Doppler Spread. Wireless Propagation Channels: Propagation Mechanisms (Qualitative treatment),

Propagation effects with mobile radio, Channel Classification, Link calculations, Narrowband and Wideband models;
Wireless Transceivers: Structure of a wireless communication link, Modulation and demodulation – Quadrature Phase Shift Keying (QPSK), p/4Differential Quadrature Phase Shift Keying (DQPSK), Offset-Quadrature Phase Shift Keying, Binary Frequency Shift Keying, Minimum Shift Keying, Gaussian Minimum Shift Keying, Power spectrum and Error performance in fading channels;
Signal Processing In Wireless Systems: Principle of Diversity, Macro diversity, Micro-diversity, transmitter diversity, receiver diversity, spatial multiplexing, Signal Combining Techniques, Transmit diversity, Equalizers- Linear and Decision Feedback equalizers, Review of Channel coding and Speech coding techniques;

Advanced Transceiver Schemes: Spread Spectrum Systems- Cellular Code Division Multiple Access Systems- Principle, Power control, Effects of multipath propagation on Code Division Multiple Access, Orthogonal Frequency Division Multiplexing – Principle, Cyclic Prefix, Transceiver implementation, Second Generation (GSM, IS–95) and Third Generation Wireless Networks and Standards.

- **TEXT BOOKS**
  1. Andreas.F. Molisch, "Wireless Communications", 2nd Edition ,John Wiley – India, 2013.
  2. W. Stallings, "Wireless Communication and Network", 2nd Edition, Prentice Hall of India, 2010.

- **REFERENCE BOOKS**
  1. Dharma P. Agrawal, Qing-An Zeng, "Introduction to Wireless and MobileSystems", 3rd Edition", Cengage Learning, 2017.
  2. T. S. Rappaport, "Wireless Communications - Principle and Practice", 2nd Edition, Prentice Hall of India, 2015

Lecture Plan:

Lec No	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	Introduction and Course Hand-out briefing	To acquaint and clear teachers expectations and understand student expectations	Lecture	NA	NA
2-4	Introduction: Types of Services, Requirements for the services	To obtain the knowledge about the various types of wireless services.	Flipped Classroom	1601.1	In Class Quiz (Not Accounted)
5-7	Multipath propagation, Parameters of mobile multipath channels	To obtain the knowledge about technical challenges for the wireless communication systems	Lecture	1601.1	Class Quiz Mid Term I End Term
8,9	Spectrum Limitations, Noise and Interference limited systems	To obtain the knowledge about technical challenges for the wireless communication systems	Lecture	1601.1	Class Quiz Mid Term I
10-12	Principles of Cellular networks,	To understand the concept of the cellular radio fundamentals such as frequency reuse, handoff, Co-channel interference and capacity of cellular systems.	Flipped Class	1601.2	Home Assignment Class Quiz Mid Term 1
13-15	Multiple Access Schemes.	To understand the concept of the cellular radio fundamentals such as frequency reuse, handoff, Co-channel interference and capacity of cellular systems.	Flipped Class	1601.2	Class Quiz Mid Term 1
16,17	Large scale path loss, Path Loss Models,	To formulate the radio propagation models, path loss models, signal fading and large scale effects of radio propagation in many operating environment.	Activity (Think Pair Share)	1601.3	Class Quiz Mid Term 1 End Term
18-19	Signal Fading: Fast Fading, Slow Fading, Fading due to Doppler Spread.	To formulate the radio propagation models, path loss models, signal fading and large scale effects of radio propagation in many operating	Lecture	1601.3	Class Quiz Mid Term I End Term

		environment.			
20	Wireless Propagation Channels: Propagation Mechanisms (Qualitative treatment),	To formulate the radio propagation models, path loss models, signal fading and large scale effects of radio propagation in many operating environment.	Lecture	1601.3	Class Quiz Mid Term II End Term
21	Propagation effects with mobile radio, Channel Classification,	To formulate the radio propagation models, path loss models, signal fading and large scale effects of radio propagation in many operating environment.	Lecture	1601.3	Class Quiz Mid Term II End Term
22	Link calculations, Narrowband and Wideband models;	To formulate the radio propagation models, path loss models, signal fading and large scale effects of radio propagation in many operating environment.	Lecture, Activity	1601.3	Home Assignment Mid Term II End Term
23	Wireless Transceivers: Structure of a wireless communication link,	To analyse modulation/demodulation & structure of communication link in wireless systems.	Lecture	1601.4	Mid Term II End Term
24-26	Modulation and demodulation – Quadrature Phase Shift Keying (QPSK), p/4Differential Quadrature Phase Shift Keying (DQPSK).	To analyse modulation/ demodulation & structure of communication link in wireless systems.		1601.4	Class Quiz Mid Term II End Term
27-29	Offset-Quadrature Phase Shift Keying, Binary Frequency Shift Keying, Minimum Shift Keying, Gaussian Minimum Shift Keying, Power spectrum and Error performance in fading channels.	To analyse modulation/ demodulation & structure of communication link in wireless systems.	Lecture	1601.4	Class Quiz Mid Term II End Term
30-33	Signal Processing In Wireless Systems: Principle of Diversity, Macro diversity, Micro-diversity.	To understand the concepts of Signal Processing In Wireless Systems.	Lecture	1601.5	Class Quiz Mid Term II End Term
34-38	Transmitter diversity, receiver diversity, spatial multiplexing,	To understand the concepts of Signal Processing In Wireless	Lecture	1601.5	Home Assignment Class Quiz

	Signal Combining Techniques, Transmit diversity.	Systems.			Mid Term II End Term
39-41	Equalizers- Linear and Decision Feedback equalizers,	To understand the concepts of Signal Processing In Wireless Systems.	Lecture	1601.5	Home Assignment Class Quiz End Term
42	Review of Channel coding and Speech coding techniques;	To understand the concepts of Signal Processing In Wireless Systems.	Lecture	1601.5	Class Quiz End Term
43,44	Advanced Transceiver Schemes: Spread Spectrum Systems- Cellular Code Division Multiple Access Systems- Principle,	To analyse the wireless transceiver schemes; Cellular Code Division Multiple Access systems, Orthogonal Frequency Division Multiplexing,3rd Generation networks & standards.	Lecture	1601.6	Class Quiz End term
45,46	Power control, Effects of multipath propagation on Code Division Multiple Access,	To analyse the wireless transceiver schemes; Cellular Code Division Multiple Access systems, Orthogonal Frequency Division Multiplexing,3rd Generation networks & standards.	Lecture	1601.6	Class Quiz End Term
47,48	Orthogonal Frequency Division Multiplexing – Principle, Cyclic Prefix, Transceiver implementation.	To analyse the wireless transceiver schemes; Cellular Code Division Multiple Access systems, Orthogonal Frequency Division Multiplexing,3rd Generation networks & standards.	Lecture	1601.6	Class Quiz End Term
49-51	Second Generation (GSM, IS–95) and Third Generation Wireless Networks and Standards.	Examine fuel properties, sketch and compare emission trends in engines	Lecture	1601.6	Class Quiz End Term
52	Conclusion and Course Summarization	NA	NA		NA

- **Course Articulation Matrix: (Mapping of COs with POs)**

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[1601.1]	To obtain the knowledge about the various types of wireless services& technical challenges for the wireless communication systems.	2												3			
[1601.2]	To understand the concept of the cellular radio fundamentals such as frequency reuse, handoff, Co-channel interference and capacity of cellular systems.	2	3			1	1	2		1	2		2	2	2		
[1601.3]	To formulate the radio propagation models, path loss models, signal fading and large scale effects of radio propagation in many operating environment.	1	2	3				2	2	1	2	2		1	1	3	
[1601.4]	To analyse modulation/ demodulation & structure of communication link in wireless systems.	1	2		3		1							2	2		
[1601.5]	To understand the concepts of Signal Processing In Wireless Systems				1	2										3	1
[1601.6]	To analyse the wireless transceiver schemes; Cellular Code Division Multiple Access systems, Orthogonal Frequency Division Multiplexing,3rd Generation networks & standards.						1										

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

- **Course Outcome Attainment Level Matrix:**

CO	STATEMENT	ATTAINMENT OF PROGRAM OUTCOMES **THRESHOLD VALUE: 40%**												ATTAINMENT OF PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[1601.1]	To obtain the knowledge about the various types of wireless services& technical challenges for the wireless communication systems.																
[1601.2]	To understand the concept of the cellular radio fundamentals such as frequency reuse, handoff, Co-channel interference and capacity of cellular systems.																
[1601.3]	To formulate the radio propagation models, path loss models, signal fading and large scale effects of radio propagation in many operating environment.																
[1601.4]	To analyse modulation/ demodulation & structure of communication link in wireless systems.																
[1601.5]	To develop required skills of applying Signal Processing in Wireless Systems for solving real life problems.																
[1601.6]	To analyse the wireless transceiver schemes; Cellular Code Division Multiple Access systems, Orthogonal Frequency Division Multiplexing,3rd Generation networks &																

	standards.																

0-No Attainment; 1- Low Attainment; 2- Moderate Attainment; 3- Substantial Attainment

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer & Communication Engineering

Course Hand-out

Computer Networks | CS 1602 | 4 Credits | 3104

Session: 2018-19 | Faculty: Dr. Narendra Singh Yadav | Class: VI Semester

Introduction: The main objective of this course is to familiarize students with computer networks of today which are based on the TCP/IP model and its layered structure.

A. Course Outcomes: At the end of the course, students will be able to

CS1602.1: Understand and learn basic concept of TCP/IP model, IPV4, class full addressing, sub netting and classless addressing.

CS1602.2: Analysis and Implement the Routing and its types.

CS1602.3 Demonstrate the Internet control protocols, IPV6 transitions.

CS1602.4: Analyse the Transport Layer and Its protocols, congestion control.

CS1602.5: Describe the Application Layer, its protocols and Network Security. Building skills for designing real life network architectures in order to get more employable.

PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Program Outcomes :

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

B. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	15
	Sessional Exam II (Close Book)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Close Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

C. SYLLABUS

Network Layer: Network layer design issues, routing algorithms, congestion control algorithms, Quality of service, MPLS. Classfull addressing, Sub-netting, Classless addressing, variable length
blocks, address allocation; Protocols: ARP & DHCP: Introduction, Packet Format, message types, IPV4 header format, fragmentation, options, checksum. ICMP: Message format, message types. Dynamic routing protocols: RIP, OSPF & BGP, Multicasting Protocol; Transport Layer: Transport services, state diagram, Elements of Transport Protocols: addressing, Connection establishment, connection release, Error control and Flow Control, Multiplexing, Congestion Control: Bandwidth allocation, regulating the sending

rate, UDP: UDP header, TCP: TCP service model, TCP segment header, TCP connection establishment, TCP connection release, TCP window management, Timer management;
Application Layer: DNS: Name space, domain resource records, Electronic Mail: SMTP, POP, IMAP, MIME, HTTP, HTTPS, SNMP;
Network Security: Security Goals, Attacks, Attack prevention techniques, Firewall, IDS, DMZ, IPsec.

TEXT BOOKS:

1. A S Tanenbaum, Computer Networks, 5th Ed., Pearson, 2010.
2. B.A. Forouzan, TCP/IP Protocol Suite, 4th Ed., TMH, 2010.

REFERENCE BOOK:

1. W.R. Stevens, TCP/IP illustrated, Volume 1: The Protocols, 2nd Ed., Addison-Wesley, 2015.
2. D E. Comer, Internetworking with TCP/IP Principles, Protocols and Architecture, 6th Ed., Pearson , 2013.

D. Lecture Plan:

lecture	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode Of Assessing CO
1	Introduction to network Layer	Basic information about network layer and interface and its Functionalities	lecture	1602.1	Mid Term I, Quiz & End Term
2	Network Layer Design Issues; Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service	Design Issues, Difference between circuit switch network and datagram network, connectionless vs connection oriented	Lecture	1602.1	Mid Term I, Quiz & End Term

3	Network Layer Design Issues; Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service	Store-and-Forward Packet Switching	Lecture	1602.1	Mid Term I, Quiz & End Term
4-7	Routing Algorithms; Characteristics and Types, The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing,	Understanding of routing algorithms	Lecture	1602.2	Mid Term I, Quiz & End Term
8-12	Internetworking; IP Addresses, Subnets, CIDR—Classless InterDomain Routing, NAT—Network Address Translation	Understanding of classfull and classless addressing, subnetting, supernetting,	Lecture	1602.2	Mid Term I, Quiz & End Term
13-14	DHCP, ARP, RARP, ICMP, IPV4 and IPV6 header format	Understanding of DHCP, ARP, RARP, and IPv4/Ipv6 header format	Lecture	1602.3	Mid Term I, Quiz & End Term
15	Fragmentation	Students will learn the Fragmentation process	Lecture	1602.2	Mid Term I, Quiz & End Term
16-17	RIP, OSPF, BGP	Understanding of RIP,	Lecture	1602.2	Mid Term I, Quiz & End Term

		OSPF, BGP protocols			
18-21	Congestion Control Algorithms; General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnets	Understanding of congestion control and prevention techniques.	Lecture	1602.1	Mid Term I, Quiz & End Term
22-23	Quality of Service; Requirements, Techniques for Achieving Good Quality of Service (till Packet Scheduling as per Tannenbaum)	Understanding of QOS, Leakey bucket and token bucket	Lecture	1602.1	Mid Term I, Quiz & End Term
	First Sessional Examination		Lecture		
24	Transport Layer; Introduction to Transport Layer, Transport Service Primitives	Understanding of Transport layer and its services	Lecture	1602.4	Mid Term II, Quiz & End Term
25-28	Elements of Transport Protocols; Addressing, Connection Establishment, Connection Release, Flow Control and Buffering, Multiplexing	Students will learn transport protocols and its functions.	Lecture	1602.4	Mid Term II, Quiz & End Term

29	UDP; UDP Header; Introduction to TCP	Understanding of UDP and TCP header.	Lecture	1602.4	Mid Term II, Quiz & End Term
30-31	The TCP Service Model, The TCP Protocol, The TCP Segment Header,	Understanding of TCP Services	Lecture	1602.4	Mid Term II, Quiz & End Term
32	TCP Connection Establishment, TCP Connection Release	Students will learn how to establish the tcp connection and tear-down process	Lecture	1602.4	Mid Term II, Quiz & End Term
33-35	TCP Transmission Policy; Window Management, Connection Control, Timer Management	Understanding of Transmission Policy and window management	Lecture	1602.4	Mid Term II, Quiz & End Term
36-37	Introduction to Application Layer; DNS—The Domain Name System	Understanding of Application layer and its protocols	Lecture	1602.5	Mid Term II, Quiz & End Term
38-39	Electronic Email; SMTP, POP, IMAP, MIME	Understanding of SMTP, POP, IMAP and MIME	Lecture	1602.5	Mid Term II, Quiz & End Term
40-41	HTTP, HTTPS	understanding of HTTP and HTTPS	Lecture	1602.5	Mid Term II, Quiz & End Term
41	HTTP, HTTPS		Lecture	1602.5	Mid Term II, Quiz & End Term
42	SNMP	understanding of SNMP	Lecture		
	Second Sessional		Lecture		
43-50	Network Security: Security Goals and Attacks	Understanding of Network security and its concerns	Lecture	1602.5	Quiz & End Term

E. Course Articulation Matrix: (Mapping of COs with POs and PSOs)

CO	Statement	Correlation with Program Outcomes												Correlation with Program Specific Outcomes			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CS1602.1	Understand and learn basic concept of TCP/IP model, IPV4, class full addressing, sub netting and classless addressing.	2	2	3	3	3		2	1		1			3	1	2	
CS1602.2	Implement the Routing and its types		2	2			2					1	1	1	1	3	
CS1602.3	Demonstrate the Internet control protocols, IPV6 transitions.				3	1			1		1			1	1		
CS1602.4	Analyse the Transport Layer and Its protocols, congestion control.					1	2							1	1		1

CS1602

CS1602.5	Describe the Application Layer, its protocols and Network Security.							2		2				1	1		1

1: Low Correlation 2: Moderate Correlation 3: Substantial Correlation

CO	Statement	ATTAINMENT OF PROGRAM OUTCOMES THRESHOLD VALUE: 40%												ATTAINMENT OF PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CS1602.1	Understand and learn basic concept of TCP/IP model, IPV4, class full addressing, sub netting and classless addressing.																
CS1602.2	Implement the Routing and its types																
CS1602.3	Demonstrate the Internet control protocols, IPV6 transitions.																
CS1602.4	Analyse the Transport Layer and Its protocols, congestion control.																

CS1602

CS1602.5	Describe the Application Layer, its protocols and Network Security. Building skills for designing real life network architectures in order to get more employable.																	

1: Low Correlation 2: Moderate Correlation 3: Substantial Correlation

MANIPAL UNIVERSITY
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SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER & COMMUNICATION ENGG.
COURSE HAND-OUT

UNIX SHELL PROGRAMMING LAB || CC1630|| 1 Credits|| [0 0 2 1]
Session: 2018-19| Faculty NAME: Dr. Muthukumaran Kasinathan& Mr. GAURAV PRASAD LAB: CORE

A. Introduction:

The course is to familiarize students with introduction to UNIX as a development platform. This course provides an introduction to the full range of UNIX user commands and utilities. It also discuss about the shell programming concept and deals with in detail about the shell programming inUNIX shell environment. Overall the course covers, through basic shell commands to shell programming.

B. Course Outcomes: At the end of the course, students will be able to

[CC1630.1]:	Learn and apply the basic knowledge and concept of UNIX as a development platform with importance on basic commands with its usage in the field of computing.
[CC1630.2]:	Use tools and utilitiesin UNIX, understand the working and applicability of these tools for real world applications.
[CC1630.3]:	Identifyappropriate technique and developskills to solve real time problems.
[CC1630.4]:	Perform experiments to analyse the performance and applicability of learned utilities and shell programming which enhance employability opportunities.

C PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communicationengineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analysing, the graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet

the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are called society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Two Test	40
	Viva	20
	File/Record	10
	Total	70
End Term Exam (Summative)	End Term Exam	30
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

E. SYLLABUS

General Unix Commands: as cal, date, echo, printf, bc, script, mailx, passwd,who; **File System:** file handling commands such as cat, cp, rm, mv, more, wc, cmp, diff, gzip ,gunzip, tar, zip, unzip, mkdir, rmdir, pwd, cd, File attributes, ownerships, permissions; **The Process Basics**, ps, Internal and external commands, Process states and zombies, nice, at, mesg, cron, time, top; **Network Commands:** Telnet, ipconfig, ping, netstat, firewalls, System configurations. The vi editor Basics, Input mode and The ex mode, Navigation, Editing text; **The Shell and Shell programming:** The Shell's interpretive cycle, Shell offering, Pattern Matching, Three Standard Files, Two special files, pipes, tee, Shell scripts. Debuggers and compilers.

F. TEXT BOOKS

1. S. Das, "Unix Concepts and Applications", 4th Edition, McGraw Hill, 2006

G. REFERENCE BOOKS

1.Y Kanitkar, "Unix shell programming",BPB Publications; 1st edition 2003.

2. W. R. Stevens, S. A. Rago, "Advanced Programming in the UNIX Environment", 3rd Edition, Addison-Wesley, 2013.

H .Lecture Plan:

LEC NO	TOPICS
1	**Basic Commands**: cal, date, echo, who. Working with files: ls, cat, wc, cp, mv, rm. Working with Directories: pwd, cd, mkdir, rmdir.
	File Compression/Decompression: gzip, bzip2, zip, tar, gunzip, bunzip2, unzip
2	**File attributes**: ownerships, permissions; **The Process Basics**, ps, Internal and external commands, Process states and zombies, nice, at, mesg, cron, time, top.
3	**Regular Expressions:** The period(.), dollar($), caret(^), asterisk(*).**cut, paste, sed, grep, sort, uniq.**
4	**Passing Arguments: The $#, $*, program to look up, add, remove entries in phonebook**
5	**Parameter substitution: ${parameter}, ${parameter:-value}, ${parameter:=value} and ${parameter:?value}. pattern matching constructs: ${variable%%pattern} ${variable#pattern} and ${variable##pattern}**
6	**Decisions:** test: string, integer, file and logical operators**, else, exit, elif and case.**
7	**Loops:**For, while until. Breaking out from loop, **Executing loop in background, I/O redirection, piping data into and out of loop.**
8	**Reading and printing data:** read, program to copy files, mycp, printf commands.
9-10	**Network Commands:** Telnet, ipconfig, ping, netstat, firewalls, System configurations. The vi editor Basics, Input mode and The ex mode, Navigation, Editing text;

I Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CC1630.1]:	Learn and apply the basic knowledge and concept of UNIX as a development platform with importance on basic commands with its usage in the field of computing.	2		1		1			1	2	1	1	1	2			
[CC1630.2]:	Use tools and utilities in UNIX, understand the working and applicability of these tools for real world applications.	2	1	1	1	3	1	1					1	1			
[CC1630.3]:	Identify appropriate technique and develop skills to solve real time problems.		2	1	1	1	1	1						1	2	3	1
[CC1630.4]:	Perform experiments to analyse the performance and applicability of learned utilities and shell programming which enhance employability opportunities.		2	2	3						1			1	2	2	

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

J Course Outcome Attainment Level Matrix:

CO	STATEMENT	ATTAINMENT OF PROGRAM OUTCOMES **THRESHOLD VALUE: 40%**												ATTAINMENT OF PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CC1630.1]:	Learn and apply the basic knowledge and concept of UNIX as a development platform with importance on basic commands with its usage in the field of computing.																
[CC1630.2]:	Use tools and utilities in UNIX, understand the working and applicability of these tools for real world applications.																
[CC1630.3]:	Identify appropriate technique and develop skills to solve real time problems.																
[CC1630.4]:	Perform experiments to analyse the performance and applicability of learned utilities and shell programming which enhance																

	employability opportunities.																

0-No Attainment; 1- Low Attainment; 2- Moderate Attainment; 3- Substantial Attainment

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SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER & COMMUNICATION ENGG.
COURSE HAND-OUT

Computer Networks LAB || CS1631|| 1 Credits|| [0 0 2 1]
Session: 2018-19 Faculty NAME: Dr. Narendra Yadav, Arjun Singh., Anshuman Kalla, Yashpal Soni, Prashant Manuja, Dr. Devershi Pallavi Bhatt, Rahul Saxena **LAB: CORE**

A. Introduction:

The course is to familiarize students with computer networks. Main aim of the course to provide the detail and working of network protocols. Course alsodiscuss the implementation of various routing algorithm. Students will learn the configuration of routers and switches.

B. Course Outcomes: At the end of the course, students will be able to

CS1631.1: Understand and learn basic concept of TCP/IP model, IPV4, classful addressing, sub-netting and classless addressing.

CS1631.2: Develop skills to analysis and implement the routing and its types.

CS1631.3 Demonstrate the Internet control message protocols and acquire skills to configure routers

CS1631.4: Analyse the Transport Layer and its protocols.

CS1631.5: Describe the Application Layer and configuration of various applications present on this layer.

C PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communicationengineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analysing graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are called society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Two Test	40
	Viva	20
	File/Record	10
	Total	70
End Term Exam (Summative)	End Term Exam	30
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

E. SYLLABUS

Flow control protocols, error detection and correction techniques, Bit stuffing and character stuffing. Implementation of link state routing protocol, distance vector routing protocol and other routing protocols. TCP and UDP socket programming. Remote method invocation (RMI). Packet analyzer- Wireshark. Network Simulator - 3 Tool.

A. Text Books

W. Stallings, *"Cryptography and Network Security Principles and Practice"*, 7th Edition, Pearson education, 2017

Behrouz A Forouzan , " *Cryptography and Network Security" 3rd edition, McGrawhill Education, 2017*

B. Reference Books

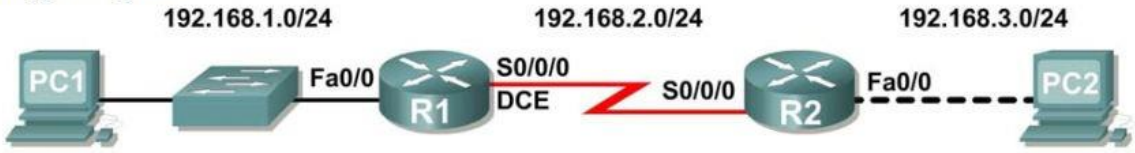
Y. Qian, D. Tipper, P. Krishnamurthy, J. Joshi, *"Information Assurance Dependability & Security in Networked Systems"*, 1st Edition, Morgan Kaufmann, 2010.

AtulKahate, "*Cryptography and Network Security" 3rd Edition, McGraw Hil Education, 2017*

H .Lecture Plan:

LEC NO	TOPICS
1	Introduction to Packet tracer and networking device components
2	Router Mode, Switch/Router basic commands Enable Password, Secret password, hostname, set clock, show command, copy command, Router modes" User Exec Mode, Privilege Mode, Global Configuration mode"
3	Star Topology using HUB and Switch, IP configuration of end devices, show command, copy command, password setting, hostname setting • Create Star topology with hub and switch • Configure the IP address of same network address range on four machines. • Send the ping command from PC0 to PC1 and observer the traffic patter, also the behavior (Broadcast/Unicast) of Hub and Switch. • Observer the ARP packet. • Send two message from different machine to one destination and observe the Collison.
4	DHCP configuration Create Star topology with 4 machines and one switch Use one server and enable DHCP service on it Configure IP range on server Provide IP address to the server Enable DHCP in each machine Send PING from PC0 to PC1
5	Configuration of Static Routing Protocol Create a below topology and assigned below IP address on router interface and machines.

Topology Diagram



Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	Fa0/0	192.168.1.1	255.255.255.0	N/A
	S0/0/0	192.168.2.1	255.255.255.0	N/A
R2	Fa0/0	192.168.3.1	255.255.255.0	N/A
	S0/0/0	192.168.2.2	255.255.255.0	N/A
PC1	N/A	192.168.1.10	255.255.255.0	192.168.1.1
PC2	N/A	192.168.3.10	255.255.255.0	192.168.3.1

6	Configuration of RIPv1 and RIPv2.
7	Investigating routing table lookup process.
8	Configuration of IGRP and troubleshooting
9	Configuration of EIGRP and troubleshooting
10	Configuration of OSPF and troubleshooting
11	Configuration of VLAN and troubleshooting
12	NAT Protocol Configuration and troubleshooting
13	Network Discovery and Documentation and troubleshooting
14	Implementation of chat server

I Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CS1631.1:	Understand and learn basic concept of TCP/IP model, IPV4, classful addressing, sub-netting and classless addressing	2	3	3	2	3	2		2					3	1	2	
CS1631.2:	Develop skills to analysis and implement the routing and its types.			2				2	2		2		1	1	2	3	
[CS1631.3]:	Demonstrate the Internet control message protocols and acquire skills to configure routers.		3			1	2							1	1		
[CS1631.4]:	Analyse the Transport Layer and its protocols.					1						2		1	1		1
[CS1631.5]:	Describe the Application Layer and configuration of various applications present on this layer.							2		2			1	1	1		1

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

J Course Outcome Attainment Level Matrix:

CO	STATEMENT	ATTAINMENT OF PROGRAM OUTCOMES **THRESHOLD VALUE: 40%**												ATTAINMENT OF PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CS1631.1:	Understand and learn basic concept of TCP/IP model, IPV4, classful addressing, sub-netting and classless addressing																
CS1631.2:	Develop skills to analysis and implement the routing and its types.																
[CS1631.3]:	Demonstrate the Internet control message protocols and acquire skills to configure routers.																
[CS1631.4]:	Analyse the Transport Layer and its protocols.																
[CS1631.5]:	Describe the Application Layer and configuration of various applications present on this layer.																

0-No Attainment; 1- Low Attainment; 2- Moderate Attainment; 3- Substantial Attainment

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer and Communication Engineering
Course Hand-out

Open Source Technologies | CC1690 | 3 Credits | 30 03

Session: 2018-19 | Class: B.Tech.IIIndYear (6thSemester)

A. Introduction: Open source technology is defined as the production and development philosophy of allowing end users and developers to not only see the source code of software, but modify it as well. The Linux operating system is a one of the best-known examples of open source software technology. The Linux operating system's open source paradigm is in direct contrast to Microsoft's approach to development and production of its popular Windows operating system. Unlike Linux, Windows is built on a closed source paradigm that does not allow the end user the ability to see or edit the code that makes up the operating system. In fact, certain aspects of the end-user license for the Windows operating system specifically forbids the end user from attempting to view or modify the code that makes up the software. Such attempts are often known as reverse engineering or reverse compiling.Although software is not the only product governed by an open source licenses, it is the most popular, lending itself well to manipulation of its code and add-ons. Open source provides a transparent platform upon which anyone with the skills to do so can add to the development and production of the software either for release as a new incarnation of the software for others to use or for strictly in-house development only.

B.

Course Outcomes: At the end of the course, students will be able

CC1690**.1:**To identify Open Source Technology and develop related skills.
CC1690**.2:**To differentiate between Open Source and Free Software.
CC1690**.3:**To discover the Free Software Foundation and the Open Source Initiative.
CC1690**.4:**To develop skills that enables them to start an open source project and provides entrepreneurship opportunities.
CC1690**.5**: To understandimpact of open source on our community.
CC1690.6: To understand open source ethics having social impact.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations

[PO.6]. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technologicalchange

The graduation from B.Tech in Computer &Communication Engineering will empowers the student:

[PSO1]. Will be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

[PSO2]. Will be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

[PSO3]. Will be able to identify the existing open problems in the field of computing and propose the best possible solutions.

[PSO4]. Will be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	**Description**	**Maximum Marks**
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	15
	Sessional Exam II (ClosedBook)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (ClosedBook)	40
	Total	100

Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.

E. SYLLABUS

Introduction: Open Source, Free Software, Free Software vs. Open Source software, Public Domain Software, FOSS does not mean any cost; History: BSD, the Free Software Foundation and the GNU Project, Open Source History, initiatives, Principle and Methodologies; Philosophy: Software Freedom, Open Source Development Model Licenses and Patents: License, Important FOSS Licenses (Apache, BSD, GPL, And LGPL), copyrights and copy thefts, Patents; Economics of FOSS: Zero Marginal Cost, Income-Generation Opportunities, Problems with traditional commercial software, Internationalization; Case Studies: Apache, BSD, Linux, Mozilla (Firefox), Wikipedia, Joomla, GCC, Open office. Starting and Maintaining an Open Source Project, Open Source Hardware, Open Source Design, Open source Teaching. Open source media. Open source vs. closed source Open source government, Open source ethics. Social and Financial impacts of open source technology, Shared software, Shared source.

F. TEXT BOOKS

D. Shah, D. Ambawade,"Linux Labs and Open Source Technologies", Dream Tech Press, 2014.

2. R. Petersen, "Linux: The Complete Reference", 6th Edition, McGraw Hill, 2007.

G. REFERENCE BOOKS

1. K. Vadera, B. Gandhi, "Open Source Technology", 1st Edition, Laxmi Publications, 2009.

2. C. Negus, "Linux Bible 2007 Edition; Boot up to Ubuntu®, FedoraTM, KNOPPIX, Debian®, SUSETM" , John Wiley & Sons, 2007.

3. A. Brown , G. Wilson, "The Architecture of Open Source Applications", Lulu.com, 2012.

H. Lecture Plan:

S/no	Topic	Blown up topics	No. of Lectures
1	Introduction	Open Source, Free Software, Free Software vs. Open Source software, Public Domain Software, FOSS does not mean no cost. History : BSD, The Free Software Foundation and the GNU Project.	8

2	**Open Source History**	**Open Source History, Initiatives, Principle and methodologies. Philosophy : Software Freedom, Open Source Development Model Licences and Patents: What Is A License, Important FOSS Licenses (Apache,BSD,GPL, LGPL), copyrights and copylefts,**	8
3	**Patents Economics of FOSS**	**Zero Marginal Cost, Income-generation opportunities, Problems with traditional commercial software, Internationalization**	6
4	**Open Source Projects**	**Starting and Maintaining an Open Source Project, Open Source Hardware, Open Source Design, Open source Teaching. and Open source media.**	6
5	**Open Source**	**Open source vs. closed source Open source government, Open source ethics.**	5
6	**OPEN SOURCE ETHICS**	**Social and Financial impacts of open source technology, Shared software, Shared source**	10
		Total Lectures/Tutorials	37

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CC1690.1:	To identify Open Source Technology and develop related skills.	1	2	1										2			
CC1690.2:	To differentiate between Open Source and Free Software.	2		1									1	1		2	
CC1690.3:	To discover the Free Software Foundation and The Open Source Initiative.		2											2			1
CC1690.4:	To develop skills that enables them to start an open source project and provides entrepreneurship opportunities.	1	1											1	2		2
CC1690.5:	To understand impact of open source on our community.			1	2					2			1			2	
CC1690.6:	To understand open source ethics having social impact.								2		1	1	1				

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

J. Course Outcome Attainment Level Matrix:

CO	STATEMENT	ATTAINMENT OF PROGRAM OUTCOMES **THRESHOLD VALUE: 40%**													ATTAINMENT OF PROGRAM SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO3	PSO 4
CC1690.1:	To identify Open Source Technology and develop related skills.																
CC1690.2:	To differentiate between Open Source and Free Software.																
CC1690.3:	To discover the Free Software Foundation and The Open Source Initiative.																
CC1690.4:	To develop skills that enables them to start an open source project and provides entrepreneurship opportunities.																
CC1690.5:	To understand impact of open source on our community.																
CC1690.6:	To understand open source ethics having social impact.																

0-No Attainment; 1- Low Attainment; 2- Moderate Attainment; 3- Substantial Attainment

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer and Communication
Course Hand-out

Soft Computing | CC 1691 | 3 Credits | 3 0 0 3

Session: 2018-19 Faculty: Mrs. Shivani Gupta | Class: Open Elective Course

A. Introduction: This course aims at introducing the fundamental theory and concepts of computational intelligence methods, in particular neural networks, fuzzy systems, genetic algorithms and their applications in the area of machine intelligence.

B. Course Objectives: At the end of the course, students will be able to

1691.1 Learn about soft computing skills and their applications.
1691.2 Analyze various neural network architectures.
1691.3 Understand perceptron and counter propagation networks.
1691.4 Define and acquire skills related to fuzzy systems.
1691.5 Analyze the genetic algorithms and their applications.

C. Program Outcomes and Program Specific Outcomes

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health

and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal,

health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in

societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the

engineering practices

[PO.9]. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse

teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects

and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

[PSO1]. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

[PSO2]. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

[PSO3]. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

[PSO4]. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Component	Duration	Date	Weightage
SESSIONAL I (Closed Book)	60 Minutes	As per Academic Calendar	15%
SESSIONAL II (Closed Book)	60 Minutes	As per Academic Calendar	15%
Quizzes (Closed Book)	Six Quizzes Each of 20 Minutes	Dates To Be Announced in Class	20%
Assignments	Open	Spread over the semester	10%
END-SEM EXAM (Closed Book)	3 hours	As per Academic Calendar	40%

A. Make-up Policy: No–makeup will be entertained. However, special sanction can be made based strictly on the

merit of the case.

B. Chamber Consultation: Individual Instructor Will AnnounceSeparately in his/her Assigned Section

C. Notice: All notices for this course will be displayed at the **Department notice board** only.

***D.* Consultancy Hours:** *Mentioned in the time table*

E. Syllabus:

Introduction: soft computing and its applications;

Neural Networks (NN) Paradigms: Introduction, Neuron model, NN Architectures, Learning Rules: Hebbian, competitive, Boltzmann, and Supervised, unsupervised; Types of neural network: Perceptron, MLP, Radial basis function network, Recurrent Network, Self-organizing feature maps, Boltzmann machine, Application of neural network;

Fuzzy Logic: Introduction, Classical and fuzzy sets: Overview, Basic operations, relations, Rule based models; Fuzzy Arithmetic: Fuzzy numbers, Linguistics variables, arithmetic operations on intervals and numbers, Lattice of fuzzy numbers, fuzzy equations, Applications of fuzzy logic: Medicine, Economics;

Evolutionary Computations: Introduction, Genetic Algorithm: Overview, Operators, Classifier systems, Genetic programming Parse tree, Variants of GA (hybrid GA, Fuzzy GA.

F. Text Book(s):

1. S. Rajasekaran& GA VijayalakshmiPai "Neural Networks, Fuzzy Logic, and Genetic Algorithms synthesis and application", PHI, 2012
2. J.S.R. Jang, C. – T, Son, E.Mizutani "Neuro-fuzzy and Soft Computing" PEARSON ,2015
3. S.N. Sivanandam& S. N. Deepa "Principles of Soft Computing" , 2nd Edition, Wiley India, 2011.

G. Reference(s):

1. B. Kosko, "Neural Networks and Fuzzy Systems, A Dynamically Systems Approaches to machine intelligence", ACM, 1992.
2. S. Haykin, "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.
3. S. Roy, "Introduction to Soft Computing: Neuro-Fuzzy and Genetic Algorithms", Pearson Education India; First edition 2013.
4. K. Knight, E. Rich, B. Nair, "Artificial Intelligence", 3rd Edition, McGraw Hill, 2008.

H. Lecture Plan:

Lec No	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1.	**Introduction:** soft computing	To familiarize with soft computing concepts.	Lecture	1691.1	Class Quiz Mid Term I End Term
2.	Its applications		Lecture	1691.1	
3.	Its applications		Lecture	1691.1	
4.	Introduction, Neuron model,		Lecture	1691.1	
5.	Application of neural network	To Basics of ANN and Learning Algorithms.	Lecture	1691.1	
6.	NN Architectures,		Lecture	1691.1	
7.	Learning Rules: Hebbian,		Lecture	1691.1	
8.	Competitive Rules		Lecture	1691.1	
9.	Boltzmann,		Handouts	1691.1	
10.	Supervised,			1691.1	
11.	Unsupervised;			1691.1	
12.	Types of neural network:	To Basics of ANN and Learning Algorithms.	Lecture	1691.1, 1691.2	
13.	Recurrent Network,	To Basics of ANN and Learning Algorithms.	Lecture	1691.1, 1691.2	
14.	Numericals		Lecture	1691.1, 1691.2	
15.	Numericals		Lecture	1691.1, 1691.2	
16.	Perceptron, MLP,		Lecture	1691.1, 1691.2	
17.	Radial basis function network,		Lecture	1691.1, 1691.2	
18.	Selforganizing feature maps		Lecture	1691.1, 1691.2	
19.	Boltzmann machine		Lecture	1691.1, 1691.2	
20.	Introduction, Classical and fuzzy sets: fuzzy equations,	To introduce the fuzzy logic concepts, fuzzy principles and relations.	Lecture	1691.1, 1691.2	
21.	Numericals		Lecture	1691.1, 1691.2	
22.	Overview of fuzzy		Lecture	1691.1, 1691.2	

23.	Basic operations		Lecture	1691.1,1691.3	
24.	relations,		Lecture	1691.1,1691.3	
25.	Rule based models;		Lecture	1691.1,1691.3	
26.	Arithmetic: Fuzzy numbers		Lecture	1691.1,1691.3	
27.	Linguistics variables,		Lecture	1691.1, 1691.2	
28.	Fuzzy arithmetic operations on intervals and numbers		Lecture	1691.1,1691.3	Class Quiz Mid Term II End Term
29.	Numericals				
30.	Lattice of fuzzy numbers,		Lecture	1691.1,1691.3	
31.	Applications of fuzzy logic:		Handouts	1691.1,1691.3	
32.	Medicine, Economics;		Lecture	1691.1,1691.5	
33.	Introduction, Genetic Algorithm:,	Genetic Algorithm and its applications to soft computing.	Lecture	1691.1,1691.5	
34.	Overview, Operators, Classifier systems,	Genetic Algorithm and its applications to soft computing.	Lecture	1691.1,1691.5	
35.	Numericals		Lecture	1691.1,1691.5	
36.	Genetic programming Parse tree MST		Lecture	1691.1,1691.5	
37.	Variants of GA (hybrid GA, Fuzzy GA.		Lecture	1691.1,1691.5	
38.			Lecture	1691.1,1691.5	
39.	Numericals		Lecture	1691.1,1691.5	
40.	Revision		Lecture	1691.1,1691.5	

CO	**STATEMENT**	**CORRELATION WITH PROGRAM OUTCOMES**												**CORRELATION WITH PROGRAM SPECIFIC OUTCOMES**		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CC 1691.	Learn about soft	2			2	3								1		

1	computing skills and their applications.															
CC 1691.2	Analyze various neural network architectures.		2		3	2							1		1	1
CC 1691.3	Understand perceptron and counter propagation networks.	2	3	2		1	1			1	1			1	1	
CC 1691.4	Define and acquire skills related to fuzzy systems.				2		1								1	
CC 1691.5	Analyze the genetic algorithms and their applications.	3		3			2	1			1		1	2	1	1

MANIPAL UNIVERSITY JAIPUR

School of Business & commerce

Department of Business Administration
Course Hand-out

Organization and Management | BB1540 | 3 Credits | 3 0 0 3

Session: 2018-19| Faculty: Ms. Jeevesh Sharma| Class: CCE (VI Semester)

A. Introduction: Keeping organizations healthy and viable in today's global competitiveness is a basic task of management. A manager links an enterprise with changing environment. There is evolving a global nature of managing. Managerial functions are essentially the same everywhere. Yet to get success, managers will have to acquire a global outlook and apply the principles, concepts and theories in an open perspective. This course will enable students understand the basic concept of organization and management and various functions of it.

B. Course Outcomes: On completion of the course the participants shall be able to:

[1540.1]To acquire knowledge in the field of organizational management and internal organization of companies required for managing an enterprise.

[1540.2]The students will also gain knowledge in the field of personnel management, motivation.

[1540.3]The students will also gain knowledge in the field of management information system and leadership for developing managerial skills.

[1540.4]The students will be able to gain knowledge for starting a small scale unit in terms of becoming an entrepreneur.

[**1540.5]**The students will also gain knowledge on case study and management information system.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Program Outcomes:

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

[PSO.1]. Will be able to design, develop and implement efficient software for a given real life problem.

[PSO.2]. Will be able to apply knowledge of computer networks, sub-netting and routing algorithms, transport layer protocols, and applications for network analysis.

[PSO.3]. Will be able to design, manage and secure wired/ wireless computer networks for data transfer.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close/Open Book)	15
	Sessional Exam II (Close/Open Book)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	20
End Term Exam (Summative)	End Term Exam (Open Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who miss a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. Syllabus

Unit 1

Meaning and definition of an organization, Necessity of Organization, Principles of Organization, Formal and Informal Organizations. Management: Functions of Management, Levels of Management, Managerial Skills, Importance of Management, Models of Management, Scientific Management, Forms of Ownership, Organizational Structures, Purchasing and Marketing Management, Functions of Purchasing Department, Methods of Purchasing, Marketing, Functions of Marketing, Advertising.

Unit 2

Introduction, Functions of Personal Management, Development of Personal Policy, Manpower Planning, Recruitment and Selection of manpower.

Unit 3

Motivation – Introduction, Human needs, Maslow's Hierarchy of needs, Types of Motivation, Techniques of Motivation, Motivation Theories, McGregor's Theory, Herzberg's Hygiene Maintenance Theory. Leadership - Introduction Qualities of a good Leader, Leadership Styles, Leadership Approach, Leadership Theories.

Unit 4

Entrepreneurship – Introduction, Entrepreneurship Development, Entrepreneurial Characteristics, Need for Promotion of Entrepreneurship, Steps for establishing small scale unit.

Unit 5

Data and Information; Need, function and Importance of MIS; Evolution of MIS; Organizational Structure and MIS, Computers and MIS, Classification of Information Systems, Information Support for functional areas of management.

F. REFERENCE BOOKS

1. Koontz, Harold, Cyril O'Donnell, and Heinz Weihrich: Essentials of Management, Tata McGraw-Hill, New Delhi
2. Robbins, Stephen P, and Mary Coulter: Management, Prentice Hall, New Delhi
3. E. S. Buffa and R. K. Sarin "Modern Production / Operations Management", 8th Edition, Wiley, 1987
4. H. J. Arnold and D. C. Feldman "Organizational Behavior", McGraw – Hill
5. Aswathappa K: Human Resource and Personnel Management, Tata McGraw Hill
   William Wether& Keith Davis, Human Resource and Personnel Management, McGraw Hill

G. Lecture Plan:

Lecture No.	Topics to be covered
1.	Meaning and definition of an organization, Necessity of Organization
2.	Principles of Organization, Formal and Informal Organizations
3.	Management Function: Planning & Organizing
4.	Management Function: Leading & Controlling
5.	Managerial Skills, Importance of Management, Models of Management: Scientific
6.	Models of Management: Human approach and Behavioral
7.	Forms of Ownership and Organization Structures
8.	Purchasing Function
9.	Marketing Function
10.	Advertising and Changing Dynamics of Advertising
11.	Introduction, Functions of Personal Management, Development of Personal Policy
12.	Manpower Planning
13.	Recruitment of Manpower
14.	Selection of Manpower
15.	Introduction to Motivation, Human needs, Maslow's Hierarchy of needs
16.	Types of Motivation
17.	Techniques of Motivation
18.	McGregor's Theory, Herzberg's Hygiene Maintenance Theory
19.	Leadership - Introduction Qualities of a good Leader, Leadership Styles
20.	Leadership Approach
21.	Leadership Theories
22.	Leadership Theories
23.	Entrepreneurship – Introduction, Entrepreneurship Development
24.	Entrepreneurial Characteristics, Need for Promotion of Entrepreneurship
25.	Steps for establishing small scale unit
26.	Data and Information Need and Importance of MIS
27.	Functions of MIS
28.	Evolution of MIS
29.	Organizational Structure and MIS

30.	Computers and MIS
31.	Classification of Information Systems
32.	Information Support for functional areas of management
33.	Introduction to case study, types of case study
34.	Steps to solve case study
35.	Case Study Discussion
36.	Case Study Discussion
37.	Revision Class
38.	Revision Class
39.	Revision Class

H. Course Articulation Matrix: (Mapping of COs with POs and PSOs)

CO	Statement	Correlation with Program Outcomes												Correlation with Program Specific Outcomes			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS O3	PS 0
CS1602.1	To acquire knowledge in the field of organizational management and internal organization of companies required for managing an enterprise.	1	2	3	1			1		2	1		1	2	1	1	**2**
CS1602.2	The students will also gain knowledge in the field of personnel management,	3	2	1	2	1			2					2		2	**2**

	motivation..																
CS1602.3	The students will also gain knowledge in the field of management	3	3	3	2	1					1	3	1	3	1		1

	information system and leadership for developing managerial skills..															
CS1602.4	The students will be able to gain knowledge for starting a small scale unit in terms of becoming an entrepreneur.	3	2	3	2	1	1	2					1	2	1	
CS1602.5	The students will also gain knowledge on case study and management information system.	2	3	1	1	1							1	2	1	1

1: Low Correlation 2: Moderate Correlation 3: Substantial Correlation

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INSPIRED BY LIFE

SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER & COMMUNICATION ENGG.
COURSE HAND-OUT

Advanced Internet Technology: CC1652 (PE) || 3 Credits||3 0 0 3

Session: 2018-19 | Faculty Name: Dr. Punit Gupta Class: PROGRAM ELETIVE

A. Introduction: Details about overall course. The main objective of this course is to familiarize students with the basics of Web, Web clients and servers with working of HTTP. It also gives the insight of developing static and dynamic Web pages to serve as front-end to client/server applications, and effective server side programming while introducing event-driven system programming. The course also covers basics of XML, Ajax, JavaScript, and recent trends in the area of web technology.

B. Course Outcomes: At the end of the course, students will be able to

[CC1652.1]: Understand the basic concepts of Advanced Internet technology.

[CC1652.2]: Perform Client /server programming.

[CC1652.3]: Understand and perform various kinds of data validation to foster the processing

[CC1652.4]: Design and execute the web based solutions pertaining to any real life need.

[CC1652.5]: Developing skills for understanding the working of web in real life situations for availing better employability options.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analysing, graduate will be able to devise solutions for complex engineering problems and design system components

or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are called society builders and transformers. B. Tech CCE graduate will be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE will understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student will be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student will be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I	15
	Sessional Exam II (Open Book)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Open Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full	

	zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.

E. SYLLABUS :

Introduction: Need for web, Basic concepts, web design fundamentals, website Strategy and planning, web testing tools, web server structure, maintenance, Criteria for navigation of web pages, development and development of the web pages, AJAX, Web sockets, WebRTC;

XML: Xml basics, document object model, DTD and schemas, xml namespaces, xml for representation and for display – path and XSLT, xml DOM, XML manipulation, XML Ajax, xml DTD XSD schema XSD, complex XSD data;

Web/Application/Database Servers: Structure, Architecture of web servers with working (IIS , Apache) , Installation and configuration of Web Servers, Security Aspects, Deployment of Web Pages, Maintenance and monitoring of Web pages; ***Case study:*** IIS / Apache / Tomcat / MSSQL/Apache/ LAMP/ WAMP/ MySQL Servers. App development issues, challenges, solutions, simulators, Tools for designing web applications;

Client side technologies: Client Side Architecture, Browsers (IE, Mozilla, Firefox), Browser Extensions – Mime Types, Plugins, Controls, add-ons, XHTML, CSS, JavaScript, Generation and Handling of Dynamic Web pages, Action script, Silver light, HTML5 and CSS3, Ajax, Session Tracking Techniques on Client-side, Security issues, Rich Internet Applications;

Advanced topics: E-Commerce Basics, Models and Architecture; **m-Commerce**: WAP and Mobile Agents, Search Engines and Search Engine Optimization, Introduction to Web Services.

F. TEXT BOOKS

1. Jackson, Jeffrey C. "*Web Technologies: a computer science perspective*", Pearson Prentice Hall, 2006.
2. R. Kamal, *"Web Technology",* 2nd Edition, McGraw-Hill, 2001.

G. REFERENCE BOOKS

1. D. Goldberg, *"Internet and World Wide Web - How to Program"*, 4th Edition, Pearson Education, 2001.
2. A. Moller, I. Michael , *"An Introduction to XML and Web Technologies"*, Addison-Wesley, 2006.
3. X. Bai, M. Ekedahl, *"The Web Warrior Guide to Web Programming",* 1st Edition, Course Technology Inc, 2003.

4. G. Alonso, *"Web Services - Concepts, Architectures and Applications Series: Data-Centric Systems and Applications"*, Springer, 2004.

Lecture Plan:

Lec No	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	Introduction and Course Hand-out briefing	To acquaint and clear teachers expectations and understand student expectations	Lecture	NA	NA
2,3	Introduction of Web Development process: Need for web, Basic concepts, web design fundamentals, website Strategy and planning,	Inderstanding web development principal and basics	Lecture	1652.1	Class Quiz Mid Term I
4,5	*Client side programming* - Web application Design Lifecycle, Web page design and production, Web Markup Languages – What is markup, why markup,	describe and identify various web development platforms and programming languages	Lecture	1652.1	Class Quiz Mid Term I
6,7	Intro to HTML and Deficiencies of HTML, Using XHTML – Basic syntax and semantics, fundamental elements, URLs –Interpage and	learn and design html pages	Lecture	1652.1	Class Quiz Mid Term I

	Intrapage						
8	Linking, Lists, Tables, Frames and Forms.,	learn html table and form tags	Lecture	1652.2	Class Quiz	Mid Term I	End Term
9,10, 11	HTML Document Object Model (DOM), Styling with CSS, Introduction to HTML5 and CSS3,	Learn CSS for designing web pages	Lecture	1652.2	Class Quiz	Mid Term I	End Term
12,13	AJAX: Introduction, Ajax XMLHttp, AJAX request,	Learn dynamic web page design concepts.	Lecture	1652.2	Class Quiz	Mid Term I	
14,15	Client side dynamic programming with JavaScript – Basics, Primitives, Loops, ,	Understanding scripting language.	Lecture	1652.2	Class Quiz	Mid Term I	End Term
16,17	Decision making and event handling	Understanding scripting language for event handling.	Lecture	1652.2	Class Quiz	Mid Term I	
18,19	Screen Output and Keyboard Input, Arrays and Functions, Event Handling, Pattern Matching	Understanding scripting language and its various functionality	Lecture	1652.2	Class Quiz	Mid Term II	End Term
20	Java Script and event handling	Understanding scripting language for event handling.	Lecture	1652.2	Class Quiz	Mid Term II	

21	Form Validation with Regular Expressions, ajax with java script	learn and design form validation in javascript	Lecture	1652.3	Class Quiz	Mid Term II	
22	*Server side programming* - Three Tier Model, PHP – Basics, Form Validation,	Understanding scripting language for server side scripting	Lecture	1652.3	Class Quiz	Mid Term II	
23,24	PHP database connection validation	Learning php and data base	Lecture	1652.3	Class Quiz	Mid Term II	
25,26	Transactions in php	Understanding transaction in PHP	Lecture	1652.4	Class Quiz	Mid Term II	
27-28	looping & event handling	Design and execute the concept of looping	Lecture	1652.4	Class Quiz	Mid Term II	
29-30	Emailing Form Data Addressing the Stateless Nature of HTTP -Sessions and Session Tracking techniques	understanding session management using php	Lecture	1652.4	Class Quiz	Mid Term II	End Term
31-32	XML – Syntax and Semantics, Document Structure,	learn and design XML messages	Lecture	1652.4	Class Quiz	Mid Term II	
33	DTDs, Need for Namespaces, XML Schemas,	learn and design DTD for XML	Lecture	1652.4	Class Quiz		End Term
34-35	Navigating XML documents with XPath, Displaying XML documents with CSS and XSLT.	learn and design N documents XPath XML	Lecture	1652.5	Class Quiz		End Term
36-37	Jquery: Introduction	learn and design Jquery for dynamic cntent	Lecture	1652.5	Class Quiz		End Term

38	Jquery and its functioning	describe and identify jquery compone nts	Lecture	1652.5	Class Quiz	End Term
39-40	Angular JSP, NodeJS, JSON	learn and design NodeJS	Lecture	1652.5	Class Quiz	End Term
41-42	Bootstrap	learn and design Bootstrap	Lecture	1652.5	Class Quiz	End Term

H. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CC1652.1]:	Understand the basic concepts of web technology	1					1					1		1			1
[CC1652.2]:	Perform Client / server programming.														1	1	
[CC1652.3]:	Understand and perform various kinds of data validation to foster the processing		3				1	1		1	1				1		
[CC1652.4]:	Design and execute the web based solutions pertaining to any real life need.			1	1				1		1	1	1		1	1	1
[CC1652.5]:	Developing skills for understanding the working of web in real life situations for availing better employability options	1			1	1				1			1	1		1	

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

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SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER & COMMUNICATION ENGG.
COURSE HAND-OUT

PRINCIPLES OF SOFTWARE ENGINEERING || CC1654|| 3 Credits|| [3 0 0 3]
Session: 2018-19| Faculty NAME: Mr. GAURAV PRASAD|| ELECTIVE

A. Introduction:

The course is to familiarize students with the concepts, steps and building block of software engineering.it also provides knowledge about basic working of the organization, Understand the importance of requirement engineering, Analyse the requirement and create proper design document with the help of tools. The course also deals with testing to check whether software meets the requirements and also to estimate cost to build the software

B. Course Outcomes: At the end of the course, students will be able to

[CC1654.1]:	The basic knowledge and concept of Software Engineering and importance of requirement engineering to solve the real time problems
[CC1654.2]:	Usage of tools and utilities to create proper design document and also to check the quality of code.
[CC1654.3]:	Identifying and applying appropriate technique to solve real time problems and getting more employability opportunities.

C PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analysing, the graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are called society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Quiz	5
	Mini project	15
	Video Assignment	10
	MTE1 ,MTE II	30
End Term Exam (Summative)	End Term Exam	40
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

E. SYLLABUS

Introduction: Defining Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models. Basic Concept of Software Requirement Specifications (SRS): Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Basic Concept of Software Design, Architectural Design, Low Level Design Modularization, Design Structure Charts, Pseudo Codes, Flow Chart. Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Testing: Testing Objectives, Unit Testing, integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code inspection, Compliance with Design and Coding Standards. Software Maintenance: Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance.

F. TEXT BOOKS

1. R. S. Pressman, “Software Engineering: A Practitioners Approach”, McGraw Hill,2009

G. REFERENCE BOOKS

1. K.K. Aggarwal and Y. Singh, “Software Engineering”, New Age International Publishers, 2008.

2. P. Jalote, “Software Engineering”, Wiley, 2010.

3. I. Sommerville, “Software Engineering”, Addison Wesley, 2013

H . Lecture Plan:

Lec No	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1-4	**Introduction:** Defining Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes.	Identify the need of Software Engineering, Identify about Software Crisis and Software Quality Attributes	Lecture	**CC1654.1**	Quiz
5-10	**Software Development Life Cycle (SDLC) Models**: Water Fall Model, Evolutionary model Prototype Model, Spiral Model, Iterative Enhancement , Component based model ,RAD (rapid application development),Agile model.	To identify & apply the Software model for the appropriate Project	Lecture	**CC1654.1**	Quiz MTE 1,2 End sem
11-15	**Models Basic Concept of Software Requirement Specifications (SRS):**Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Documents	Identify the importance and relevance of Requirement Analysis To Draw the different diagrams which will lead to Design Development	Lecture	**CC1654.1** **CC1654.2** **CC1654.3**	Quiz MTE 1,2 End sem
16-18	SoftwareQualityAssurance (SQA): Verification and Validation:	Identify and apply the Quality Assurance	Lecture	**CC1654.1** **CC1654.2** **CC1654.3**	Quiz MTE 1,2 End sem
19-25	**Basic Concept of Software Design**: Architectural Design, Low Level Design Modularization, Coherence & coupling, Design Structure Charts, Pseudo Codes, Flow Chart. UML.Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Design patterns, General process to be followed for quality of code understanding MVC architecture.	Identify ,Apply the design to the real time Application Project	Lecture	**CC1654.1** **CC1654.2** **CC1654.3**	Quiz MTE 2 End sem
26-30	**Cost estimation**: Product Metric and different	To Calculate the Cost incurred to develop the software and their techniques	Lecture	**CC1654.1** **CC1654.2**	Quiz MTE 2

	estimation technique based on Functional Point, Loc and calculation time and cost based on size using COCOMO model			**CC1654.3**	End sem
31-36	**Software Testing:** Testing Objectives, Unit Testing, integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top Down and Bottom Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code inspection, Compliance with Design and Coding Standards.	Apply testing techniques and identify the bugs and importance of testing phase	Lecture	**CC1654.1** **CC1654.2** **CC1654.3**	Quiz MTE 2 End sem
37-41	**Software Configuration Management**: An SCM Scenario, Elements of a Configuration Management System, Baselines, Software Configuration, SCM Repository, SCM Process, Configuration Audit	Identify the need of Software Configuration and management	Lecture	**CC1654.1** **CC1654.3**	Quiz End sem
42-46	**Software Maintenance**: Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance	To apply the techniques for Software Maintenance	Lecture	**CC1654.1** **CC1654.3**	Quiz End sem

I Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CC1654.1]:	The basic knowledge and concept of Software Engineering and importance of requirement engineering to solve the real time problems	1	1	1	1			1	1		1	1		1			1
[CC1654.2]:	Usage of tools and utilities to create proper design document and also to check the quality of code.		1	1	1	1		1	1						1		
[CC1654.3]:	Identifying and applying appropriate technique to solve real time problems.		1	1	1		1		1		1	1	1			1	1

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

J Course Outcome Attainment Level Matrix:

CO	STATEMENT	ATTAINMENT OF PROGRAM OUTCOMES **THRESHOLD VALUE: 40%**												ATTAINMENT OF PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CC1654.1]:	The basic knowledge and concept of Software Engineering and importance of requirement engineering to solve the real time problems																
[CC1654.2]:	Usage of tools and utilities to create proper design document and also to check the quality of code.																
[CC1654.3]:	Identifying and applying appropriate technique to solve real time problems and getting more employability opportunities.																

0-No Attainment; 1- Low Attainment; 2- Moderate Attainment; 3- Substantial Attainment

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer and Communication
Course Hand-out

Soft Computing | CC 1691 | 3 Credits | 3 0 0 3

Session: 2018-19| Faculty: Mrs. Shivani Gupta | Class: Open Elective Course

A. Introduction: This course aims at introducing the fundamental theory and concepts of computational intelligence methods, in particular neural networks, fuzzy systems, genetic algorithms and their applications in the area of machine intelligence.

B. Course Objectives: At the end of the course, students will be able to

1691.1 Learn about soft computing techniques and their applications.
1691.2 Analyze various neural network architectures.
1691.3 Understand perceptron and counter propagation networks.
1691.4 Developing skills to understand the application of fuzzy systems in solving real life problems to achieve employability.
1691.5 Analyze the genetic algorithms and their applications.

C. Program Outcomes and Program Specific Outcomes

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health

and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal,

health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

[PSO 1]. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

[PSO 2]. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

[PSO 3]. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

[PSO 4]. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Component	Duration	Date	Weightage
SESSIONAL I (Closed Book)	60 Minutes	As per Academic Calendar	15%
SESSIONAL II (Closed Book)	60 Minutes	As per Academic Calendar	15%
Quizzes (Closed Book)	Six Quizzes Each of 20 Minutes	Dates To Be Announced in Class	20%
Assignments	Open	Spread over the semester	10%
END-SEM EXAM (Closed Book)	3 hours	As per Academic Calendar	40%

A. Make-up Policy: No–makeup will be entertained. However, special sanction can be made based strictly on the

merit of the case.

B. Chamber Consultation: Individual Instructor Will Announce Separately in his/her Assigned Section

C. Notice: All notices for this course will be displayed at the **Department notice board** only.

***D.* Consultancy Hours:** *Mentioned in the time table*

E. Syllabus:

Introduction: soft computing and its applications;

Neural Networks (NN) Paradigms: Introduction, Neuron model, NN Architectures, Learning Rules: Hebbian, competitive, Boltzmann, and Supervised, unsupervised; Types of neural network: Perceptron, MLP, Radial basis function network, Recurrent Network, Self-organizing feature maps, Boltzmann machine, Application of neural network;

Fuzzy Logic: Introduction, Classical and fuzzy sets: Overview, Basic operations, relations, Rule based models; Fuzzy Arithmetic: Fuzzy numbers, Linguistics variables, arithmetic operations on intervals and numbers, Lattice of fuzzy numbers, fuzzy equations, Applications of fuzzy logic: Medicine, Economics;

Evolutionary Computations: Introduction, Genetic Algorithm: Overview, Operators, Classifier systems, Genetic programming Parse tree, Variants of GA (hybrid GA, Fuzzy GA.

F. Text Book(s):

1. S. Rajasekaran & GA Vijayalakshmi Pai "Neural Networks, Fuzzy Logic, and Genetic Algorithms synthesis and application", PHI, 2012
2. J.S.R. Jang, C. – T, Son, E.Mizutani "Neuro-fuzzy and Soft Computing" PEARSON ,2015
3. S.N. Sivanandam & S. N. Deepa "Principles of Soft Computing" , 2nd Edition, Wiley India, 2011.

G. Reference(s):

1. B. Kosko, "Neural Networks and Fuzzy Systems, A Dynamically Systems Approaches to machine intelligence", ACM, 1992.
2. S. Haykin, "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.
3. S. Roy, "Introduction to Soft Computing: Neuro-Fuzzy and Genetic Algorithms", Pearson Education India; First edition 2013.
4. K. Knight, E. Rich, B. Nair, "Artificial Intelligence", 3rd Edition, McGraw Hill, 2008.

H. Lecture Plan:

Lec No	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1.	**Introduction:** soft computing	To familiarize with soft computing concepts.	Lecture	1691.1	Class Quiz Mid Term I End Term
2.	Its applications		Lecture	1691.1	
3.	Its applications		Lecture	1691.1	
4.	Introduction, Neuron model,		Lecture	1691.1	
5.	Application of neural network	To Basics of ANN and Learning Algorithms.	Lecture	1691.1	
6.	NN Architectures,		Lecture	1691.1	
7.	Learning Rules: Hebbian,		Lecture	1691.1	
8.	Competitive Rules		Lecture	1691.1	
9.	Boltzmann,		Handouts	1691.1	
10.	Supervised,			1691.1	
11.	Unsupervised;			1691.1	
12.	Types of neural network:	To Basics of ANN and Learning Algorithms.	Lecture	1691.1, 1691.2	
13.	Recurrent Network,	To Basics of ANN and Learning Algorithms.	Lecture	1691.1, 1691.2	
14.	Numericals		Lecture	1691.1, 1691.2	
15.	Numericals		Lecture	1691.1, 1691.2	
16.	Perceptron, MLP,		Lecture	1691.1, 1691.2	
17.	Radial basis function network,		Lecture	1691.1, 1691.2	
18.	Self organizing feature maps		Lecture	1691.1, 1691.2	
19.	Boltzmann machine		Lecture	1691.1, 1691.2	

20.	Introduction, Classical and fuzzy sets: fuzzy equations,	To introduce the fuzzy logic concepts, fuzzy principles and relations.	Lecture	1691.1, 1691.2	
21.	Numericals		Lecture	1691.1, 1691.2	
22.	Overview of fuzzy		Lecture	1691.1, 1691.2	
23.	Basic operations		Lecture	1691.1,1691.3	
24.	relations,		Lecture	1691.1,1691.3	
25.	Rule based models;		Lecture	1691.1,1691.3	
26.	Arithmetic: Fuzzy numbers		Lecture	1691.1,1691.3	
27.	Linguistics variables,		Lecture	1691.1, 1691.2	
28.	Fuzzy arithmetic operations on intervals and numbers		Lecture	1691.1,1691.3	Class Quiz Mid Term II End Term
29.	Numericals				
30.	Lattice of fuzzy numbers,		Lecture	1691.1,1691.3	
31.	Applications of fuzzy logic:		Handouts	1691.1,1691.3	
32.	Medicine, Economics;		Lecture	1691.1,1691.5	
33.	Introduction, Genetic Algorithm:,	Genetic Algorithm and its applications to soft computing.	Lecture	1691.1,1691.5	
34.	Overview, Operators, Classifier systems,	Genetic Algorithm and its applications to soft computing.	Lecture	1691.1,1691.5	
35.	Numericals		Lecture	1691.1,1691.5	
36.	Genetic programming Parse tree MST		Lecture	1691.1,1691.5	
37.	Variants of GA (hybrid GA,		Lecture	1691.1,1691.5	

	Fuzzy GA.				
38.			Lecture	1691.1,1691.5	
39.	Numericals		Lecture	1691.1,1691.5	
40.	Revision		Lecture	1691.1,1691.5	

CO	**STATEMENT**	**CORRELATION WITH PROGRAM OUTCOMES**												**CORRELATION WITH PROGRAM SPECIFIC OUTCOMES**		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CC 1691.1	Learn about soft computing techniques and their applications	2			2	3								1		
CC 1691.2	Analyze various neural network architectures.		2		3	2							1		1	1
CC 1691.3	Understand perceptron and counter propagation networks.	2	3	2		1	1			1	1			1	1	
CC 1691.4	Developing skills to understand the application of fuzzy systems in solving real life problems to achieve employability.				2		1								1	
CC	Analyze the	3		3			2	1			1		1	2	1	1

1691.5	genetic algorithms and their applications.															

MANIPAL UNIVERSITY JAIPUR
SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER & COMMUNICATION ENGG.
Course Hand-out

CRYPTOGRAPHY AND SECURITY || CC1501|| 4 Credits|| [3 1 0 4]
Session: 2018-19| Faculty: Gaurav Prasad, Prof. Uma Shankar Rawat | Class: CORE

A. Introduction: The course is to familiarize students with cryptography and concepts of security and its importance. The course gives clear idea of different Symmetric/Asymmetric algorithms. It also discusses the application and need of cryptography in the field of computation. The course gives a brief introduction and helps to identify the direction and the current trends of the subjects in real time applications.

B. Course Objectives: At the end of the course, students will be able to

[CC1501.1]: Explain the basic concept of Cryptography & Security with importance on mathematical background of number theory with its usage in the field of computing

[CC1501.2]: Identify the usage of tools in performing and understanding the security attacks

[CC1501.3]: Identifying and acquiring appropriate skills to solve real time problems in real world

[CC1501.4]: Perform experiments to analyze the performance and applicability of learned cryptographic algorithms

[CC1501.5]: Identify the research trends and also to propose their own design for different security issues to have safer environment for computation in order to acquire more employability options.

C. Program Outcomes and Program Specific Outcomes

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

[PSO.1] Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

[**PSO.2]** Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

[PSO.3] Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

[PSO.4] Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	15
	Sessional Exam II (Open Book)	15
	In class Quizzes and Assignments, Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Open Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

E. Syllabus

Introduction: Number theory and finite fields, Shannon ciphers and perfect security, computational ciphers and semantic security: Computer Security Concepts: the OSI security architecture, security attacks, security services and mechanisms; Block Cipher: DES, triple-DES; Block Cipher AES: AES structure, AES transformation functions, AES key expansions, AES implementation; electronic codebook mode, cipher block chaining mode, cipher feedback mode, output feedback mode, counter mode; Pseudorandom Number Generation: Principles of pseudorandom number generation, pseudorandom number generators, pseudorandom number generation using block ciphers and stream ciphers, stream ciphers, cryptographic hash functions, message authentication codes, digital signatures; Public-Key Cryptography: Components of public-key cryptography, RSA algorithm, Diffee-Hellman key exchange, ElGamal cryptographic system, Elliptic curve arithmetic, Elliptic curve cryptography, pseudorandom number generation based on a public-key cryptosystem; Operating Systems. Security capabilities of different platforms, Identification and authentication. Passwords, choosing, managing, spoofing attacks. User accounts, file permissions, backups, Access Control and Firewalls, ownership, Assessing and Securing a system , Information
Warfare, Security Administration, Insider Threat; Corporate Espionage

F. Text Book

T1. W. Stallings, "Cryptography and Network Security, Principles and Practices", 6th Edition, Pearson Education, 2013.

G. Reference Books

R1. B. A. Forouzan, “Cryptography and Network Security”, 3rd Edition, McGraw Hill, 2015.

R2. Pieprzyk, T. Hardjono, J. Seberry, “Fundamentals of Computer Security”, springer- Verlag Berlin Heidelberg, 2013.

R3. C. P. Pfleeger, “Security in Computing”, 4th Edition, Prentice Hall, 2014.

H. Lecture Plan

Lec No	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1-2	Introduction and Course Hand-out briefing	To acquaint and clear teachers expectations and understand student expectations	Lecture	NA	NA
1-5	Introduction to Security & Cryptography: Need for Computer, Security, Basic concepts, Security Attributes, security attacks, Security services and mechanisms.	Identifying the Security attribute and its importance	Lecture	CC1501.1	In Class Quiz
6-12	Cryptography: Introduction, Symmetric ciphers, Symmetric Key, cryptography,Diffeerent types of Encryption	Identify different classical encryption technique with their drawbacks	Lecture Gaming activity	CC1501.1 CC1501.2	In Class Quiz, End Term Sessional, Project, Video Assignment
13-20	Block Cipher: S-DES, DES,its rounds, strength of DES,tripleDES; Modes: Electronic codebook mode, cipher block chaining mode, cipher feedback mode, output feedback mode, counter mode;Finite fields	Working and basics of modern encryption techniques and modes of Encryption	Lecture	CC1501.3 CC1501.4	End Term ,Sessional Project.
21-25	Block Cipher AES: AES structure, AES transformation functions,AES key expansions, AES implementation;	Advance encryption scheme and its working and applications	Lecture	CC1501.3,CC1501.4 CC1501.5,CC1501.1	In Class Quiz, End Term Sessional
26-30	Pseudorandom Number Generation: Principles of pseudorandom number generation, pseudorandom number generators, pseudorandom number generation using block ciphers and stream cipher	Importance of Pseudo Random Numbers and its application	Lecture	CC1501.5,CC1501.1	Class Quiz,Mid Term I End Term,Project
31-37	Basics of Number theory ,Public-key cryptography,RSA,its implementation, , El Gamal cryptographic system, Elliptic curve arithmetic, Elliptic curve cryptography	Working of modern Cryptographic algorithms	Lecture	CC1501.3 CC1501.4 CC1501.5	Class Quiz Mid Term 1 End term Project
38-43	Key Management,Diffee-Hellman key exchange, Certification Authority, Digital Certificate.	Key exchange relevance and its application	Lecture	CC1501.3 CC1501.4	Class Quiz Mid Term 1 End Term Project
44-48	Basics of Hash, MAC, working of it, Digital signature and authentication protocols	Working of Hash,Mac	Activity (Think Pair Share)	CC1501.3 CC1501.1	Class Quiz Mid Term 1 End Term
48-52	Security Attacks :Different types of attack and its existing Solutions	Possible attacks and its solution	Activity (Think Pair Share)	CC1501.2,CC1501.5 CC1501.1	Class Quiz,Mid Term I End Term

52-56	Operating Systems. Security capabilities of different platforms, Identification and authentication. Passwords, choosing, managing, spoofing attacks. User accounts, file permissions, backups, Access Control and Firewalls.	Operating system attacks	Self-study	CC1501.1,CC1501.2 CC1501.4CC1501.5	Class Quiz End Term

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CC1501.1]:	Explain the basic concept of Cryptography & Security with importance on mathematical background of number theory with its usage in the field of computing	2						1			1		1	1		1	1
[CC1501.2]:	Identify the usage of tools in performing and understanding the security attacks	1	2		1	3		1		1		1	1	1	1	1	1
[CC1501.3]:	Identifying and acquiring appropriate skills to solve real time problems in real world		2					2	1	1	1	1	1		2	2	1
[CC1501.4]:	Perform experiments to analyse the performance and applicability of learned cryptographic algorithms		1	2	3			1	1	1		1	1		2	2	2
[CC1501.5]:	Identify the research trends and also to propose their own design for different security issues to have safer environment for computation in order to acquire more employability options.		1	1	1		2	2	1	1		1				2	2

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer and Communication Engineering

Course Hand-out

Formal Language and Automata Theory| CC 1502 | 4 Credits | 3 1 0 4

Session: 2018-19| Faculty: Mr. Satyabrata Roy and Dr. Naina Narang | Class: CORE

A. Introduction: This course is offered by Dept. of Computer and Communication Engineering as a core course, targeting students who wish to pursue research & development or higher studies in field of theory of computation. Automata Theory is an exciting, theoretical branch of computer and communication engineering. It established its roots during the 20th Century, as mathematicians began developing - both theoretically and literally - machines which imitated certain features of man, completing calculations more quickly and reliably. The word automaton itself, closely related to the word "automation", denotes automatic processes carrying out the production of specific processes. Simply stated, automata theory deals with the logic of computation with respect to simple machines, referred to as automata. Through automata, computer scientists are able to understand how machines compute functions and solve problems and more importantly, what it means for a function to be defined as computable or for a question to be described as decidable.

B. Course Objectives: At the end of the course, students will be able to

[1502.1]. Develop abstract models such as finite automata, finite automata with outputs, pushdown automata, linear bounded automata and Turing machines based on any problem specified in formal language.

[1502.2]. Compare the characteristics of different types of formal languages and grammars as mentioned in Chomsky Hierarchy.

[1502.3]. Determine the type of computational problems and examine the decidability of them by constructing Turing machines.

[1502.4]. Propose an optimal abstract model that can be applied to a suitable real life problem. With the help of this students can get skills to obtain more entrepreneurship options.

C. Program Outcomes and Program Specific Outcomes

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

[PSO.1]. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

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D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	15
	Sessional Exam II (Closed Book)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	15
	Project	10
	Video Assignment	5
End Term Exam (Summative)	End Term Exam (Closed Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.

E. Syllabus

Mathematical Preliminaries and Notation: Three basic concepts, Some Applications, Deterministic Finite Accepters, Nondeterministic Finite Accepters, Equivalence of Deterministic and Nondeterministic Finite Accepters, Reduction of the Number of States in Finite Automata, Regular Expressions, Identifying Non-regular Languages; **Context-Free grammars:** Parsing and Ambiguity, Context-Free Grammars and Programming Languages, Methods for Transforming Grammars, Two important Normal Forms, Nondeterministic Pushdown Automata, Pushdown Automata and
Context–Free Languages, Deterministic Pushdown Automata and Deterministic Context-Free Languages; **The Standard Turing Machine:** Linear Bounded Automata, Recursive and Recursively Enumerable Languages, Unrestricted Grammars, Context Sensitive grammars and Languages, The Chomsky Hierarchy.

F. Text Books

T1. An Intorduction to Formal Languages and Automata – Peter Linz, Jones and Bartlett Student Edition, Fifth Edition, 2010.

G. Reference Books

R1. Introduction to Automata Theory, Languages and Computations - J. E. Hopcroft, R. Motwani, J. Ullman, Pearson Education, Third Edition, 2006.

R2. Introduction to the Theory of Computation – Michael Sipser, Cengage Learning, Third Edition, 2012.

R3. Introduction to Languages and the Theory of Computation – John Martin, Tata McGraw Hill, Fourth Edition, 2010.

R4. Formal Language and Automata Theory – C. K. Nagpal, Oxford University Press, Sixth Impression, 2013.

H. Lecture Plan:

Lec No	**Topics**	**Session Outcome**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing the Outcome**
1	Mathematical Preliminaries and Notation, Review of set theory	Understand basics of set theory, groups, relations, functions.	Lecture	NA	NA
2	Function, relation, Three Basic Concepts i.e. string, sentence and languages	Understand basics of set theory, groups, relations, functions.	Lecture	1502.1	In Class Quiz (Not Accounted)
3	Kleen's closure, Some Applications	Understand Kleen's closure and its application	Lecture	1502.1	In Class Quiz Mid Term I End Term
4	Deterministic Finite Automata	Introduction to automata theory and finite state machines	Lecture, Practice questions	1502.1	Home Assignment Mid Term I End Term
5-7	Design of DFA	Construction of DFA using different approaches for different type of problems	Lecture, Practice questions	1502.1	In Class Quiz Home Assignment Mid Term I End Term
8-10	Equivalence of DFA and NDFA	Understanding the basic difference between DFA and NDFA and realising the importance of NDFA	Lecture, Practice questions	1502.1	In Class Quiz Home Assignment Mid Term I End Term
11	Reduction of the number of states in Finite Automata Regular languages	Understanding the algorithm for minimizing the DFA	Lecture, Practice questions	1502.1	In Class Quiz Home Assignment Mid Term I End Term
12-13	FA with output: Mealy and Moore machine	Understand the design principles of Mealy and Moore machines	Lecture, Practice questions	1502.1	In Class Quiz Home Assignment Mid Term I End Term
14-15	Equivalence between Mealy machine and Moore machine	Compare Mealy machines with Moore machines and understand the algorithm to convert Mealy machine into Moore machine and vice-versa.	Lecture, Flipped class room	1502.1	In Class Quiz Home Assignment Mid Term I End Term
16	Removal of null moves from FA	Identify the properties of null moves and learn to remove them from FA	Lecture, Practice questions	1502.1	In Class Quiz Home Assignment Mid Term I End Term

17	Grammar and Formal Languages	Understand the notations and properties of formal languages and grammar	Lecture	1502.2	In Class Quiz Home Assignment Mid Term I End Term
18	Chomsky Hierarchy	Understand the properties of formal languages and to compare properties of different languages of Chomsky Hierarchy	Lecture	1502.2	In Class Quiz Home Assignment Mid Term I End Term
19	Regular Expressions and Finite Automata	Construct regular expressions	Lecture, Practice questions	1502.2	In Class Quiz Home Assignment Mid Term I End Term
20	Regular Grammar	Construct regular grammar	Lecture, Practice questions	1502.2	In Class Quiz Home Assignment Mid Term I End Term
21	Properties of Regular Languages	Study the properties of regular languages	Lecture, Practice questions	1502.2	In Class Quiz Home Assignment Mid Term I End Term
22	Identifying Non-Regular Languages	Compare and identify the non-regular languages	Flipped Classroom	1502.2	In Class Quiz Home Assignment Mid Term I End Term
23	Pumping Lemma for Regular Languages	Understand Pumping lemma for regular languages and applying this lemma to prove a given language is not regular	Lecture, Practice questions	1502.2	In Class Quiz Home Assignment Mid Term I End Term
24	Derivation trees	Deriving language from CFGs and constructing derivation trees from it	Lecture, Practice questions	1502.2	In Class Quiz Home Assignment Mid Term I End Term
25	Ambiguity	Determine whether a grammar is ambiguous	Lecture, Practice questions	1502.2	In Class Quiz Home Assignment Mid Term I End Term
26-28	Methods for Transforming Grammars: Reduced grammar formation, null production removal, unit production removal, Useless Symbol removal	Simplify a given CFG using three transformation method	Lecture, Practice questions	1502.2	In Class Quiz Home Assignment Mid Term II End Term

29	Chomsky Normal Form	Normalize a CFG into CNF	Flipper Classroom	1502.2	In Class Quiz Home Assignment Mid Term II
					End Term
30	Greibach Normal Form	Normalize a CFG into GNF	Lecture, Practice questions	1502.2	In Class Quiz Home Assignment Mid Term II End Term
31	Pushdown Automata and Context–Free Languages	Construction of PDA using different approaches for different type of problems	Lecture	1502.1	In Class Quiz Home Assignment Mid Term II End Term
32	Deterministic Pushdown Automata, Nondeterministic Pushdown Automata	Understanding acceptability of PDAs and categorizing the PDAs into DPDA and NPDA	Lecture, Practise questions	1502.1	In Class Quiz Home Assignment Mid Term II End Term
33-39	Design of DPDA, NPDA, Conversion between PDA and CFG	Differentiate DPDA from NPDA and understanding equivalence of them	Flipped Classroom	1502.1	In Class Quiz Home Assignment Mid Term II End Term
40	Linear Bounded Automata and Context-Sensitive Languages	Understanding basic concepts of LBA and CSL	Flipped Classroom	1502.1	In Class Quiz Home Assignment Mid Term II End Term
41	Turing Machine and Recursive, Recursive Enumerable Languages	Understanding principles of Turing machines, halting problems and the languages of Turing machine	Lecture, Practise questions	1502.1	In Class Quiz Home Assignment Mid Term II End Term
42	The Standard Turing Machine and variants of Turing Machine, Solving Some Problems by using Turing Machine, Problems that cannot be solved by Turing Machine. Halting Turing machine, PCP Problem, etc.	Understanding variants of Turing machine and applying these to solve problems	Flipped Classroom	1502.1 1502.3	In Class Quiz Home Assignment End Term
43-48	Design of DTM, NTM	Design different DTM, NTM for different problems	Lecture, Practise questions	1502.1 1502.3	In Class Quiz Home Assignment End Term
49-50	Recursive and Recursively Enumerable Languages, Unrestricted Grammars, Context Sensitive Grammars and Languages, The Chomsky Hierarchy revisited	Understanding the Chomsky hierarchy in detail and revision of the same	Lecture, Practise questions	1502.3 1502.4	In Class Quiz Home Assignment End Term

51-52	Decidable, Undecidable Problems, The complexity Classes P and NP, Some NP problems, Polynomial Time Reduction, NPCompleteness and Open Question	Understanding classes of problems and applying these concepts to categorize a given problem into its appropriate type. Further, able to decide whether a problem is solvable or not	Lecture, Practise questions, Group Study	1502.3 1502.4	In Class Quiz Home Assignment End Term

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4

CC 1502.1	Develop abstract models such as finite automata, finite automata with outputs, pushdown automata, linear bounded automata and Turing machines based on any problem specified in formal language.	3	3	3	3	1	1		1			2	2	3	1		1
CC 1502.2	Compare the characteristics of different types of formal languages and grammars as mentioned in Chomsky Hierarchy.	1	2	1				1	1		1					3	2
CC 1502.3	Determine the type of computational problems and examine the decidability of them by constructing Turing machines.	3	3	3	3	1	1	1	2	2	1			2	3		2
CC 1502.4	Propose an optimal abstract model that can be applied to a suitable real life problem. With the help of this students can get skills to obtain more entrepreneurship options.	3	3	3	3		1		1	2	1			2	2	3	3

MANIPAL UNIVERSITY
JAIPUR

SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER & COMMUNICATION ENGINEERING

COURSE HAND-OUT

Data Communications Laboratory || CC1530|| 1 Credits || [0 0 2 1]
Session: 2018-19 || Faculty NAME: Dr. Anshuman Kalla/ Dr. Gulrej Ahmed/ Mr. Arvind Dhaka/ Mr. Vidyadhar Jinnappa Aski || CORE

A. Introduction:

This laboratory course aims to facilitate the practical understanding of the concepts and principals being discussed in the course - Data Communications. Students will be able perform experiments related to Digital Modulation techniques, analog data to digital signal encoding techniques, multiplexing techniques and multiple accessing techniques with the view to analyze and interpret the corresponding waveforms.

B. Course Objectives: At the end of the course, students will be able to

[CC1530.1]: To understand serial and parallel communication.

[CC1530.2]: To understand various modulation, demodulation techniques in data communication and trace the corresponding waveforms.

[CC1530.3]: To understand time division multiplexing, de-multiplexing technique and trace the corresponding waveforms.

[CC1530.4]: To simulate multiple accessing techniques and understand their functioning. Also get skills to solve real life problems.

C. PROGRAM OUTCOMES

PO1. Engineering knowledge: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

PO2. Problem analysis: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. Design/development of solutions: Upon analysing, the B Tech CCE graduate should be able to devise solutions for complex engineering problems and design system components or processes

that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. Conduct investigations of complex problems: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. The engineer and society: The engineers are called society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. Environment and sustainability: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. Ethics: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

PO9. Individual and team work: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. Communication: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment	Continuous evaluation (Lab records, Performance in Lab, Viva-Voce and mini-project)	70
End Term Exam	End Term Exam (2 Hr. Lab Exam including VivaVoce)	30
	Total	100
Attendance	A minimum of 75% attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

E. Syllabus

PC to PC and PC to Peripherals Communication: Serial communication using RS-232C, RS-485, Parallel Communication using 8 bit parallel cable; LAN topologies: Star, Token bus and Token ring; Signal Encoding Techniques: Analog and Digital Signals, Analog -To-Digital Conversion: Line Coding Schemes; Signal Modulation Techniques: ASK, PSK, FSK, Pulse Code Modulation and Delta Modulation; Medium Access Control protocols: Aloha, Slotted Aloha, CSMA, CSMA/CD, CSMA/CA, Wireless LAN-IEEE 802.11, BLUETOOTH; Network Devices configuration: Hub, Repeaters, Bridges, Switches, Gateways and Routers.

F. TEXT BOOK

T1. W. Stallings, “Data and Computer Communications”, 9th Edition, Pearson Education, 2010.

G. REFERENCE

R1. L. Peterson, B. Davie, “Computer Networks: A Systems Approach”, 5th Edition, Morgan Kaufmann, 2011.

R2. F. A. Behrouz, “Data communications & networking”, 5th Edition, McGraw-Hill, 2012. R3. L. Kleinrock ,“Queueing Systems - Vol. 1: Theory”, Wiley, 2013.

H. Laboratory Plan

Lab No	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1.	1Introduction and Course Hand-out briefing	To acquaint and clear teachers expectations and understand student expectations	Lecture	NA	NA
2.	Implement PC to PC Communication for (i) Parallel Communication 2 using 8 bit parallel cable (ii) Serial communication using RS 232C	To understand basics of serial communication, parallel communication ports and protocols	Demonstration	CC1530.1	Internal Evaluation End Sem Exam
3.	To analyze a PCM system and interpret the modulated and 3demodulated waveforms for a sampling frequency of 4KHz.	To understand and practice modulation and demodulation schemes in data communication	Demonstration and Practical	CC1530.2	Internal Evaluation Project End Sem Exam
4.	To analyze a DPCM system and interpret the modulated 4and demodulated waveforms for a sampling frequency of 8KHz.	To understand and practice modulation and demodulation schemes in data communication	Demonstration and Practical	CC1530.2	Internal Evaluation Project End Sem Exam
5.	To analyze a Delta modulation system and interpret the modulated and demodulated waveforms.	To understand and practice modulation and demodulation schemes in data communication	Demonstration and Practical	CC1530.2	Internal Evaluation Project End Sem Exam

6.	To analyze a ASK & FSK modulation system and interpret the modulated and demodulated waveforms.	To understand and practice modulation and demodulation schemes in data communication	Demonstration and Practical	CC1530.2	Internal Evaluation Project End Sem Exam
7.	To analyze a PSK modulation system and interpret the modulated and demodulated waveforms.	To understand and practice modulation and demodulation schemes in data communication	Demonstration and Practical	CC1530.2	Internal Evaluation Project End Sem Exam
8.	To demonstrate Time Division Multiplexing and De multiplexing process using Pulse amplitude modulation signals	To understand and practice multiplexing and de-multiplexing in data communication	Demonstration and Practical	CC1530.3	Internal Evaluation End Sem Exam
9.	Create scenario and show the performance of Aloha, Slotted Aloha protocol through simulation using Network Simulator (NS2).	To understand and practice configuration of network simulator (NS2) for following protocols: • Aloha • Slotted Aloha	Demonstration and Practical	CC1530.4	Internal Evaluation End Sem Exam
10.	Create scenario and show the performance of CSMA/CD protocols through NS2.	To understand and practice configuration of network simulator (NS2) for CSMA/CD protocols	Demonstration and Practical	CC1530.4	Internal Evaluation End Sem Exam
11.	Create scenario and show the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols using Wireless LAN	To understand and practice configuration of network simulator (NS2) for CSMA/CA protocols To visualize the comparison among the results of CSMA/CD and CSMA/CA	Demonstration and Practical	CC1530.4	Internal Evaluation End Sem Exam

	protocols.				

I Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CC1530.1	To understand serial and parallel communication.	3								2			2	3	3		
CC1530.2	To understand various modulation, demodulation techniques in data communication and trace the corresponding waveforms.	3				2				2			2	3	3		
CC1530.3	To understand time division multiplexing, de-multiplexing technique and trace the corresponding waveforms.	3				2				2			2	3	3		
CC1530.4	To simulate multiple accessing techniques and understand their functioning. Also get skills to solve real life problems.	2	2	2	2	3	2			2			3	3	3		

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing & IT

Department of Computer & Communication Engineering
Course Hand-out

Design and analysis of Algorithms| CS 1501 | 4 Credits | 3 0 1 4

Session: 2018-19 | Faculty: Dr. Sunil Kumar | Class: Core (V Sem)

A. Introduction: This course aims to discuss techniques for designing efficient algorithms and also to measure their complexity and performance. The course is intended to provide the students the experience in program algorithm design and to emphasize both the practical as well as the mathematical aspects of program efficiency including analyse the asymptotic performance of algorithms, write rigorous correctness proofs for algorithms, demonstrate a familiarity with major algorithms and data structures, apply important algorithmic design paradigms and methods of analysis and synthesize efficient algorithms in common engineering design situations.

B. Course Objectives: At the end of the course, students will be able to

1501.1 Analyse worst-case running times of algorithms using asymptotic analysis.

1501.2 Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm.

1501.3 Design dynamic-programming algorithms, and analyse them.

1501.4 Synthesize efficient greedy algorithms in common engineering design situations

1501.5 Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyse them

1501.6 Analyse intractable problems and design best possible solutions for them. Also obtaining skills to solve real life problems as well as getting entrepreneurship opportunities.

C. Program Outcomes and Program Specific Outcomes

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

[PSO 1]. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

[PSO 2]. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

[PSO 3]. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

[PSO 4]. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Component	Duration	Date	Weightage
SESSIONAL I (Open Hand written Notes)	60 Minutes	As per Academic Calendar	15%
SESSIONAL II (Open Hand written Notes)	60 Minutes	As per Academic	15%
Quizzes (Closed Book)	Six Quizzes Each of 20 Minutes Duration	Dates To Be Announced in Class	30%
END-SEM EXAM (Open Hand written Notes	3 hours	As per Academic Calendar	40%

A. **Make-up Policy:** No makeup will be entertained. However, special sanction can be made based strictly on the merit of the case.

B. **Chamber Consultation:** Individual Instructor Will Announce Separately in his/her Assigned Section

C. **Notice:** All notices for this course will be displayed at the **Department notice board** only.

D. **Consultancy Hours:** *Mentioned in the time table*

E. Syllabus

Algorithm Analysis: A priori and a posteriori Analysis, Time Space Tradeoff, Asymptotic Notations, Properties of asymptotic notations, Recurrence equations, Solving recurrence equations using Substitution method and Master's method; Trees: BTree Red Black Tree; Divide and Conquer: Binary Search, Finding Maximum and Minimum, Merge Sort, Quick Sort, Matrix
Multiplication; Greedy Algorithms: Knapsack Problem, Job Sequencing with deadline, Optimal Merge Pattern, Single Source Shortest Path, Minimum Cost Spanning tree; Dynamic Programming: Multistage Graphs, Matrix Chain Multiplication, All-Pair shortest paths, Optimal binary search trees, 0/1 Knapsack, Travelling salesperson problem, Graph Traversals, Connected Components, Spanning Trees, Bi-connected components; Complexity Classes: Introduction to NP-Hard and NPCompleteness; Approximation Algorithm, Randomized Algorithm. **E. Text Books:**

T1. E. Horowitz, S. Sahni and S. Rajasekaran, *"Computer Algorithms"*, 2nd Edition, University Press, 2007. T2. T. H. Cormen, C. E. Leiserson, R.L.Rivest, and C. Stein, *"Introduction to Algorithms*", 3rd Edition, MIT press, 2009.

F. Reference Book:

R1. A. V. Aho, J. E. Hopcroft and J. D. Ullman, "*The Design and Analysis of Computer Algorithms"*, 1st Edition, Pearson Education, 1999.

F. Lecture Plan:

Lec No	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of the Assessing Outcome
1.	Introduction to Algorithms, Specification of Algorithm, Complexity	Idea of computer algorithm and its performance measurement	Lecture	1501.1	Class Quiz Mid Term I End Term
2.	Asymptotic Notation- Analysis of Algorithm,	Use of asymptotic notations in algorithm analysis	Lecture	1501.1	
3.	Time & Space Complexity – Hands-on	Calculate time complexity of some typical algorithms	Lecture	1501.1	
4.	Insertion Sort and Analysis, QA-Discussions	Insertion sort analysis	Lecture	1501.1	
5.	Master Theorem and its cases	Apply Masters theorem on recurrence relations	Lecture	1501.1	
6.	Selection Sort and Bubble Sort Analysis, QA-Discussions (can be covered in Lab)	Analysis of commonly used sorting methods	Handouts	1501.1	
7.	Divide and Conquer: Merge Sort and Analysis, QA-Discussions	Familiarity with divide and conquer and use it for merge sort	Lecture	1501.1, 1501.2	
8.	Quick Sort and Analysis,	divide and conquer using quicksort	Lecture	1501.1, 1501.2	
9.	Concept of Randomisation and Analysis of Randomized Quick sort	Quicksort case analysis and dealing with worst case using randomization	Lecture	1501.1, 1501.2	
10.	Heap Sort - Insertion, Deletion – Analysis	Understand Heap as a data structure And use of heap to sort elements	Lecture	1501.1, 1501.2	
11.	Heap Sort- Priority Queue	Using Heap as priority queue	Lecture	1501.1, 1501.2	
12.	Heap - Insertion, Deletion – Analysis	Analysis of insertion and deletion costs	Lecture	1501.1, 1501.2	
13.	Strassen's Matrix Multiplication	Matrix multiplication using divide and conquer	Lecture	1501.1, 1501.2	
14.	Greedy Paradigm - Introduction, Coin Change Problem	Understanding greedy method using coin change problem	Lecture	1501.1,1501.4	Class Quiz Mid Term II End Term
15.	Job Sequencing with deadline,Interval Scheduling Problem (Given as Assignment)	Job sequencing using greedy method	Handouts	1501.1,1501.4	
16.	Knapsack-problem	Fractional knapsack and its solution using greedy method	Lecture	1501.1,1501.4	
17.	Optimal Merge tape, Huffman Encoding		Lecture	1501.1,1501.4	
18.	Connected Components, Bi-connected Components, Spanning Trees - MST	Understanding of connected components and their application	Lecture	1501.1,1501.4	
19.	Prim's, Algorithm	Classical algorithms to find	Lecture	1501.1,1501.4	

20.	Kruskal's Algorithm	minimum spanning tree using greedy approach	Lecture	1501.1,1501.4	
21.	Dijkstra's Algorithm-SSSP	Solving single source shortest path problem using Dijkstra's algorithm	Lecture	1501.1,1501.4	
22.	Graph Search Algorithm - BFS/ DFS	Basic graph traversal algorithms and their applications	Lecture	1501.1,1501.4	
23.	Topological Sort,		Lecture	1501.1,1501.4	
24.	Bellman Ford Algorithm	Shortest path finding in the presence of negative edge weights	Lecture	1501.1,1501.4	
25.	Introduction to Dynamic Programming-	Understanding dynamic programming and its characteristics	Lecture	1501.1,1501.3	
26.	0-1 Knapsack problem	0-1 knapsack problem as for understanding dynamic programming	Lecture	1501.1,1501.3	
27.	Top Down Fibonacci, Binomial Coefficient	Classical problems of finding binomial and Fibonacci coefficient	Lecture	1501.1,1501.3	
28.	Bottom up Binomial Coefficient, Dynamic Knapsack,		Lecture	1501.1,1501.3	
29.	Longest Integer Sequence, Longest Common Subsequence	Solving LCS using dynamic programming	Lecture	1501.1,1501.3	
30.	Multi-Stage Graph	Better understanding of dynamic problem solving technique using classical problems.	Lecture	1501.1,1501.3	
31.	Floyd Warshal Algorithm – All pair of shortest path		Lecture	1501.1,1501.3	
32.	Matrix Chain Multiplication		Lecture	1501.1,1501.3	
33.	TSP- DP method		Lecture	1501.1,1501.3	
34.	OBST-Optimal Binary Search Tree		Lecture	1501.1,1501.3	
35.	Backtracking Intro – Problems	Use of backtracking to solve graph problems	Lecture	1501.5	Class Quiz End Term
36.	Graph Coloring, M-Graph Coloring	Use of backtracking to solve some classical problems. Limitations of backtracking.	Lecture	1501.5	
37.	Sum of Subset Problem		Lecture	1501.5	
38.	N-Queen Problem		Lecture	1501.5	
39.	Sudoku Game - Design & Implementation (Given as an assignment)	Game development using backtracking	Handouts	1501.5	
40.	Branch & Bound – Knapsack	Use of branch and bound to solve graph problems	Lecture	1501.5	
41.	Branch & Bound - Job Assignment	Use of branch and bound to solve some classical problems. Limitations of backtracking.	Lecture	1501.5	
42.	15 Puzzle (Given as an assignment) Problem		Handouts	1501.5	
43.	Branch & Bound – TSP		Lecture	1501.5	
44.	String Matching – Meaning and Application	To understand importance of string matching in practical applications	Lecture	1501.1	End Term
45.	Naïve String Matching, Rabin Karp Algorithm	Classical string matching algorithms	Lecture	1501.1	

46.	Knuth-Morris-Pratt (KMP) Algorithm	and their limitations	Lecture	1501.6
47.	Introduction to NP-Hard and NP-Completeness	Concept of intractability and significance of intractability proof	Lecture	1501.6
48.	Approximation Algorithm	Finding better solutions to intractable problems	Lecture	1501.6

G. Course Articulation Matrix: (Mapping of COs with POs)

Course Out-Comes	**STATEMENT**	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CS1501.1	Analyze worst-case running times of algorithms using asymptotic analysis.	1	3		2				2					3			
CS1501.2	Describe the divide-andconquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm.	1	2	2				1				2	1		2	1	
CS1501.3	Design dynamic-programming algorithms, and analyse them.	1			2	2							1	2	1	3	
CS1501.4	Synthesize efficient greedy algorithms in common engineering design situations	1					2		2	3				3	2		2
CS1501.5	Synthesize new graph algorithms and algorithms that employ graph computations as key components, and analyse them	1		2						1	2			1		2	1
CS1501.6	Analyse intractable problems and design best possible solution for them. Also obtaining skills to solve real life problems as well as getting entrepreneurship opportunities.		3		2								1			3	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer and Communication Engineering

Data Communications | IT 1504 | 4 Credits | 3 1 0 4

Session: 2018-19| Faculty: Dr. Anshuman Kalla, Dr. Gulrej Ahmed | Class: V Semester

A. Introduction:

This course provides students with the fundamental concepts and techniques used for communicating data in efficient and reliable manner. The student will be able to gain practical understanding of relevant terminology and describe various encoding techniques, flow & error control mechanisms, multiplexing & multiple-access techniques used for enabling data communication. The course lays down the foundation for Computer Networks, Wireless & Mobile Communication and Network security.

B. Course Outcomes: At the end of the course, students will be able to

[1504.1]: Define the significance of relevant terminologies, explain the transmission of digital & analog signals over different types of transmission media and outline the effects of various transmission impairments on analog & digital transmission. Develop skills for getting better employability opportunities.

[1504.2]: Describe the principles of signal encoding techniques used for digital data to digital signal conversion and analog data to digital signal conversion and compare them.

[1504.3]: Apply the knowledge of various error detection and correction techniques in order to find and overcome error encountered during transmission and discuss flow control and error control techniques.

[1504.4]: Discuss and distinguish between different types of multiplexing techniques and spread spectrum techniques.

[1504.5]: Identify and compare various generations of wireless cellular networks.

C. Program Outcomes and Program Specific Outcomes

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communica- engineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: the sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analyzing the B Tech CCE graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are terms society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics,responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: United we grow, divided we fall is a culture at MUJ that an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Program Specific Outcomes (PSOs)

On successful completion of B.Tech. in Computer and Communication Engineering (CCE), the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	15
	Sessional Exam II (Close Book)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Close Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

E. Syllabus

Data Transmission: Concepts and Terminology, Analog and Digital Data Transmission, Transmission Impairments, Channel Capacity.

Transmission Media: Guided Transmission Media, Wireless Transmission, Wireless Propagation, Line-of-Sight Transmission.

Signal Encoding Techniques: Analog and Digital Signals, Digital-To-Digital Conversion: Line Coding Schemes, Block Coding, Scrambling, Analog-To-Digital Conversion: Pulse Code Modulation, Delta Modulation.

Digital Data Communication Techniques: Asynchronous and Synchronous Transmission, Types of Errors, Error Detection, Error Correction, Line Configurations.

Data Link Control Protocols: Flow Control, Error Control, High-Level Data Link Control (HDLC).

Multiplexing: Frequency-Division Multiplexing (FDM), Time-Division Multiplexing (TDM), Code-Division Multiple Access (CDMA); Space Division Multiplexing.

Spread Spectrum: The Concept of Spread Spectrum, Frequency Hopping Spread Spectrum (FHSS), Direct Sequence Spread Spectrum (DSSS).

Cellular Wireless Communication Techniques: Introduction, Generations: 1G, 2G, 3G, 4G, and 5G.

F. Text Books

T1. W. Stallings, “Data and Computer Communications”, 9th Edition, Pearson Education, 2010

G. Reference Books

R1. B. Forouzan, “Data communication & networking” Fifth Edition. TMH, 2012.

R2. L. Peterson and T. Davie “*Computer Networks: A Systems Approach*” Fifth Edition, Morgan Kaufmann Publishers, 2012. R3. R. Stevens, *“TCP/IP Illustrated*”, Addison-Wesley Publication, 2011.

H. Lecture Plan

Lecture No.	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1.	Data, Data Communication, Data Network, Internet	Define the significance of relevant terminologies, Layered Architecture and	Lecture	NA	NA
2.	Need of Layered Protocol Architecture (OSI &TCP/IP)		Lecture	NA	NA
3.	TCPIP - Layers and its Functioning		Lecture & Activity	NA	NA
4.	Concepts and Terminology – Simplex, Half-Duplex, Full-Duplex, Frequency, Bandwidth		Lecture	[1504.1]	Class Quiz Mid Term - I End Term
5.	Time Domain and Frequency Domain Concepts, Data Rate		Lecture & Problem Solving Practice	[1504.1]	Class Quiz Mid Term - I End Term
6.	Analog and Digital Data and Signals	Explain the transmission of digital & analog signals over different types of transmission media and characteristics of Analog and Digital Transmission	Lecture	[1504.1]	Class Quiz Mid Term - I End Term
7.	Analog and Digital Transmission		Lecture	[1504.1]	Class Quiz Mid Term - I End Term
8.	Attenuation, Delay Distortion, Noise	Identify and comprehend various transmission impairments and its effects	Lecture & Problem Solving Practice	[1504.1]	Class Quiz Mid Term - I End Term

9.	Data Rate and Nyquist Bandwidth	Define and understand significance of Channel Capacity	Lecture	[1504.2]	Class Quiz Mid Term - I End Term
10.	Shannon Capacity Formula		Lecture & Problem Solving Practice	[1504.2]	Class Quiz Mid Term - I End Term
11.	Twisted Pair & CAT Types	Identify and distinguish various Transmission Media: Guided Transmission Media	Lecture & Activity	[1504.2]	Class Quiz Mid Term - I End Term
12.	Coaxial Cable, Optical Fiber		Lecture	[1504.2]	Class Quiz Mid Term - I End Term
13.	Antennas , Terrestrial Microwave	Explain the principles of Wireless Transmission	Lecture	[1504.2]	Class Quiz Mid Term - I End Term
14.	Satellite Microwave, Broadcast Radio, Infrared		Lecture & Problem Solving Practice	[1504.2]	Class Quiz Mid Term - I End Term
15.	Ground Wave Propagation, Sky Wave Propagation	Identify and explain wireless propagation modes	Lecture & Activity	[1504.2]	Class Quiz Mid Term - I End Term
16.	Line-of-Sight Propagation		Lecture & Problem Solving Practice	[1504.2]	Class Quiz Mid Term - I End Term

17.	Free Space Loss	Explain the principles of Line-of-sight Propagation	Lecture & Problem Solving Practice	[1504.2]	Class Quiz Mid Term - I End Term
18.	Atmospheric Absorption, Multipath, Refraction		Lecture	[1504.2]	Class Quiz Mid Term - I End Term
19.	Analog and Digital Signals, Line Coding Schemes: Unipolar, Polar	Identify and distinguish various Signal Encoding Techniques: Digital-ToDigital Conversion	Lecture & Problem Solving Practice	[1504.2]	Class Quiz Mid Term - I End Term
20.	NRZ & Bipolar – AMI		Lecture & Problem Solving Practice	[1504.2]	Class Quiz Mid Term - I End Term
21.	Biphase – Manchester & Differential Manchester		Lecture & Problem Solving Practice	[1504.2]	Class Quiz Mid Term - I End Term
22.	Modulation Rate and Scrambling Techniques		Lecture & Problem Solving Practice	[1504.2]	Class Quiz Mid Term - I End Term
23.	ASK & FSK	Explain the principles of Digital Data – Analog Signal and draw the respective waveforms	Lecture	[1504.2]	Class Quiz Mid Term - I End Term
24.	PSK – BPSK		Lecture	[1504.2]	Class Quiz Mid Term - I End Term
25.	MFSK		Lecture	[1504.2]	Class Quiz Mid Term - I End Term

26.	QAM		Lecture	[1504.2]	Class Quiz Mid Term - I End Term

27.	Pulse Code Modulation	Explain the principles of Analog Data – Digital Signal and draw the respective waveforms	Lecture & Problem Solving Practice	[1504.2]	Class Quiz Mid Term - I End Term
28.	Delta Modulation		Lecture	[1504.2]	Class Quiz Mid Term - I End Term
29.	Asynchronous and Synchronous Transmission	Apply the knowledge of various error detection and correction techniques in order to find and overcome error encountered during transmission	Lecture	[1504.3]	Class Quiz Mid Term - I End Term
30.	Type of Error, Redundancy, Detection Vs Correction		Lecture	[1504.3]	Class Quiz Mid Term - II End Term
31.	Cyclic Redundancy Check		Lecture	[1504.3]	Class Quiz Mid Term - II End Term
32.	Polynomials & CRC Architecture		Lecture & Problem Solving Practice	[1504.3]	Class Quiz Mid Term - II End Term

33.	Error Correction and Block Code Principle		Lecture & Problem Solving Practice	[1504.3]	Class Quiz Mid Term - II End Term
34.	Line Configurations		Lecture	[1504.3]	Class Quiz Mid Term - II End Term

35.	Framing	Data Link Control Protocols: Discuss flow control and error control techniques.	Lecture	[1504.3]	Class Quiz Mid Term - II End Term
36.	Flow Control - Stop-and-Wait Protocol		Lecture & Problem Solving Practice	[1504.3]	Class Quiz Mid Term - II End Term
37.	Sliding Window		Lecture & Problem Solving Practice	[1504.3]	Class Quiz Mid Term - II End Term
38.	Error Control: Stop-and-Wait ARQ		Lecture & Problem Solving Practice	[1504.3]	Class Quiz Mid Term - II End Term
39.	Go-Back-N ARQ		Lecture & Problem Solving Practice	[1504.3]	Class Quiz Mid Term - II End Term

40.	Selective Repeat ARQ		Lecture & Problem Solving Practice	[1504.3]	Class Quiz Mid Term - II End Term
41.	High-Level Data Link Control (HDLC)		Lecture	[1504.3]	Class Quiz Mid Term - II End Term

42.	Introduction to Multiplexing	Discuss and distinguish between different types of multiplexing techniques	Lecture	[1504.4]	Class Quiz Mid Term - II End Term
43.	Frequency Division Multiplexing (FDM)		Lecture	[1504.4]	Class Quiz Mid Term - II End Term
44.	Time-Division Multiplexing (TDM)		Lecture & Activity	[1504.4]	Class Quiz Mid Term - II End Term
45.	The Concept of Spread Spectrum	Principles of spread spectrum techniques and in particular CDMA technique	Lecture	[1504.4]	Class Quiz Mid Term - II End Term
46.	Frequency Hopping Spread Spectrum (FHSS)		Lecture	[1504.4]	Class Quiz Mid Term - II End Term

47.	Slow and Fast FHSS		Lecture & Problem Solving Practice	[1504.4]	Class Quiz Mid Term - II End Term
48.	Direct Sequence Spread Spectrum (DSSS)		Lecture & Problem Solving Practice	[1504.4]	Class Quiz Mid Term - II End Term
49.	Performance Consideration – FHSS and DSSS		Lecture	[1504.4]	End Term
50.	Code Division Multiple Access (CDMA)		Lecture & Problem Solving Practice	[1504.4]	End Term
51.	Introduction, Generations: 1G, 2G, 3G,	Identify and compare various generations of wireless cellular networks.	Lecture	[1504.5]	End Term
52.	4G, and 5G		Lecture	[1504.5]	End Term

I. Course Articulation Matrix (Mapping of COs with POs and PSOs) for Data Communications:

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
1504.1	Define the significance of relevant terminologies, explain the transmission of digital & analog signals over different types of transmission media and outline the effects of various transmission impairments on analog & digital transmission. Develop skills for getting better employability opportunities.	1	1			1		1	1	1	2	1	1	2	1		
1504.2	Describe the principles of signal encoding techniques used for digital data to digital signal conversion and analog data to digital signal conversion and compare them.	2	2	1		1	1		1		1			3	1		

1504.3	Apply the knowledge of various error detection and correction techniques in order to find and overcome error encountered during transmission and discuss flow control and error control techniques.	3	2	1	1		1		1		1	1		2	2	1	
1504.4	Distinguish between different types of multiplexing techniques and spread spectrum techniques.	2					1	1		1	2	1		2	1		
1504.5	Identify and compare various generations of wireless cellular networks.	2						1				1	1	1	1		1

1- Low Correlation : 2- Moderate Correlation; 3-Substantial Correlation

MANIPAL UNIVERSITY
JAIPUR

School of Computing & Information Technology

Department of Computer & Communication Engineering

LAB MANUAL
CC-1530
Data Communications Lab

Program	:	B. Tech. (CCE)
Session	:	2018 - 2019
Semester	:	V Semester CCE
Course Name	:	DATA COMMUNICATIONS LAB
Course Code	:	CC1530
Credits	:	[LTPC] [0 0 2 0]

Dr. Anshuman Kalla
Dr. Gulrej Ahmed
Mr. Arvind Dhaka
Mr. Vidyadhar Jinnappa Aski
(Course Instructors)

Dr. Anshuman Kalla
(Course Coordinator)

HoD
(Department of CCE)

1. AIM

This laboratory manual aims to facilitate the practical understanding of the concepts and theories being discussed in the course - Data Communications. Students will be able perform experiments related to Digital Modulation techniques, analog data to digital signal encoding techniques, multiplexing techniques and multiple accessing techniques with the view to analyze and interpret the corresponding waveforms.

2. ASSESSMENT CRITERIA

Continuous evalution will be carried out through out the semester
Ratio of Internal and External Marks: 70:30
Internal Assesment: Continous evaluation comprises lab records, performance in lab and Viva-Voce.
External assesment: 2 Hr. Lab Exam including Viva-Voce.

3. LAB OBJECTIVES

1. To perform experiments regarding digital modulation and de-modulation techniques as well as trace and interpret the corresponding waveforms.
2. To perform experiments regarding analog data to digital signal conversion techniques as well as trace and interpret the corresponding waveforms.
3. To perform experiment regarding time division multiplexing technique as well as trace and interpret the corresponding waveforms.
4. To simulate multiple accessing techniques and understand their functioning by getting skills in order to solve real life problems.

4. GUIDELINES TO STUDENTS

1. Equipment in the lab for the use of student community. Students need to maintain a proper decorum in the laboratory. Students must use the equipment with care. Any damage caused is punishable.
2. Students are required to carry their up-to-date lab files/records while entering the lab.
3. Students can use laboratory during free time / lunch hour, however, s/he needs to take prior permission from the lab in-charge.
4. Lab files/records would be assessed on the same day the experiment is

performed.

5. Lab files/records need to be submitted on or before the announced date of submission.

5. FORMAT OF INDEX

S. No.	Aim of the Program	Date of Performance	Date of Submission	Remark	Signature
	Complete aim of the experiment that student has written in the aim section of every experiment performed	*DD/MM/YYYY*	*DD/MM/YYYY*	*Here faculty will write some remark/grade/comment/etc.*	*Signature of the faculty member*

6. HOW TO WRITE PROGRAM IN THE LAB RECORD

Student will need to write program in following format.

1. **Aim:** Write the complete aim of the experiment performed
2. **Apparatus Used:** List types of different apparatus used
3. **Theory:** Discuss key principles and concepts of the topic in your own words that help you to understand the same.
4. **Procedure:** Step wise write the procedure involved in performing the experiment in your own words.
5. **Observations:** Write the observations in your own words and trace the waveforms on the butter paper with appropriate annotations. Also if required

show the related calculations.

6. **Result:** Write the outcome of the experiment performed in your own words.

Department of Computer and Communication Engineering

Data Communications Laboratory

Course Code: - CC1530 Credit: - [0 0 2 1]

List of Experiments

Semester - V

1. Implement PC to PC Communication for (i) Parallel Communication using 8 bit parallel cable (ii) Serial communication using RS 232C
2. To analyze a PCM system and interpret the modulated and demodulated waveforms for a sampling frequency of 4KHz.
3. To analyze a DPCM system and interpret the modulated and demodulated waveforms for a sampling frequency of 8KHz.
4. To analyze a Delta modulation system and interpret the modulated and demodulated waveforms.
5. To analyze a ASK & FSK modulation system and interpret the modulated and demodulated waveforms.
6. To analyze a PSK modulation system and interpret the modulated and demodulated waveforms.
7. To demonstrate Time Division Multiplexing and De-multiplexing process using Pulse amplitude modulation signals
8. Create scenario and show the performance of Aloha, Slotted Aloha protocol through simulation using Network Simulator (NS2).
9. Create scenario and show the performance of CSMA/CD protocols through NS2.
10. Create scenario and show the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols using Wireless LAN

protocols.

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Dept of Computers & Communication Engg.

Course Hand-out

Embedded Systems | CC1552| 3 Credits | 3003

Session: 2018-19 | Faculty: Prof. R. S. Shekhawat| Class: I Semester

Introduction: Embedded systems have grown in population exponentially since 70's. This has been aided by advancements in IC technology which has grown as per Moore 's law resulting into ever increasing performance per unit area of processors and decreasing costs. The result is presence of processors in a plethora of systems, equipment, appliances, and devices. The incorporation of computing to make devices smart and even intelligent however is full of challenges. A majority of computer engineers end-up being designers of products which use computing engines and the need is growing as technology offers multicore processors for common use due to decreasing cost and ease of use. With this, the demand of engineers with skillset of designing embedded systems or programming them has grown continuously and thus the need for such a course.

A. Course Outcomes: At the end of the course, students will be able to

[1552.1] Differentiate the design objectives of an embedded system vis-à-vis a computing system. The characteristics of embedded systems would help him to explicitly delineate the same.

[1552.2] Learn about a large number of options available to him in terms of microcontrollers, SOCs, sensors and actuators from a variety of vendors and a cost appreciation based on functionality.

[1552.3] Prepare the requirements for a given application for which an embedded system is to be developed. He shall be able to design such a system after a judicious selection of hardware components and also determine what functionality should reside in software.

[1552.4] Acquire a good knowledge of various IDEs popular for different families of micros and also the open source platform Eclipse. He would get hands on exposure to one of his choice hardware/IDE platform so that in later stage the students can get better entrepreneurship opportunities.

[1552.5] Decide if any given application needs to incorporate readymade kernel, with or without real - time features or need a full embedded OS/RTOS. The functionalities of popular kernels/RTKs or RTOS be well understood by him.

B. Program Outcomes [of CCE]

[PO1]: Engineering knowledge: Apply the knowledge of mathematics, computer science & engineering fundamentals and integrate technologies for computer based applied engineering systems.

[PO2]: Problem Identification & Analysis: Ability to identify, formulate and critically analyze problems pertaining to computational engineering and extracting scientifically validated conclusions towards optimized algorithms solutions.

[PO3]: Design/Development of solutions: Developing real time solutions for varying business requirements and designing system components to manage the complex functionalities efficiently, managing the operational data in clouds and formally validate the solutions using computational methods.

[PO4]: Optimizing results to complex problems: Use research-based knowledge to frame workflow for solving complex unfamiliar problems including principles of discrete structures and efficient management of structured and unstructured databases.

[PO5]: Usage of cutting-edge tool: Ability to apply appropriate tools that use latest engineering techniques including forecasting and simulation of complex computational activities.

[PO6]: Exploring future technologies: Ability to apply in depth knowledge of key thrust areas in computational science to explore the possibilities in Artificial Intelligence, Image Processing, Data Analytics, Cloud Computing, Security and Forensic technologies

[PO7]: Best practices in computing: Ability to apply complex computational models which can be run in parallel by means of high performance computing and network architecture.

[PO8]: The engineers and society: Ability to apply computational engineering knowledge in all verticals pertaining to society viz., health care, banking and finance, other professions such as medical, law, etc.

[PO9]: Involvement in lifelong-learning: Being capable of learning iteratively from mistakes and thus to be engaged in lifelong-learning, embrace the new developments enthusiastically to nurture personal prosperity and in turn organizational growth.

[PO10]: Professional Ethics: Ability to abide by professional ethics followed by computer science and engineering society and respect the moral values in life and extend the same towards others in society.

[PO11]: Distributed environment learning: Ability to intimate knowledge about how things work in a distributed environment, how components located on networked computers communicate and coordinate their actions by passing messages.

[PO12]: Communication: Ability to participate in knowledge sharing activities through seminar and articles by means of technical reports.

C. Programme Specific Outcomes (of CCE):

The graduation from B. Tech in Computer Science and Engg will empower the students with:

PSO 1: Ability to understand requirements for embedded systems

PSO 2: Ability to apply concepts of advanced and ubiquitous computing knowledge in problem analysis and solution development.

PSO 3: Ability to create appropriate and optimal solution for a given real life problem.

PSO 4: Ability to gain detailed knowledge about distributed environment paradigms with respect to communication network and database systems.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	20
	Sessional Exam II (Open Book)	20
	In class Quizzes and Assignments, Activity feedbacks (Accumulated and Averaged)	10
End Term Exam (Summative)	End Term Exam (Open Book)	50
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from	

	the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.

E. SYLLABUS

Introduction: what is embedded system, its characteristics, variety-with kernel (Embedded windows, embed Linux), with RTK, with/without communication, battery – chargeable/storage, examples; **Design and implementation**: typical requirements and their representation, generation of specifications, executable specs, behavioral models, hardware software partitioning, embedded software synthesis, mapping of hardware to standard micros; **Building blocks of embedded systems**: variants of micros, architectures-RISC/CISC, multicore, typical building blocks of micros, memory – RAM, ROM, Cache, timers, I/O, PIC, ADC, DAC, MUX, i/o-Serial, USB, I2C, CAN, SPI etc., RF controllers-Bluetooth, ZigBee, Wifi, Adhoc wireless, Ethernet, custom building blocks like TDC, FFT, DCT, etc., FPGAs/PLDs, sensors and actuator, displays, low power modes, battery mgmt. etc. Sample Design examples; **Programming of micros:** IDEs, Emulators, debuggers, programmers, Instructions, instruction set emulators, MISRA, WELMEC, etc., developing using Matlab, LabView etc., Low-end applications-custom manager, **Kernels & RTOS:** kernels- winCE, embedded Linux, android etc. embedding Real time capabilities – RTK, RTOS. Multi-tasking, Scheduler etc., Networked Embedded Systems, Wireless Sensor Networks and IOT, Case Studies and Projects.

Text Book(s):

1. K. V. Shibu, *"Introduction to Embedded Systems"*, McGraw Hill, 2013.
2. D. E. Simon, *"An Embedded Software Primer"*, Pearson Education Asia, 2001

Reference(s):

1. F. Vahid, T. Givargis, *"Embedded System Design"*, Wiley, 2002.
2. S. Heath, *"Embedded System Design"*, 2nd Edition, Elsevier, 2004.
3. J. K. Peckol, "Embedded Systems – A Contemporary Design Tool", Wiley Student Edition, 2008

F. Lecture Plan:

Lecture no.	Topic to be covered
L 1	Introduce Embedded Systems: What is System? Concept of embedding computing in a device/product.
L 2	Building blocks of embedded systems: CPU, peripherals, sensors, actuators,
L 3	Characteristics of ES, Attributes of ES: Quality,
L 4	Attributes of ES: performance and non-operational
L 5	Details of Embedded Systems: (i) Processors: uP/uC, DSP, ASIC, FPGA/PLD, COTS, IP cores,
L 6	(ii) Memory: RAM, ROM, NVROM, Flash Memory, DDR, Cache
L 7	(iii) Serial Comm: RS232/485, I^2C, SPI, IrDA, Firewire, Bluetooth, USB,

L 8	iv) Keyboard/ Displays : LED, LCD, Camera, HDMI, UGA
L 9	(v) LANs : Ethemet 1,10, 100, 1 GBPS, Connection & cables
L 10	(vi) Wireless Comms: Blue tooth, Wifi, ZigBee, LoRa: RF Bands and their utilization.
L 11	(vii) Sensors and interfacing: analog signals, AD converters
L 12	(viii) Actuators and interfacing: digital signals, DA Converters
L 13	Processors and Microcontrollers (Low Power Modes)
L 14	Battery Mgmt.
L 15	Custom blocks : TDC, FFT, DCT
L 16	Programmable logic : PLD, FPGA
L 17	Sample Design 1 :
L 18	Sample Design 2 :
L 19	Design and Implementation : typical requirements and their representation,
L 20	generation of specifications,
L 21	executable specs,
L 22	behavioural models-I
L 23	behavioural models-II
L 24	behavioural models-III
L 25	hardware software partitioning,
L 26	embedded software synthesis
L 27	Hardware Synthesis, IPs
L 28	Mapping of hardware to standard micros;
L 29	IDE : ECLIPSE intro to toolset : Editor
L 30	Debugger/ Tracer (Emulator, Simulator) programmer
L31	Programing Standard & Guideline : MISRA, WEL MEC
L 32	Matlab for Embadded System Development
L 33	Labview intro + its use for ESDev
L34	Low End Applications : (i)Custom resource scheduler
L35	(ii) Kernels Concept
L36	Win CE, Emb Linux, Android, iOS
L37	Real Time attributes : RTK/ Executives
L38	Multitasking, Task scheduler, RTOS
L39	VRTX, QNX

L40	WSNs & IOT

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nsultation Hours: Thursdays 2.00 PM – 4.00 PM (Cabin of Director, SCIT – Room No. 125, Academic Block -1

H. Course Articulation Matrix: (Mapping of COs with POs and PSOs)

CO	Statement	Correlation with Program Outcomes												Correlation with PSOs			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CC1552.1	Difference in design objectives of an embedded system vis-à-vis a computing system. The characteristics of embedded systems would help him to explicitly delineate the same.	3	3	3	1	2	1	2	3	3	1	1	3	2	2	2	3
CC1552.2	Learn about a large number of options available to him in terms of microcontrollers, SOCs, sensors and actuators from a variety of vendors and a cost appreciation based on functionality.	3	1	3	3	1	1	1	2	2	1	3	2	3	2	2	3
CC1552.3	Prepare the requirements for a given application for which an embedded system is to be developed. He shall be able to design such a system after a judicious selection of hardware components and also determine what functionality should reside in software.	3	3	3	3	3	1	2	3	2	2	3	2	2	3	3	
CC1552.4	Acquire a good knowledge of various IDEs popular for different families of micros and also the open source platform Eclipse. He would get hands on exposure to one of his choice hardware/IDE platform.	3	1	2	1	3	2	3	1	1	1	2	2	2	2	2	2
CC1552.5	Decide if any given application needs to incorporate readymade kernel, with or without real-time features or need a full embedded OS/RTOS. The functionalities of popular kernels/RTKs or RTOS be well understood by him.	3	3	2	3	3	3	2	1	1	1	2	1	2	3	2	

1: Low Correlation 2: Moderate Correlation 3: Substantial Correlation

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SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER & COMMUNICATION ENGG.
COURSE HAND-OUTss

Web Technologies: CC1551 (DE) || **3 Credits||3 0 0 3**

Session: 2018-19| Faculty Name: Dr V S Dhaka

A. Introduction: Details about overall course. The main objective of this course is to familiarize students with the basics of Web, Web clients and servers with working of HTTP. It also gives the insight of developing static and dynamic Web pages to serve as front-end to client/server applications, and effective server side programming while introducing event -driven system programming. The course also covers basics of XML and recent trends in the area of web technology. The course also covers application areas of Introduction of web technology in Electronic Commerce**.**

B. Course Outcomes: At the end of the course, students will be able to

[CC1551.1]: Recognize fundamentals of working principles of web technology and web programming.

[CC1551.2]: Define web solution as a whole and design client side interface with various kinds of authentication. Developing skills for designing websites so that student can get more entrepreneurship opportunities.

[**CC1551.3]:** Design server side business logic with Database interactions (Authentication, Data Fetching and presentation).

[CC1551.4]: Customize and use advanced objects for web technology in order to obtain faster processing and improved DB interaction

[CC1551.5]: Web based applications development and deployment on web server and debugging the issues on real time.

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- **Program Outcomes and Program Specific Outcomes**

[PO.1] Engineering knowledge: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

[PO.2] Problem analysis: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyses complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

[PO.3] Design/development of solutions: Upon analyzing, the B Tech CCE, CSE, IT graduate will be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

[PO.4] Conduct investigations of complex problems: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

[PO.5] Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

[PO.6] The engineer and society: The engineers are called society builders and transformers. B. Tech CCE, CSE and IT graduate will be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

[PO.7] Environment and sustainability: The zero effect and zero defect is not just a slogan, it is to be practiced in each action. Thus a B Tech CCE, CSE and IT will understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

[PO.8] Ethics: Protection of IPR, staying away from plagiarism are important. Student will be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

[PO.9] Individual and team work: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student will be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[PO.10] Communication: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO.11] Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

[PO.12] Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

At the end of the B Tech CCE program, the student:

[PSO.1] Will be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

[PSO.2] Will be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

[PSO.3] Will be able to identify and devise solutions for the existing open problems in the field of computing and propose the best possible solutions.

[PSO.4] Will be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	15
	Sessional Exam II (Open Book)	15
	class Quizzes, course Project Video Assignments, Mooc	30
End Term Exam (Summative)	End Term Exam (Open Book)	40
	Total	100
(Formative)	A student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

E. Syllabus:

Introduction: Overview of Internet and the sub network "the Web", History, and Other sub networks, Web System Architecture, Web Clients and Web Servers, Application Servers. HTTP– Basics of HTTP Request and Response, HTTP Methods, headers, content transport (PUSH and PULL), Drawbacks HTTP1.0, Introduction to HTTP1.1, HTTPS, SSL, and Generation of Dynamic Web pages, Extension Mechanisms;

Client side programming: Web application Design Life-cycle, Web Markup Languages – What is markup, why markup, Intro to HTML and Deficiencies of HTML, Using XHTML – Basic

syntax and semantics, fundamental elements, URLs – Inter-page and Intra-Page Linking, Lists, Tables, Frames and Forms., HTML Document Object Model (DOM), Styling with CSS, Introduction to HTML5 and CSS3;

Scripting: Client side dynamic programming with JavaScript – Basics, Primitives, Loops, Decision Statements, Screen Output and Keyboard Input, Arrays and Functions, Event Handling, Pattern Matching and Form Validation with Regular Expressions;

Server side Programming: Three Tier Model, PHP –Basics, Form Validation, Sessions and Session Tracking techniques, ASP, JSP;

Advanced technologies*:* XML– Syntax and Semantics, Document Structure, DTDs, Need for Namespaces-e Commerce Basics, Models and Architecture; ecommerce - WAP and Mobile Agents.

F. Text Book(s):

T1.J. C. Jackson, "*Web Technologies: A Computer Science Perspective*", Pearson Education, 2007.

T2.H. Chan, R. Lee, T. Dillon, E. Chang, "*E-commerce, Fundamentals and Applications*", John Wiley & Sons, 2007.

G.Reference(s):

R1.DT Editorial Services, "HTML 5 Black Book", 2nd Edition, Wiley India, 2016.

R2.Treese, G. Winfield, L. C. Stewart, "*Designing Systems for Internet Commerce*", 2nd Edition, Addison-Wesley Professional, 2003.

R3.X. Bai, M. Ekedahl, *"The Web Warrior Guide to Web Programming",* 1st Edition, Course Technology Inc, 2003.

H. Lecture Plan:

Lecture No	**Topics**	**Session Outcome**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing the Outcome**
1	Overview of Internet and the sub network	Introduction of Internet	Lecture	1551.1	Class Quiz and Mid Term-1
2	Web System Architecture	Physical structure of Web system	Lecture	1551.1	Class Quiz and Mid Term-1
3,4	Web Clients and Web Servers	To store, process and deliver web pages to the users.	Lecture	1551.1	Class Quiz and Mid Term-1
5,6	Application Servers	Understanding the application servers	Lecture	1551.1	Class Quiz and Mid Term-1
7,8,9	HTTP– Basics of HTTP Request and Response, HTTP Methods, headers, content transport (PUSH and PULL), Drawbacks HTTP1.0	Introduction of HTTP with Drawbacks	Lecture	1551.2	Class Quiz and Mid Term-1
10,11	Introduction to HTTP1.1, HTTPS ,SSL	Explanation and analysis of HTTP and SSL	Lecture	1551.2	Class Quiz Mid Term I End Term
12,13	Generation of Dynamic Web pages, Extension Mechanisms	Basics of Web development.	Lecture	1551.3	Class Quiz Mid Term 1 End term
14,15,16	Web application Design Life-cycle, Web Markup Languages	Website enhancement methods.	Lecture	1551.3	Home Assignment Class Quiz Mid Term 1 End Term
17,18	Intro to HTML and Deficiencies of HTML	Static approach of development	Lecture	1551.2	Class Quiz Mid Term 1 End Term
19	XHTML– Basic syntax and semantics, fundamental elements,	Introduction of XHTML	Lecture	1551.3/4	Class Quiz Mid Term I End Term

20	URLs – Inter-page and Intra-page Linking, Lists, Tables, Frames and Forms	Designing of frames, lists, tables.	Lecture	1551.3/4	Class Quiz Mid Term I End Term
21,22	HTML Document Object Model (DOM), Styling with CSS	Introduction of Web development	Lecture	1551. 4	Class Quiz Mid-Term II and End Term
23,24	Introduction to HTML5 and CSS3	Basic introduction of web design and development	Lecture	1551.4	Class Quiz Mid-Term II and End Term
25,26	Client side dynamic programming with JavaScript- Basics	Advance web designing and development	Lecture	1551.3/4	Class Quiz Mid-Term II and End Term
27,28	Primitives, Loops, Decision Statements, Screen Output and Keyboard Input .	Understanding of loops and decision statement.	Lecture	1551.3/4	Class Quiz Mid-Term II and End Term
29,30,31	Arrays and Functions, Event Handling, Pattern Matching and Form Validation with Regular Expressions	Verification and validation of web development.	Lecture	1551.3/4	Class Quiz Mid-Term II and End Term
32	Three Tier Model	Analysis of Tier system	Lecture	1551.3/4	Class Quiz Mid-Term II and End Term
33	PHP –Basics, Form Validation	Dynamic programing –Through PHP	Lecture	1551.3/4	Class Quiz Mid-Term II and End Term
34,35	Sessions and Session Tracking techniques	Useful Methodology of PHP	Lecture	1551.4/5	Class Quiz Mid-Term II and End Term
36,37	ASP, JSP	Dynamic programing through ASP	Lecture	1551.3/4/5	Class Quiz Mid-Term II and End Term

38-39	XML – Syntax and Semantics	Introduction of XML	Lecture	1551.3/4	Class Quiz and End term
40	Document Structure, DTDs, Need for Namespaces	Explanation of Domain name server	Lecture	1551.4/5	Class Quiz and End term
41	eCommerce Basics	Introduction of business web development	Lecture	1551.5	Class Quiz and End term
42	Models and Architecture of eCommerce	Physical structure of eCommerce	Lecture	1551.4/5	Class Quiz and End term
43	Ecommerce - WAP and Mobile Agents.	analysis of agent applications	Lecture	1551.4/5	Class Quiz and End term

A. ssCourse Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES													CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
[CC1551.1]	Recognize fundamentals of working principles of web technology and web programming	2				3		2	2			3		3	2		
[CS1515.2]	Define web solution as a whole and design client side interface with various kinds of authentication. Developing skills for designing websites so that student can get more entrepreneurship opportunities.			3	3	1							3		2	2	2
[CS1515.3]	Design server side business logic with Database interactions (Authentication, Data Fetching and presentation)		2	3	2	1	1			2	2					3	
[CS1515.4]	Customize and use advanced objects for web technology in order to obtain faster processing and improved DB interaction					3			1	1				3		2	2
[CS1515.5]	Web based applications development and deployment on web server and debugging the issues on real time			3	2						1	3	1	2		2	2

1- **Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

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DEPARTMENT OF COMPUTER & COMMUNICATION ENGG.
Course Hand-out

Network Security| CC1701 | Credits 4 | 3 1 0 4)

Session: 2018-19 | Faculty: Arjun Singh | Class: B.Tech CCE (VII Sem)

A. Introduction: This course is offered by Dept. of Computer and Communication Engineering as an department core subject for the students who wish to pursue research & development in Network Security or higher studies in the field of Information Security, Network Security and Cryptography. Course offers in depth knowledge of Network attacks, network Security applications, internet security, issues in network security and the techniques to mitigate these attacks. Students are expected to have background knowledge on cryptography for the better understanding of subject.

B. Course Objectives: At the end of the course, students will be able to

[CC1701.1] identify some of the factors driving the need for network security and classify particular examples of attacks.

[CC1701.2] Experiment different type of network security Applications and tools.

[CC1701.3] To analyse and deploy network security devices to stop the attacks on the network.

[CC1702.4] To design security applications in the field of Information technology & enhance the security skills.

C. Program Outcomes and Program Specific Outcomes

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analysing, the B Tech CCE graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are called society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the

professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. A

s	Criteria	Description	Maximum Marks
e s s m	Internal Assessment (Summative)	Sessional Exam I (Closed Book)	15
		Sessional Exam II (Closed Book)	15
		In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
e n	End Term Exam (Summative)	End Term Exam (Closed Book)	40
t		Total	100
P l	Attendance	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

an:

E. Syllabus

Basics of Network Security: Attacks, services and mechanisms; **Network Security Applications:** Kerberos, IPSec, SSL, TLS and VPN; **Internet Security:** Digital Certificate, PKI, Secure Electronic Payment System and Protocols, iKP protocol; **Issues in Network Security and Tools:** Man in the middle attack, Replay, ARP poisoning, DNS poisoning, web based attacks ; **Firewalls and IDS:** Need of firewalls, firewall characteristics and access policy, type of firewall, firewall basing, firewall location and configuration, Types of Intrusion detection System, working of IDS and policies; **Malware, Virus, Worm, Trojan Horse:** Introduction and working of malwares, Identifications and remedies.

F. Text Books

T1: W. Stallings, *"Cryptography and Network Security Principles and Practice"*, 7th Edition, Pearson education, 2017

G.

Reference Books

R1: Y. Qian, D. Tipper, P. Krishnamurthy, J. Joshi, *"Information Assurance Dependability & Security in Networked Systems"*, 1st Edition, Morgan Kaufmann, 2010.

H. Lecture Plan:

Lec No	**Topics**	**Session Outcome**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing the Outcome**
1	Introduction and Course Hand-out briefing	To acquaint and clear teachers expectations and understand student expectations	Lecture	NA	NA
2,3	Network Attacks, services and mechanism	Recall the network attacks and preventive Mechanism	Lecture	1701.1	In Class Quiz (Not Accounted)
4,5,6	Network Security Applications: Kerberos	Understanding of the Kerberos as KDC and Authentication protocol	Lecture	1701.2	In Class Quiz, mid term-1, End Term
7,8,9	IPsec, Modes of IPSec	Understanding of IPSec architecture, operational modes	Lecture	1701.2	Home Assignment Mid term-1
10,11,12	IPSec Security Protocol, AH vs ESP, Services provided by ESP	Understanding of two security protocols (AH & ESP)	Lecture	1701.2	In Class Quiz Mid term-1 End Term
13	Security Association, Security association database	Recall IPSec Security association and database	Lecture	1701.2	Class Quiz Mid Term I End Term
14,15,16	SSL introduction , SSL Architecture, Key exchange algorithm, Cryptographic parameter generation	Understand the need of security at TL layer, Structure of SSL	Lecture	1701.2	Home assignment, Mid Term I End term
17	SSL Handshake protocol	Recall the handshake protocol functionality	Self-learning	1701.2	Home Assignment
18,19,20	TLS version, cipher suite, generation of cryptographic secrets	Highlight the general structure of TLS and difference between SSL and TLS	Lecture and Activity (Think Pair Share)	1701.2	Class Quiz Mid Term I End Term
21,22,23,24	Digital Certificate: Hash function, MD hash Family, whirlpool, SHA-512	Understand the process of creating Hash function, illustration of structure of whirlpool with example	Group Discussion	1701.2	Class Quiz Mid Term I End Term
25,26,27	Digital Signature, differences between conventional signature and digital signature Refer the below link- https://www.coursera.org/lecture/iot-connectivity-security/digital-signatures-digital-certificates-wGVU2	Compare between conventional signature and digital signature, understand the process of digital signature	Flipped class	1701.2	Class Quiz Mid Term-1 End Term
28,29	Public key Infrastructure, PKI Tust model, Mesh Model, hijacking	Infer the concept of PKI and key distribution	Lecture	1701.2	Class Quiz Mid Term II End Term

30,31,32,33,34	Secure Electronic Transaction (SET), SET participants, SET Process, SET Internals, Payment Authorization, Payment Capture, SET model Note: Refer cryptography and Network Security, Atul Kahate, chapter-6	Describe the SET process and issues	Lecture	1701.2	Home assignment, Mid Term-11, End Term
35,36,37	Issues in Network Security: Man in middle attack, Replay Attack (cryptography and Network Security, William stalling and handouts)	Describe the working of MIM attack in different environment.	Lecture, Activity	1701.3	Class Quiz Mid Term II End Term
38,39,40,41	ARP Poisoning, web based attacks (cryptography and Network Security, Prakash C Gupta)	Simulation of ARP poisoning and web attacks	Lecture, Activity	1701.3	Class Quiz Mid Term II End Term
41,42,43	Firewalls, type of firewalls, Firewall configurations, DMZ zones (cryptography and Network Security, Prakash C Gupta)	Describe working of firewall and its deployment process	Lecture, activity	1701.4	Class Quiz Mid Term II End Term
44,46	Intrusion Detection System, Signature based vs Anomaly based IDs (cryptography and Network Security, Prakash C Gupta)	Infer the knowledge of IDS and working	Activity	1701.4	Class Quiz End Term
47,48,49,51	Introduction and working of malwares, warms, viruses , Identifications and remedies	Understanding the difference among various type of malicious code, and their neutralization process	Flipped Class	1701.4	Class Quiz End Term
52	Conclusion and Course Summarization	NA	NA		NA

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO4
CC 1701.1	identify some of the factors driving the need for network security and classify particular examples of attacks.	2	2			1	1		1	1		1		2	1		
CC1701.2	Experiment different type of network security Applications and tools.		2	2	1	1	1	2	1	1	1		1	1			1
CC1701.3	To analyse and deploy network security devices to stop the attacks on the network.				1			2				1				2	
CC1701.4	To design security applications in the field of Information technology & enhance the security skills.					1							3		1		3

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing & Information Technology

Department of Computer & Communication Engineering
Course Hand-out

Machine Learning | CC 1702 | 4 Credits | 3 1 0 4

Session: 2018-19 | Faculty: Nitesh Pradhan & Sandeep Chaurasia | Class: VII Sem

A. Introduction: This course is offered by Dept. of Computer & Communication Engineering as an department core, targeting students who wish to pursue research & development in industries or higher studies in field of Artificial Intelligence, including supervised machine learning, unsupervised learning & reinforcement learning. Offers in depth knowledge of use Machine Learning for personal purpose, handle specific topics like Reinforcement Learning, NLP and Deep Learning, handle advanced techniques like Dimensionality Reduction, know which Machine Learning model to choose for each type of problem, build an army of powerful Machine Learning models and know how to combine them to solve any problem.

B. Course Objectives: At the end of the course, students will be able to

[CC1702.1] Explain and improve the skills in the range of machine learning algorithms along with their strengths and weaknesses.
[CC1702.2] Explain the basic theory underlying machine learning.
[CC1702.3] Identify how to apply a variety of learning algorithms to data.
[CC1702.4] Perform evaluation of learning algorithms and model selection.
[CC1702.5] Identify machine learning problems corresponding to different applications.
[CC1702.6] Explain the concept of transfer learning and deep learning architecture.

C. Program Outcomes and Program Specific Outcomes

[PO.1]. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4]. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Program Specific Outcomes (PSOs)

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.
PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.
PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.
PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice. and control/validate phases.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Notes)	15
	Sessional Exam II (Open Notes)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Open Notes)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. Syllabus

Introduction: Introduction and applications of machine learning; **Supervised learning:** perceptron network, Adaptive linear neuron, multiple Adaptive linear neuron, Back propagation network, Generative learning algorithms. Gaussian discriminant analysis, Naive Bayes, Support vector machine, KNN algorithm, basic/variance tradeoff, linear regression and feature selection; **Neural network**: forward/backward network, Deep learning; **Unsupervised learning**: clustering, K-means algorithm, Kohonen self-organizing map, learning vector quantization, Counter propagation network; Introduction to Reinforcement learning, Optimization technique, Gradient descent method**, Introduction to natural language processing**, **Decision making and Expert system.**

F. Text Books

1. M. Mohri, A. Rostamizadeh, A. Talwalker, "Foundations of Machine Learning", MIT Press, Cambridge, MA, 2012.
2. T.M. Mitchell, "Machine learning", 1 st Indian Edition, McGraw-Hill India,2013.

G. Reference Books

1. T. Hastie, R. Tibshirani, J. Friedman, "The Elements of Statistical Learning", 2nd Edition, Springer, 2009.
2. C.M. Bishop, "Pattern Recognition and Machine Learning", 1st Edition, Springer Verlag, 2010.
3. S.N. Sivanandam, S.N. Deepa, "Principles of Soft Computing", 2nd Edition, Wiley,2011.

H. Lecture Plan:

Lec No	**Topics**	**Session Outcome**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing the Outcome**
1	Machine Learning – Introduction	To acquaint and clear teachers expectations and understand student expectations	Lecture	NA	NA
2	Use of ML, Types of ML	Supervised, Unsupervised, Reinforcement, Batch & Online Learning	Lecture	1702.1	In Class Quiz
3,4	Challenges of ML	Quality of training data, Non representative training data, Poor quality data.	Lecture	1702.1	In Class Quiz End Term
5,6	Challenges of ML	Poor-Quality Data, Irrelevant Features, Overfitting the Training Data, under fitting the Training Data Stepping Back, Testing andValidating	Lecture	1702.1	Home Assignment End Term
7,8	Machine learning on Real Data	Frame the Problem, Select a Performance Measure, Check the assumptions, Get the data, create a test.	Lecture	1702.2	In Class Quiz End Term
9	Visualization of Data	Visualizing geographical data, correlations, experiment with attribute	Lecture	1702.2	Class Quiz Mid Term I End Term
10	Pre-processing of Data for ML	Data cleaning, Handling text, feture scaling & transformation.	Lecture	1702.2	Class Quiz Mid Term I End term
11	Training & Testing of Model	Training and evaluating on a training set, cross validation.	Lecture	1702.2	Home Assignment Class Quiz Mid Term I End Term
12	Classification	Case Study of MNIST dataset Performance Measures Multi Class Classification	Lecture	1702.2	Class Quiz Mid Term I End Term
13	Linear Regression	Formulation	Lecture	1702.3/4/5	Class Quiz Mid Term I End Term
14	Gradient Decent	Batch Gradient, Stochastic Gradient & Mini Batch	Lecture	1702.3/4/5	Class Quiz End Term
15,16	Polynomial Regression	Multi variate regression	Lecture	1702.3/4/5	Class Quiz Mid Term II End Term

17, 18	Regularization & Logistic Regression	Regression, Estimating Probability, Decision Boundaries, Softmax regression	Lecture	1702.3/4/5	Class Quiz Mid Term II End Term
19, 20	Artificial Neural Network -	Introduction, Neuron, Model, Perceptron	Lecture	1702.3/4/5	Class Quiz Mid Term II End Term
21- 23	Multilayer Perceptron & Backpropagation.	Activation Function, Hidden Layers, Weights, Bias	Lecture	1702.3/4/5	Class Quiz Mid Term II End Term
24 - 26	Decision Tree	Training & visualizing, making prediction, CART training algorithm, Computational Complexity, Entropy, Regularization hyper parameter.	Lecture	1702.3/4/5	Class Quiz End Term
27 – 29	Naïve Bayes	Learning Classifiers based on Bayes Rule, Discrete Inputs, Continuous Input, Conditional independence Multinomial Naive Bayes	Lecture	1702.3/4/5	Class Quiz End Term
30 – 31	Belief Network	Gaussian Bayes classifiers, Document classification Bayesian belief Network	Lecture	1702.3/4/5	Class Quiz End Term
32 -35	Support Vector Machine	Linear SVM Soft Margin Classifier Non Linear SVM SVM Regression	Lecture	1702.3/4/5	Class Quiz End Term
36-37	Ensemble Learning & Random Forest	Voting Classifiers Bagging Random Forest Boosting	Lecture	1702.3/4/5	Class Quiz End Term
38-39	Instance Based Learning	k-Nearest Neighbours KNN algorithm How do we choose the factor K	Lecture	1702.3/4/5	Class Quiz End term
40-44	Unsupervised Learning	Concept of clustering with some example, K-means algorithm Kohonen Self-Organizing Feature Map with their architecture and algorithm Learning Vector Quantization (LVQ) architecture and algorithm Counter Propagation Networks (CPN) with their training and testing algorithm	Lecture	1702.3/4/5	Class Quiz

45-46	Reinforcement Learning	Learning Task Markov Decision Process Learning to optimize rewards	Lecture	1702.3/4	Class Quiz Mid Term II End Term
47-50	Convolution Neural Network	Architecture Convolution Layer Pooling Layer CNN Architecture	Lecture	1702.6	Class Quiz Mid Term II End Term
51-52	Recurrent Neural Network	Recurrent Neurons Basic RNN Deep RNN LSTM GRU	Lecture	1702.6	Class Quiz Mid Term II End Term
53-54	Natural Language Processing	Introduction and application of NLP. Processing Raw text Learning to classify text Developing Chatbot	Lecture	1702.3/4/5	Class Quiz End Term
55	Conclusion and Course Summarization	NA	Lecture		NA

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO1
[CC1702.1]	Explain and improve the skills in the range of machine learning algorithms along with their strengths and weaknesses	3						1	1		1		1	2	2	2	1
[CC1702.2]	Explain the basic theory underlying machine learning.		2	2								2					
[CC1702.3]	Identify how to apply a variety of learning algorithms to data.				2	2		1						3	2	3	1
[CC1702.4]	Perform evaluation of learning algorithms and model selection.						2		2	3		1					
[CC1702.5]	Identify machine learning problems corresponding to different applications.			1						1	1			1			1
[CC1702.6]	Explain the concept of transfer learning and deep learning architecture.	3	2	2	2					2			1				

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing and IT

Department of Computer and Communication Engineering
Course Hand-out

Wireless Sensors and Adhoc Networks | **CC1755** | 3 Credits | 3 0 0 3

Session: 2018-19| Faculty: Dr. Jyoti Grover, Ms. Kuntal Gaur | Class: VII Semester (Department Elective)

A. **Introduction:** This course is offered by Dept. of Computer and Communication Engineering for seventh semester students as department elective course. The core objective of this course is to make the students understand the concepts of Ad Hoc Networks as well as Wireless Sensor Networks (WSN), their characteristics, novel applications, and technical challenges. The prerequisites are to have basic understanding of infrastructured networks, basic protocols used on computer networking.

B. **Course Outcomes:** At the end of the course, students will be able to

[1755.1]- Describe the concept of wireless ad hoc networks and specialized ad hoc networks like sensor networks.

[1755.2]- Analyse different categories of routing protocols in ad hoc networks and main design issues.

[1755.3]- Analyze design issues of Wireless sensor networks such as Energy consumption, Clustering of Sensors, QoS and applications.

[1755.4]- Describe the basic concepts of MAC layer, routing layer and high level application layer in WSN.

[1755.5]- Illustrate Security issues in wireless ad hoc networks, cooperation in MANETs, Intrusion detection systems.

[1755.6]- Build the required skills to read and research the current literature in ad hoc and sensor networks.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1] Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2] Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3] Design/development of solutions: Design solutions for complex engineering problems and design system components or processes_that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4] Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5] Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools_including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6] The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues_and the consequent responsibilities relevant to the professional engineering practice

[PO.7] Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8] Ethics: Apply ethical principles and commit to professional ethics_and responsibilities and norms of the engineering practices

[PO.9] Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10] Communication: Communicate effectively_on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11] Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12] Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

D. Program Specific Outcomes (PSOs)

[PSO1]. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

[PSO2]. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

[PSO3]. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

[PSO4]. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

E. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	15
	Sessional Exam II (Closed Book)	15
	Quizzes and Assignments (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Closed Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

F. SYLLABUS

Introduction to Ad Hoc Wireless Networks: Characteristics of Mobile Ad-hoc Networks (MANETs), Applications of MANETs, Challenges; **Routing in MANETs:** Topology-based versus Position-based approaches, Topology based routing protocols, Position based routing, Other Routing Protocols; **Data Transmission in MANETs, TCP over Ad Hoc Networks. Basics of Wireless Sensors and Applications:** Design issues, Energy consumption, Clustering of Sensors, Applications; **Data Retrieval in Sensor Networks:** Classification of WSNs, MAC layer, Routing layer, High-level application layer support, Adapting to the inherent dynamic nature of WSNs; **Security:** Security in Ad hoc Wireless Networks, Key Management, Secure Routing, Cooperation in MANETs, Intrusion Detection Systems; **Sensor Network Platforms and Tools:** Sensor Network Hardware, Sensor Network Programming Challenges, Node-Level Software Platforms.

G. TEXT BOOKS

T1. C.S.R. Murthy, B.S. Manoj, *"Adhoc Wireless Networks — Architectures and Protocols"*, 1st Edition, Pearson Education, 2006.

T2. C. M. Cordeiro, D. P. Aggarwal, *"Ad Hoc and Sensor Networks — Theory and Applications"*, 2nd Edition, World Scientific Publications, 2011

H. REFERENCE BOOKS

R1. F. Zhao,L. Guibas, "Wireless Sensor Networks: An Information Processing Approach", 1st Edition, Morgan Kauffman Publishers, 2004

R2. F. Hu,X. Cao, "Wireless Sensor Networks — Principles and Practice", An Auerbach Publications, CRC Press, Taylor & Francis Group, 2010.

R3. C.E. Perkins, "Ad hoc Networking", Addison-Wesley, 2008.

Lecture Plan:

Lecture No.	Major Topics	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode Of Assessing CO
1.	**Introduction to Ad Hoc Wireless Networks**	Introduction and Course Hand-out briefing	To acquaint and clear teachers expectations and understand student expectations	Lecture	**NA**	NA
2.		Introduction to basic of Ad Hoc Network	To acquaint infrasture-based and infrastructure-less network and fundamental concepts used in ad hoc networks	Lecture	**1755.1**	Mid Term I, Quiz & End Term
3.		Characteristics and Applications of MANETs	Describe the need of MANET, its characteristics and different applications of MANET and finding different scenarios of its applicability	Lecture	**1755.1**	Mid Term I, Quiz & End Term
4.		Challenges in Ad Hoc Networks	Identify different design issues of ad hoc networks in realistic environment	Lecture	**1755.1**	Mid Term I, Quiz & End Term
5.		Data Transmission in MANETs	Describe the process of data transmission in MANETs	Lecture	**1755.1**	Mid Term I, Quiz & End Term
6.	**Routing in MANETs**	Issues in Designing routing Protocols	Illustrate different design issues in routing of Ad hoc networks	Lecture	**1755.2**	Mid Term I, Quiz & End Term
7.		Classification of Routing Protocols	Describe various parameters for classification of routing protocols	Lecture	**1755.2**	Mid Term I, Quiz & End Term
8.		Distance vector and Link state routing protocols	Recall distance vector and link state routing protocols and their applications	Flipped Class	**1755.2**	Mid Term I, Quiz & End Term
9.		Destination Sequenced distance vector routing protocol	Describe Destination Sequenced distance vector routing protocol	Lecture	**1755.2**	Mid Term I, Quiz & End Term
10.		Destination Sequenced distance vector routing protocol	Describe working and applications of DSDV	Lecture	**1755.2**	Mid Term I, Quiz & End Term
11.		Wireless routing protocol, Cluster-head	Describe WRP and CGSR routing and applicability in real world	Lecture	**1755.2**	Mid Term I, Quiz & End Term

		gateway switch routing protocol				
12.		On demand routing protocols	Recall on-demand routing protocols and its advantages over table-driven routing protocols	Flipped Class	**1755.2**	Mid Term I, Quiz & End Term
13.		Dynamic source routing protocol	Describe DSR routing protocol and its working and advantages	Lecture	**1755.2**	Mid Term I, Quiz & End Term
14.		Ad hoc on demand distance vector routing protocol	Describe AODV routing protocol and its working and advantages	Lecture	**1755.2**	Mid Term I, Quiz & End Term
15.		Location-aided routing	Describe LAR routing protocol and its working and advantages	Lecture	**1755.2**	Mid Term I, Quiz & End Term
16.		Hybrid routing protocols, Zone routing protocol	Describe Hybrid routing protocol and its working and advantages. Illustrate the trade-off among all routing protocols in realistic environment	Lecture	**1755.2**	Mid Term I, Quiz & End Term
17.	**TCP over Ad Hoc Networks**	Transport layer Design issues for Ad Hoc Networks	Describe different design issues at transport layer in ad hoc networks	Lecture	**1755.4 & 1755.6**	Mid Term I, Quiz & End Term
18.		Transport layer Goals for Ad Hoc Networks	Describe design goals of transport layer protocol for ad hoc wireless networks.	Lecture	**1755.4 & 1755.6**	Mid Term I, Quiz & End Term
19.		TCP performance in Ad Hoc	Revisit to traditional TCP and recount the performance of traditional TCP protocols in wireless ad hoc networks	Lecture	**1755.4 & 1755.6**	Mid Term I, Quiz & End Term
20.		Feedback based TCP	Describe Feedback based TCP	Lecture	**1755.4 & 1755.6**	Mid Term II, Quiz & End Term
21.		TCP –BUS , Ad Hoc TCP	Describe TCP- BUS, Ad Hoc TCP and compare with traditional TCP	Lecture	**1755.4 & 1755.6**	Mid Term II, Quiz & End Term
22.		Ad Hoc TCP , Split TCP	Describe Split TCP and compare with traditional TCP	Lecture	**1755.4 & 1755.6**	Mid Term II, Quiz & End Term
23.		Comparative study of various protocols	Analyse various transport layer protocols in Ad hoc environment	Flipped Class	**1755.4 & 1755.6**	Mid Term II, Quiz & End Term

24.		Other Transport layer Protocols	Trade-off study of various protocols at transport layer	Activity	**1755.4 & 1755.6**	Mid Term II, Quiz & End Term
25.	**Security**	Issues and challenges in Security of Ad Hoc Networks	Describe the need of security in ad hoc networks due to its unique characteristics	Lecture	**1755.5**	Mid Term II, Quiz & End Term
26.		Security attacks	Describe issues and challenges in security provisioning in wireless ad hoc networks	Flipped Class	**1755.5**	Mid Term II, Quiz & End Term
27.		Key Management algorithms	Describe symmetric and Asymmetric kay algorithms	Lecture	**1755.5**	Mid Term II, Quiz & End Term
28.		Key Management approaches in Ad Hoc Networks	Describe various key management approaches used in Wireless Ad Hoc Networks	Lecture	**1755.5**	Mid Term II, Quiz & End Term
29.		Secure Routing	Describe the requirement of secure routing protocol for ad hoc network and elaborate security versions of studied routing protocols	Lecture	**1755.5**	Mid Term II, Quiz & End Term
30.		Cooperation in MANET	Describe the need of cooperation in security provisioning of mobile ad hoc networks	Lecture	**1755.5**	Mid Term II, Quiz & End Term
31.		Intrusion Detection System	Describe intrusion detection system for Ad hoc networks	Lecture	**1755.5**	Mid Term II, Quiz & End Term
32.	**Basics of Wireless Sensors and Applications**	Design issues, Clustering of Sensors	Describe different design issues and challenges of wireless sensor network	Lecture	**1755.3 & 1755.6**	Quiz & End Term
33.		Clustering of Sensors	Describe clustered architecture of wireless sensor network	Lecture	**1755.3 & 1755.6**	Quiz & End Term
34.		Energy consumption	Describe small minimum energy communication network	Lecture	**1755.3 & 1755.6**	Quiz & End Term
35.		Applications	Describe various applications of wireless sensor network	Lecture	**1755.3 & 1755.6**	Quiz & End Term
36.	**Data Retrieval in Sensor Networks**	Classification of WSNs	Classify Wireless Sensor Networks based on various parameters	Flipped Class	**1755.3 & 1755.6**	Quiz & End Term
37.		MAC layer, Routing layer	Describe MAC and routing layer design issues of Wireless Sensor Networks	Lecture	**1755.3 & 1755.6**	Quiz & End Term

38.		High-level application layer support	Describe application layer architecture of WSN	Lecture	**1755.3 & 1755.6**	Quiz & End Term
39.		Adapting to the inherent dynamic nature of WSNs	Identify the impact of different parameters on solutions designed for WSN	Lecture	**1755.3 & 1755.6**	Quiz & End Term
40.	**Sensor Network Platforms and Tools**	Sensor Network Hardware	Identify the hardware components required for WSN and their characteristics	Lecture	**1755.3 & 1755.6**	Quiz & End Term
41.		Sensor Network Programming Challenges, Node-Level Software Platforms.	Build solutions in WSN using node level software platforms	Lecture	**1755.3 & 1755.6**	Quiz & End Term

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CC 1755.1	Describe the concept of wireless ad hoc networks and specialized ad hoc networks like sensor networks.	2	1		1			1		1	1	1	1	2			
CC 1755.2	Analyse different categories of routing protocols in ad hoc networks and main design issues	3	2					1	1				1		2		
CC 1755.3	Analyze design issues of Wireless sensor networks such as Energy consumption, Clustering of Sensors, QoS and applications.	2	2	1		3	1					1	1	1			1
CC 1755.4	Describe the basic concepts of MAC layer, routing layer and high level application layer in WSN.	3	2			3		1		1	1		2			1	
CC 1755.5	Illustrate Security issues in wireless ad hoc networks, cooperation in MANETs, Intrusion detection systems.	3	2	1								1	2	1	1	1	1
CC 1755.6	Build the required skills to read and research the current literature in ad hoc and sensor networks.						1			1			2	1		1	1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer & Communication Engineering
Course Hand-out

Principles of Web Services: CC1753| CC 1751 | 3 Credits | 3 0 0 3

Session: 2018-19 | Faculty: Punit Gupta | Class: B.Tech 4st Year

A. **Introduction:** Principles of Web Services focuses on propagate communication between the client and server applications on the World Wide Web. Principles of Web Services allows student to learn popular service protocols like SOAP, WSDL, REST and other standard languages and architecture of web service deployment. Web services provide a common platform that allows multiple applications built on various programming languages to have the ability to communicate with each other

B. **Course Outcomes:** At the end of the course, students will be able to

CS1753.1: To identify and describe various web services technologies like WSDL, UDDI, SOAP
CS1753.2: To understand xml technology and message passing
CS1753.3: To understand and identify various web service models and messaging techniques
CS1753.4: Understanding SOA design implementation, managing SOA environment
CS1753.5: To evaluate and identify suitable service for a business model and by using this enhance the entrepreneurship.
CS1753.6: To design and develop web service models using beans and spring framework

C. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analysing, the B Tech CCE graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are called society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	15
	Sessional Exam II (Close Book)	15
	In class Quizzes and/or Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Open Handwritten Notes)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Homework/ Home Assignment/ Activity Assignment	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a	

(Formative)	student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.

E. SYLLABUS

Evolution and Emergence of Web Services: Evolution of distributed computing, emergence of Web Services and Service Oriented Architecture (SOA). Introduction to Web Services – The definition of web services, basic operational model of web services, tools and technologies enabling web services, benefits and challenges of using web services;

Web Service Architecture: Web services Architecture and its characteristics, , web services communication, basic steps of implementing web services. Describing Web Services – WSDL introduction, non-functional service description, WSDL1.1 Vs. WSDL 2.0, WSDL d ocument, WSDL elements, WSDL binding, WSDL tools, WSDL port type, limitations of WSDL; Brief Over View of XML: XML technologies – XML, XML Document structure, XML namespaces, Defining structure in XML, documents, Reuse of XML schemes, Document navigation ,DTD, XSD, XSLT, X-Query-Path Web services technologies - Web services and SOA, WSDL, SOAP, UDDI Standards (WS-*) - Web services and Service- oriented enterprise (SOE), WS-Coordination and WS-Transaction, transformation WS-Security and the Web services secu rity specifications, WS-Reliable Messaging, WSPolicy, WS-Attachments;

SOA Design implementation, Managing SOA Environment: service-oriented design process, design activities, determine services and tasks based on business process model, choosing appropriate standards, articulate architecture, mapping business processes to technology, designing service integration environment (e.g., ESB, registry), implementing SOA, security implementation, implementation of integration patterns, services enablement, quality assurance,impact of changes to services in the SOA lifecycle;

SOAP : Simple Object Access Protocol Inter-application communication and wire protocols, SOAP as a messaging protocol, Structure of a SOAP message, SOAP envelope, Encoding, Service Oriented Architectures, SOA revisited, Service roles in a SOA, Reliable messaging, The enterprise Service Bus, SOA Development Lifecycle, SOAP HTTP binding, SOAP communication model, Error handling in SOAP.

TEXT BOOKS

1. R. Nagappan, R. Skoczylas, R.P. Sriganesh , “Developing Java Web Services”, 2nd Edition, Wiley India, 2005.
2. S. Chatterjee, J. Webber, “Developing Enterprise Web Services”, 2nd Edition, Pearson Education, 2003.

REFERENCE BOOKS

1. Coyle, Frank P., “XML, Web services, and the data revolution”, 1st Edition, Addison-Wesley,2002.
2. S. Graham “Building web Services with Java”, 2nd Edition, Pearson Education, 2004.
3. D.A. Chappell & T. Jewell, “Java Web Services”, 1st Edition, O’Reilly, SPD, 2002.
4. McGovern, “Java web Services Architecture”, 1st Edition, Morgan Kaufmann , 2005.
5. Ethan Cerami, “Web Services Essentials: Distributed Application with XML – RPC, SOAP, UDDI & WSDL”, O’ Reilly, 2000.
6. Thomas Erl, “Service-Oriented Architecture: A Field Guide to Integrating XML and Web Services”, Prentice Hall, 2004.

F. Lecture Plan:

Lec No	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	Introduction and Course Hand-out briefing	To acquaint and clear teachers expectations and understand student expectations	Lecture	NA	NA
2,3	Introduction to web services	understand web services	Lecture	1753.1	Class Quiz Mid Term I
4,5	Type of Sevices & difference between distributed system and web services	describe and identify various web service models	Lecture	1753.1	Class Quiz Mid Term I
6,7	Emergence of Web Services and Service Oriented Architecture (SOA) fundamentals.	understand web services models using SOA	Lecture	1753.1	Class Quiz Mid Term I
8	QoS, Web service interportability, SLA.	describe and identify various web service performance parameters	Lecture	1753.2	Class Quiz Mid Term I End Term
9,10,11	Distributed computing Infrastructure and communication models.	distinguish between distributed model and web services.	Lecture	1753.2	Class Quiz Mid Term I End Term
12,13	Brief Over View of XML: XML technologies	learn and design XML messages	Lecture	11753.2	Class Quiz Mid Term I
14,15	XML DTD & XSD	design XML using XSD	Lecture	1753.2	Class Quiz Mid Term I End Term
16,17	SOAP Protocol, communication protocol.	learn SOAP messaging protocol for web services	Lecture	1753.2	Class Quiz Mid Term I

18,19	SOAP Message Structure, SOAP encoding	learn SOAP messaging protocol design and architecture	Lecture	1753.2	Class Quiz	Mid Term II	End Term
20	Describing web services	understand need of WSDL in web services	Lecture	1753.2	Class Quiz	Mid Term II	
21	WSDL services	learn WSDL protocol and its design	Lecture	1753.3	Class Quiz	Mid Term II	
22	WSDL binding.	understand WSDL binding with soap protocol	Lecture	1753.3	Class Quiz	Mid Term II	
23,24	Register and discovery services	learn various phases of deploying web services.	Lecture	1753.3	Class Quiz	Mid Term II	
25,26	WSDL to UDDI, maping & services.	learn UDDI protocol	Lecture	1753.4	Class Quiz	Mid Term II	
27-28	SOA, service composition	explain the complete layered architecture of web services.	Lecture	1753.4	Class Quiz	Mid Term II	
29-30	WS- BPEL process	learn and design business models in web services	Lecture	1753.4	Class Quiz	Mid Term II	End Term
31-32	Service Transactions, distributed transaction, nected transactions	design service transaction in SOAP	Lecture	1753.4	Class Quiz	Mid Term II	
33	SOAP Scurity policies	understand need of security in services	Lecture	1753.4	Class Quiz		End Term
34-35	xml secuity standards	understand ways to implement security in XML	Lecture	1753.5	Class Quiz		End Term
36-37	service policies	understand various service policies	Lecture	1753.5	Class Quiz		End Term
38	Service transactions	describe transactions in web services and rollback	Lecture	1753.5	Class Quiz		End Term

39-40	EJB service architecture, Beans model	to design and deploy EJB based web services and its various model	Lecture	1753.6	Class Quiz	End Term
41-42	REST protocol	Design and deploy RESTful services on HTTP	Lecture	1753.6	Class Quiz	End Term

G. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CS 1753.1:	Understand the details of web services technologies like WSDL,UDDI, SOAP	2		2	2	1	1		1	1	1	1	2				1
CS 1753.2:	To learn how to implement and deploy web service client and server	2			3			1	1		1		2		1	1	
CS 1753.3:	To learn various XML technologies to manage and design web services.	2		1		3	1		1		1	1	2	2			1
CS 1753.4:	Understanding various web service architectures.	2	1	3				1	1	1			2	3			
CS 1753.5:	To evaluate and identify suitable service for a business model and by using this enhance the entrepreneurship.	2		3	2		1		1		1	1	3	3		1	1
CS 1753.6:	To learn how to implement and deploy web service models	3		3		3	1						1	1			1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR
SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER & COMMUNICATION ENGG.
Course Hand-out

Advance Computer Networks | CS1756 | 3 credits | [3 0 0 3]

Session: 2018-19| Faculty: Dr. Kusum Lata Jain | Class: Dep. Elective (VII Sem)

A. Introduction: This course is offered by Dept. of Computer Science as a department elective, the aim of the course to provide the students advanced background on relevant computer networking topics to have a comprehensive and deep knowledge. This is targeting students who wish to pursue research & development in industries or higher studies in field of Computer Networks. The course includes understanding the principles for multi-layer network and management systems for the network. The focus is on techniques and protocol for medium access control, remote procedure calls, quality assurance.

B. Course Objectives: At the end of the course, students will be able to

[1756.1] To master the terminology and concepts of the OSI reference model and the TCP-IP reference model.
[1756.2] To master the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks.

[1756.3] To master the MAC layer concepts.

[1756.4] Understand network management and improve the networking skills of its relevant issues.

[1756.5] Implementation of QOC parameters.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1] Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2] Problem analysis: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3] Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

[PO.4] Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5] Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

[PO.6] The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7] Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8] Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9] Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10] Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11] Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12] Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Program Specific Outcomes (PSOs)

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	15
	Sessional Exam II (Close Book)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Close Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. Syllabus

Introduction – network architecture - protocol implementation issues – Quantitative performance metrics - network design. Reference models- The OSI Reference Model- The TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models Low level network technologies-Ethernet to token ring to wireless-Issues wit data link protocols Encoding framing and error detection and correction-sliding window protocol Medium access control sub layer-Basic models of switched networks-Datagrams versus virtual circuits witching technologies-Switched Ethernet and ATM- The design of hardware based switches Network layer – network layer design issues-Touting algorithms-Congestion control algorithms-Internetworking- The network layer in the internet-Internet Protocol (IP).-Unicast, multicast, and inter domain routing Transport layer-Elements of transport protocol Congestion control – Performance issues The Internet's Trans-mission Control Protocol (TCP)- Remote Procedure Call (RPC)- –Implementation semantics of RPC -client-server applications- The Real-time Transport Protocol(RTP) - Multimedia applications- Congestion control and resource allocation.-congestion control in TCP–UDP –Quality of service in IP. Application layer-Domain name server-World wide web-Hyper text transfer protocol Presentation formatting and data compression- Network security- crypto graphic tools- the problems of key distribution – General authentication techniques - Pretty Good Privacy (PGP)- Secure Shell (SSH),- IP Security architecture(IPSEC).-Firewalls .Network applications and the protocols- File transfer protocol - email and the Web, multimedia applications such as IP telephony and video streaming- Overlay networks like peer-to-peer file sharing and content distribution networks- Web Services architectures for developing new application protocols.

F. Text Books

1. B.A. Forouzan, Data Communication and Networking, 5th Ed., TMH, 2013
2. A S Tanenbaum, Computer Networks, 5th Ed., Pearson, 2010.

G. References:

1. L. L. Peterson and Bruce S. Davie, Computer Network a systems approach, 5th Ed., MK ,2011

Sr.No.	Topics to be covered	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	Introduction and course Hand-out briefing	To acquaint and clear teachers expectations and understand student expectations	Lecture	NA	NA
2	Reference Model: The OSI Reference Model-TCP/IP Model and Comparison	Recall OSI and TCP/IP Reference Models	Lecture	1756.1	Class Quiz Sessional 1 End Term
3	Introduction to Local Area Network, Network Devices	Recall Networks, Local Area Networks	Flipped Class	1756.2	Class Quiz Sessional 1 End Term
4	Ethernet Protocol, Standard Ethernet,	Understanding of basic component and standards for Ethernet	Lecture	1756.2	Class Quiz Sessional 1 End Term
5	Fast Ethernet, Gigabit Ethernet	Knowledge about Fast Ethernet and Gigabit and Application of Ethernet	Lecture and Flipped Class	1756.2	Class Quiz Sessional 1 End Term
6	Telephone Network, Cable Network, ATM	Understanding of working of telephone network	Lecture	1756.2	Class Quiz Sessional 1 End Term
7	SONET	Knowledge of Architecture, Protocol for SONET	Lecture	1756.2	Class Quiz Sessional 1 End Term
8	ATM	Enable to explanation Protocol, Specifications, devices required for ATM	Lecture	1756.2	Class Quiz Sessional 1 End Term
9	Wireless LANs: IEEE 802.11	Understand protocol and Architecture of Wireless LANs		1756.2	Class Quiz Sessional 1 End Term
10	Bluetooth	Explain Blue tooth and Blue tooth Scenarios	Lecture	1756.2	Class Quiz Sessional 1 End Term

11	WiMAX, Cellular Telephony,	Knowing about WiMAX, Cellular Telephony	Lecture / Flipped Class	1756.2	Class Quiz Sessional 1 End Term
12	Satellite Network Virtual LANs: Connecting Devices, Virtual LANs	Understand Virtual network and Connecting Devices	Lecture	1756.2	Class Quiz Sessional 1 End Term
13	Introduction to Data Link Protocol, Error Correction and Error Detection	Recall DLL basic and Error Correction and Error Detection	Flipped Lecture	1756.3	Class Quiz Sessional 2 End Term
14-15	Medium Access Control: Protocol, Datagram versus Virtual Circuits	Know about MAC protocols, Datagram and Virtual Circuit	Flipped Class	1756.3	Class Quiz Sessional 2 End Term
16	Random Access, Control Access	Identify MAC protocols, Medium Access Techniques	Lecture	1756.3	Class Quiz Sessional 2 End Term
17	Channelization, Data Link layer Switching	Explain Channelization and Switching	Lecture	1756.3	Class Quiz Sessional 2 End Term
18	Network Layer: Introduction to Routing Algorithm and Congestion Control Algorithm	Recall Routing Algorithm and Congestion Control	Lecture	1756.4	Class Quiz Sessional 2 End Term
19	Transport Layer: A simple Transport Layer Protocol,	Understanding of Transport Layer	Lecture	1756.4	Class Quiz Sessional 2 End Term
20-21	Remote Procedure Call	Know about Remote procedure call components	Lecture	1756.4	Class Quiz Sessional 2 End Term
22	Real Time Transport Protocol	Understanding of Real Time Transport protocol	Lecture	1756.4	Class Quiz Sessional 2 End Term
23	Standard Client Server Protocols : TALNET	Understanding TALNET	Lecture	1756.4	Class Quiz Sessional 2 End Term
24	Network Management	Understanding Network Management Concepts	Lecture	1756.4	Class Quiz Sessional 2 End Term
25	SNMP	Knowing concept of SNMP	Lecture	1756.4	Class Quiz Sessional 2 End Term

26	ANS.1	Knowing Concept of ANS.1	Lecture	1756.4	Class Quiz Sessional 2 End Term
27	Quality of Service: Data Flow Characteristics	Understanding concept of Quality of Services	Lecture	1756.5	Class Quiz End Term
28-29	Flow Control to Improve QoS	Know the method to improve QoS	Lecture	1756.5	Class Quiz End Term
30	Integrated Services	Identifying Integrated Service and Application	Lecture	1756.5	Class Quiz End Term
32	Differentiated Services.	Identifying Differentiated Services and Application	Lecture	1756.5	Class Quiz End Term
34	Conclusion and Course Summarization			All	

H. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CS 1756.1	To master the terminology and concepts of the OSI reference model and the TCP-IP reference model.	3	2							1	1			2			1
CS 1756.2	To master the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks		3	3	2					1				2			1
CS 1756.3	To master the MAC layer concepts and routing mechanisms	3			3	2				1				3	2		
CS 1756.4	Understand network management and improve the networking skills of its relevant issues.			3	2							3			2	3	1
CS 1756.5	Implementation of QOC parameters		3		2									3		2	2

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer and Communication
Course Hand-out

Software Testing | CC 1754 | 3 Credits | 3 0 0 3

Session: 2018-19| Faculty: Mrs. Shivani Gupta | Class: Departmental Elective Course

A. Introduction: This course presents the knowledge about Testing background such introduction of Bug, cause of Bug, how it effects on cost of project, role of STLC cycle realities of software testing. This subject also gives the knowledge software testing fundamentals, under the study of types of testing this subject enlighten the Configuration testing, Compatibility testing, Foreign language testing, Usability testing, Testing the documentation, testing for software security, Web site testing and more.

B. Course Outcomes: At the end of the course, students will be able to

[1754.1]. To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.

[1754.2]. To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing.

[1754.3]. To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.

[1754.4]. To expose the advanced software testing topics, such as object-oriented software testing methods, and component-based software testing issues, challenges, and solutions.

[1754.5]. To gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects.

[1754.6]. To gain the techniques and skills on how to use modern software testing tools to support software testing projects.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

1. **PO1: Engineering knowledge**: : Apply the knowledge of basic science and fundamental computing in solving complex engineering problems

2. **PO2: Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **PO3: Design/development of Computing solutions**: Design solutions for complex IT engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the Information oriented public health and safety, and the cultural, societal, and environmental considerations

4. **PO4: Conduct investigations of complex problems**: Use IT domain research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

5. **PO5: Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

6. **PO6: The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

7. **PO7: Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

8. **PO8: Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

9. **PO9: Individual and team work**: Function effectively as an individual, and as a member or leader in diverse IT teams, and in multidisciplinary settings.

10. **PO10: Communication**: Communicate effectively on complex computing engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

11. **PO11: Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

12. **PO12: Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

D. PROGRAM SPECIFIC OUTCOMES

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

E. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	15
	Sessional Exam II (Closed Book)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Closed Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and	

(Formative)	perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.

F. Syllabus:

Basics of software testing: Introduction to software Testing, Testing and debugging, Test metrics and measurements, Verification, Validation and Testing, Types of testing, Software defect tracking;
Structural testing techniques: Path testing, DD-Paths, Cyclomatic Complexity, Graph Metrics, Data Flow Testing;
Functional testing techniques: Boundary Value Analysis, Equivalence Class Testing, Decision Table Based Testing, Cause Effect Graphing Technique, Ad hoc Testing;
Top down and Bottom up integration: Bi-directional integration, System integration, Scenario Testing, Defect Bash, Design/Architecture verification, Deployment testing, Beta testing, Scalability testing, Reliability testing, Stress testing; Acceptance testing; Regression testing, Test Planning;
Software Test Automation: Scope of automation, Design & Architecture for automation, Generic requirements for test tool framework, Test tool selection, Testing in Object Oriented Systems, Case Study on software testing;
Advanced Topics on Testing: Functional and Non-Functional Testing, Prioritizing the Test cases, Testing Web Applications, Testing Off-the-shelf component, Testing security, Testing Data warehouse.

G. Text Book(s):

T1. P. C. Jorgenson, "Software Testing: A Craftsman's Approach", 4th Edition, CRC Press, 2014.
T2. A. P. Mathur, "Fundamentals of Software Testing", 2nd Edition, Pearson Education, 2014.

H. Reference(s):

R1. Rajib Mall, "Fundamentals of Software Engineering", Fourth Edition, PHI Learning, 2014
R2. K. K. Aggarwal, Y. Singh, "Software Engineering", 3rd Edition, New Age International Publication, 2008.
R3. K. Perry, "Effective Methods for Software Testing", 3rd Edition, Wiley, 2006.
R4. B. Beizer, "Software Testing Techniques", 2nd Edition, Wiley India, 2008.
R5. S. Desikan, G. Ramesh, "Software Testing: Principles and Practices", Pearson Education, 2006.

I. Lecture Plan:

LEC NO	TOPICS	Session Outcomes	Mode of Delivery	Corresponding CO	Mode Of Assessing CO
1.	Basics of software testing: Introduction to software Testing, Testing and debugging,	Understand Basics of software testing	Lecture	CC1754.1	Mid Term I, Quiz I
2.	Test metrics and measurements,	Identify various parameters of software	Lecture	CC1754.1	Mid Term I, Quiz & End Term
3.	Verification, Validation and Testing,	Discuss about software validity	Lecture	CC1754.1 and CC 1754.5	Mid Term I, Quiz & End Term
4.	Types of testing	Learn and discuss types	Lecture	CC1754.1	Mid Term I, Quiz & End

					Term
5.	Software defect tracking;	Identification of defects	Lecture	CC1754.1 and CC1754.5	Mid Term I, Quiz & End Term
6.	Structural testing techniques:	Learn about testing techniques	Lecture	CC1754.2	Mid Term I, Quiz & End Term
7.	Path testing,	Identification of path testing	Lecture	CC1754.2	Mid Term I, Quiz & End Term
8.	Path testing,	Identification of path testing	Lecture	CC1754.2	Mid Term I, Quiz & End Term
9.	DD-Paths,	Identify paths	Lecture	CC1754.2	Mid Term I, Quiz & End Term
10.	Cyclomatic Complexity,	Identify complexity of code	Lecture	CC 1754.2	Mid Term I, Quiz & End Term
11.	Graph Metrics,	Understand graph metrics	Lecture	CC1754.2	Mid Term I, Quiz & End Term
12.	Data Flow Testing,	Understand data flow graph and testing	Lecture	CC1754.1	Mid Term I, Quiz & End Term
13.	Functional testing techniques:	Learn about functional testing	Lecture	CC1754.3	Mid Term I, Quiz & End Term
14.	Boundary Value Analysis,	Identification of boundary values	Lecture	CC1754.1	Mid Term I, Quiz & End Term
15.	Equivalence Class Testing,	Identification of equivalence classes in software	Lecture	CC1754.2	Mid Term I, Quiz & End Term
16.	Decision Table Based Testing,	Learn and identification of decision table	Lecture	CC1754.2	Mid Term I, Quiz & End Term
17.	Cause Effect Graphing Technique	Identification of graphing techniques	Lecture	CC754.2	Mid Term I, Quiz & End Term
18.	Ad hoc Testing;	Discuss and learn Ad hoc testing	Lecture	CC1754.2	Mid Term I, Quiz & End Term
19.	Top down and Bottom up integration:	Learn about testing	Lecture	CC1754.2 and CC1754.3	Mid Term II, Quiz & End Term
20.	Bi-directional integration,	Learn bidirectional integation	Lecture	CC1754.2	Mid Term II, Quiz & End Term
21.	System integration,	Perform system testing	Lecture	CC1754.3	Mid Term II, Quiz & End Term
22.	Scenario Testing,	Perform scenario testing	Lecture	CC1754.3	Mid Term II, Quiz & End Term
23.	Defect Bash,	Learn and identify defect	Lecture	CC1754.3	Mid Term II, Quiz & End Term
24.	Design/Architecture	Learn and identify	Lecture	CC1754.3	Mid Term II,

	verification,	defect archtecture			Quiz & End Term
25.	Deployment testing,	Learn about testing techniques	Lecture	CC1754.3 and CC1754.2	Mid Term II, Quiz & End Term
26.	Beta testing,	Learn about testing techniques	Lecture	CC1754.3	Mid Term II, Quiz & End Term
27.	Scalability testing,	Learn about testing techniques	Lecture	CC1754.3	Mid Term II, Quiz & End Term
28.	Reliability testing,	Learn about testing techniques	Lecture	CC1754.1	Mid Term II, Quiz & End Term
29.	Stress testing;	Learn about testing techniques	Lecture	CC1754.3	Mid Term II, Quiz & End Term
30.	Acceptance testing;	Learn about testing techniques	Lecture	CC1754.3 and CC1754.1	Mid Term II, Quiz & End Term
31.	Regression testing,	Learn about testing techniques	Lecture	CC1754.4 and CC1754.3	Mid Term II, Quiz & End Term
32.	Test Planning,	Learn about testing techniques	Lecture	CC1754.4 and CC1754.5	Mid Term II, Quiz & End Term
33.	Software Test Automation: Scope of automation,	Learn and identify defect automation	Lecture	CC1754.4 and CC1754.5	Mid Term II, Quiz & End Term
34.	Design & Architecture for automation,	Learn and identify defect architecture	Lecture	CC1754.4 and CC1754.2	Mid Term II, Quiz & End Term
35.	Design & Architecture for automation,	Learn and identify defect architecture	Lecture	CC1754.2 and CC1754.4	Mid Term II, Quiz & End Term
36.	Generic requirements for test tool framework,	Learn and identify defect tools	Lecture	CC1754.4	Mid Term II, Quiz & End Term
37.	Test tool selection,	Learn and identify defect tools	Lecture	CC1754.1 and CC1754.2	Mid Term II, Quiz & End Term
38.	Testing in Object Oriented Systems,	Learn and identify different systems	Lecture	CC1754.5 and CC1754.6	Mid Term II, Quiz & End Term
39.	Case Study on software testing;	Discuss case study	Lecture	CC1754.5 and CC1754.6	Quiz & End Term
40.	Advanced Topics on Testing:.	Discuss advanced topics	Lecture	CC1754.1 and CC1754.3	Quiz & End Term
41.	Functional and Non-Functional	Understand different types of testing	Lecture	CC1754.4	Quiz & End Term
42.	Testing, Prioritizing the Test cases,	Learn to design test cases	Lecture	CC1754.4 and CC1754.6	Quiz & End Term
43.	Testing Web Applications,	Learn and identify testing applications	Lecture	CC1754.6	Quiz & End Term

44.	Testing Web Applications,	Learn and identify testing applications	Lecture	CC1754.4 and IT 1754.	Quiz & End Term
45.	Testing Off-the-shelf component, ,	Learn component testing	Lecture	CC1754.5	Quiz & End Term
46.	Testing security,	Understand security during testing	Lecture	CC1754.6	Quiz & End Term
47.	Testing Data warehouse	Discuss testing warehouses	Lecture	CC1754.6	Quiz & End Term
48.	Revision Class-I	Discussion	Lecture	CC1754.6	Quiz & End Term
49.	Revision Class-II	Discussion	Lecture	CC1754.5 and CC 1754.6	Quiz & End Term

J. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CC 1754.1	To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.	2			2	3	2	1		1	1			1		
CC 1754.2	To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing		2	3	3	2			1				1		1	1
CC 1754.3	To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.	2	3	2		1	1			1	1	1		1	1	
CC1754.4	To expose the advanced software testing topics, such as object-oriented software testing methods, and component-based software				2		1						1		1	

	testing issues, challenges, and solutions.															
CC1754.5	To gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects.	3		3			2	1			1		1	2	1	1
CC1754.6	To gain the techniques and skills on how to use modern software testing tools to support software testing projects.	1			1									1		

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer and Communication Engineering
Course Hand-out

Principles of Distributed Computing CS 1760 | 3 Credits | 3 0 0 3

Session:2018-19| Faculty: Dr. Amita Nandal | Class: Program Elective Course: B.Tech. 4th Year VII Semester

A. Introduction This course provides fundamentals and structure of distributed systems using multiple levels of software. Specific topics include: distributed algorithms, distributed file systems, distributed databases, security and protection, distributed services such as the world-wide web, and examples of research and commercial distributed systems.

B. Course Outcomes: At the end of the course, students will be able to

[1760.1] Describe and implement various communication mechanisms between different processes and systems.

[1760.2] Describe and examine the naming conventions and name resolution mechanisms.

[1760.3] Use algorithms to coordinate and synchronize multiple tasks in a distributed system.

[1760.4] Identify how replication of resources improves performance and scalability in distributed systems, and examine algorithms that maintain consistent copies of replicas.

[1760.5] Describe the common security issues in distributed systems and various mechanisms to secure the system.

[1760.6] Apply principles of distributed systems in real-world applications like Distributed File Systems, Virtualization hence develop employability skills.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

1. **PO1: Engineering knowledge**: : Apply the knowledge of basic science and fundamental computing in solving complex engineering problems

2. **PO2: Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **PO3: Design/development of Computing solutions**: Design solutions for complex IT engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the Information oriented public health and safety, and the cultural, societal, and environmental considerations

4. **PO4: Conduct investigations of complex problems**: Use IT domain research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

5. **PO5: Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

6. **PO6: The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

7. **PO7: Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

8. **PO8: Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

9. **PO9: Individual and team work**: Function effectively as an individual, and as a member or leader in diverse IT teams, and in multidisciplinary settings.

10. **PO10: Communication**: Communicate effectively on complex computing engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

11. **PO11:Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

12. **PO12: Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

D. PROGRAM SPECIFIC OUTCOMES

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

E. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	15
	Sessional Exam II (Open Book)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Open Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to get eligible for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class should report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5	

	throughout the entire semester.

F. SYLLABUS

CS1760 Principles of Distributed Systems

Introduction , Introduction concepts related to distributed computing and distributed operating systems. , Clients/Server Architecture , Communications , Communication via Message Passing and Various Message Passing Models, Hardware and Software Sides of C/S Architecture , File Server , Database Server , Transaction Processing , Centralized Processing , Distributed Processing , Logical Time, Physical Time and Local and Global State, Ordering of Messages (Causal Ordering) and Group Communication via Broadcasting of Messages, Termination Detection, Global Predicate Detection, Distributed Mutual Exclusion Algorithms, Distributed Deadlock Detection Algorithms, Distributed Shared Memory Systems, Check pointing and Rollback Recovery, Consensus and Agreement Algorithms, Failure Detection and Self Stabilization, etc. The design aspects of various advanced distributed computing models like Cluster of cooperative computers, Grid computing, Peer-to-Peer networks, and Internet of Things.

G. TEXT BOOKS

1. G. Coulouris, J. Dollimore, T. Kindberg, *"Distributed Systems, Concepts and Design*", Pearson, 3rd Edition, 2001.
2. A. S. Tanenbaum, M. Van Steen, *"Distributed Systems, Principles and Paradigms"*, Pearson, 1st Indian Reprint, 2002.

H. REFERENCE BOOKS

1. A. D. Kshemkalyani, M. Singhal, *"Distributed Computing: Principles, Algorithms, and Systems",* Cambridge University Press/ Foundation Books India, 2008.
2. Mei- Ling Liu, *"Distributed Computing: Principles and Application*", Pearson Education, 2004.

I. Lecture Plan:

Lecture No.	Topic(s) to be covered	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	Introduction concepts related to distributed computing and distributed operating systems	To understand basics about distributed computing	Lecture	1760.1	In Class Quiz End Term
2	Clients/Server Architectures and Models	To learn basic client server models	Lecture	1760.1	Class Quiz Mid Term I End Term
3	Hardware and Software Sides of C/S Architecture	To learn basic client server models	Lecture	1760.1	Class Quiz Mid Term 1 End term
4	Name resolution Telnet, FTP	To learn basic client server models	Lecture	1760.1	Home Assignment Class Quiz Mid Term 1 End Term
5	C/S communication, NSlookup	To learn client server communication	Lecture	1760.1, 1760.2	Class Quiz Mid Term 1 End Term
6	Communication via Message Passing	To learn client server communication	Lecture	1760.1, 1760.2	Class Quiz Mid Term I End Term
7	Logical Time, Physical Time	To learn client server communication	Lecture	1760.2, 1760.3	Class Quiz End Term
8	Local and Global State	To learn client server communication	Lecture	1760.2, 1760.3	Class Quiz Mid Term I End Term
9	Ordering of Messages (Causal Ordering)	To learn client server communication	Lecture	1760.1, 1760.3	Class Quiz Mid Term I End Term
10	Group Communication via Broadcasting of Messages	To learn client server communication	Lecture	1760.1, 1760.3	Class Quiz Mid Term I End Term
11	Various Message Passing Models	To learn client server communication	Lecture	1760.1, 1760.3	Class Quiz Mid Term I End Term
12	Alternative communication	To learn client server	Lecture	1760.1, 1760.3	Class Quiz

	methods- RPC	communication			End Term Mid Term 1I
13	Inet address and Sockets	To learn client server networking using Sockets	Lecture	1760.1, 1760.2	Class Quiz End Term Mid Term 1I
14	Distributed File system	To learn File system	Lecture	1760.3	Class Quiz End Term Mid Term 1I
15	Practical Considerations of File System	To learn File system	Lecture	1760.3	Class Quiz End Term Mid Term 1I
16	Database and SQL Programming	To learn databases in distributed systems	Lecture	1760.1, 1760.2	Class Quiz End Term Mid Term 1I
17	Introduction to Transaction Processing	To learn basics about transaction server	Lecture	1760.1, 1760.2	Class Quiz End term Mid Term 1I
18	Single-User Vs. Multi-User Systems	To learn transaction server as single user and multi-user system	Lecture	1760.1, 1760.2	Class Quiz Mid Term 1I
19	Read and Write Operations of a Transaction	To learn transaction server	Lecture	1760.1, 1760.2	Class Quiz Mid Term II End Term
20	Problems in Concurrency Operations	To learn transaction server	Lecture	1760.4	Class Quiz Mid Term II End Term
21	Types of Transaction Failures	To learn transaction server	Lecture	1760.4	Class Quiz Mid Term II End Term
22	Serializability of Schedules	To learn transaction server	Lecture	1760.4	Class Quiz End Term Mid Term 1I
23	View Serializable Schedules	To learn transaction server	Lecture	1760.4	Class Quiz End Term Mid Term 1I
24	Termination Detection, Global Predicate Detection	To learn transaction server	Lecture	1760.4	Class Quiz End Term Mid Term 1I

25	Distributed Mutual Exclusion Algorithms	To learn transaction server	Lecture	1760.4	Class Quiz End Term
26	Types of Schedule	To learn transaction server	Lecture	1760.4	Class Quiz End Term
27	Concurrency Problems	To learn transaction server	Lecture	1760.4	Class Quiz End Term
28	Conflict and Serializability	To learn transaction server	Lecture	1760.4	NA
29	Precedence graph, More practice exercise/problems	To learn transaction server	Lecture	1760.4	In Class Quiz (Not Accounted)
30	Distributed Deadlock Detection Algorithms	To learn transaction server	Lecture	1760.2, 1760.3,1760.4	In Class Quiz End Term
31	Parallel Computing and Programming models	To learn parallel computing	Lecture	1760.2, 1760.3,1760.4	Home Assignment End Term
32	Routing Mechanisms for Interconnection Networks	To learn parallel computing	Lecture	1760.2, 1760.3,1760.4	In Class Quiz End Term
33	Decomposition Techniques	To learn parallel computing	Lecture	1760.2, 1760.3,1760.4	Class Quiz End Term
34	Parallel Scalability	To learn parallel computing	Lecture	1760.2, 1760.4	Class Quiz End term
35	Numerical problems on Scalability	To learn parallel computing	Lecture	1760.2, 1760.4	Home Assignment Class Quiz End Term
36	Distributed Shared Memory Systems	To learn distributed shared memory systems	Lecture	1760.4, 1760.5	Class Quiz End Term
37	Check pointing and Rollback Recovery	To learn distributed shared systems	Lecture	1760.4, 1760.5	Class Quiz End Term
38	Consensus and Agreement Algorithms	To learn distributed system algorithms	Lecture	1760.4, 1760.5	Class Quiz End Term
39	Failure Detection and Self Stabilization	To learn distributed system algorithms for fault detection	Lecture	1760.4, 1760.5	Class Quiz End Term

40	The design aspects of various advanced distributed computing models	To understand distributed computing	Lecture	1760.4, 1760.5	Class Quiz End Term
41	Cluster of cooperative computers	To understand clusters in cooperative networks	Lecture	1760.4, 1760.5	Class Quiz End Term
42	Fault tolerance: Introduction to fault tolerance, Process Resilience,	To understand fault tolerance in distributed systems	Lecture	1760.4, 1760.5	Class Quiz End Term
43	Reliable Client-Server Communication, Reliable Group communication	To understand clusters in client-server communication	Lecture	1760.4, 1760.5	Class Quiz End Term
44	Security: Introduction to security, Secure Channels, Access control	To understand security in distributed network of systems	Lecture	1760.4, 1760.5	Class Quiz End Term
45	Grid Computing and IOT	To understand basic concepts of grid computing and IOT	Lecture	1760.6	Class Quiz End Term
46	Problems and Questionnaire	-	Lecture	1760.1, 1760.2,1760.3, 1760.4, 1760.5, 1760.6	Class Quiz End Term

J. Course Articulation Matrix: (Mapping of COs with POs and PSOs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CS 1760.1	Describe and implement various communication mechanisms between different processes and systems.	2		2									2	3		2	2
CS 1760.2	Describe and examine the naming conventions and name resolution mechanisms.	2											2				
CS 1760.3	Use algorithms to coordinate and synchronize multiple tasks in a distributed system.	2	2	2									2	3		3	2
CS 1760.4	Identify how replication of resources improves performance and scalability in distributed systems, and examine algorithms that maintain consistent copies of replicas.	2	2										2				
CS 1760.5	Describe the common security issues in distributed systems and various mechanisms to secure the system.	2	2	2	1								2	3		2	
CS 1760.6	Apply principles of distributed systems in real-world applications like Distributed File Systems, Virtualization hence develop employability skills.	3		2	2								2	3	3	3	3

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer & Communication Engineering
Course Hand-out

Introduction to Data Mining | CS 1790 | 3 Credits | 3 0 0 3

Session: 2018-19 Faculty: Arvind Dhaka | Class: Open Elective Course (7th Semester)

A. Introduction: This course aims to discuss concepts and terminology associate with Statistics, Database Systems and machine learning. The course also discuss the pseudo code and data structures use in the multidimensional arrays for data mining tasks.

B. Course Objectives: At the end of the course, students will be able to

[1790.1] Interpret the contribution of data warehousing and data mining to the decision-support level of organizations

[1790.2] Categorize and carefully differentiate between situations for applying different data-mining techniques: frequent pattern mining, association, correlation, classification, prediction, and cluster and outlier analysis

[1790.3] Design and implement systems for data mining

[1790.4] Evaluate the performance of different data-mining algorithms

[1790.5] Propose data-mining solutions for different applications which enhance the employability and entrepreneurship skills.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

1. **PO1: Engineering knowledge**: : Apply the knowledge of basic science and fundamental computing in solving complex engineering problems

2. **PO2: Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **PO3: Design/development of Computing solutions**: Design solutions for complex IT engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the Information oriented public health and safety, and the cultural, societal, and environmental considerations

4. **PO4: Conduct investigations of complex problems**: Use IT domain research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

5. **PO5: Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

6. **PO6: The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

7. **PO7: Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

8. **PO8: Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

9. **PO9: Individual and team work**: Function effectively as an individual, and as a member or leader in diverse IT teams, and in multidisciplinary settings.

10. **PO10: Communication**: Communicate effectively on complex computing engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

11. **PO11:Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

12. **PO12: Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

D. PROGRAM SPECIFIC OUTCOMES

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

E. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	15
	Sessional Exam II (Closed Book)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Closed Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that	

	particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.

F. Syllabus:

Data mining: Introduction to Data mining, Types of Data, Data Mining Functionalities, Interestingness of Patterns, Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Data Warehouse, Issues, Data, Pre-processing; association rule mining and classification: Mining Frequent Patterns, Mining Various Kinds of Association Rules, Correlation Analysis, Constraint Based Association Mining, Classification and Prediction : Basic Concepts , Decision Tree, Induction , Bayesian Classification , Rule Based Classification , Support Vector Machines, Apriori algorithm, FP-Growth algorithm, Associative Classification , Lazy Learners, Other Classification Methods, Prediction; clustering and applications and trends in data mining: Cluster Analysis, Types of Data, Categorization of Major Clustering Methods: K-means, Partitioning Methods , Hierarchical Methods, Density Based Methods, Model-Based Clustering- Web Mining, Text Mining, Spatial Mining, Case study on Data mining with data sets.

G. TEXT BOOKS:

1. Data Mining: Concepts and Techniques Book by Jiawei Han

H. REFERENCES BOOKS:

1. Data Mining: Practical Machine Learning Tools and Techniques Book by Eibe Frank and Ian H. Witten

I. Lecture Plan:

LEC NO	TOPICS	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1.	Data Objects and Attribute Type	To understand basics about data mining	Lecture	1790.1	In Class Quiz End Term
2.	Basic Statistical Description of Data	To learn statistical attributes of data	Lecture	1790.1	Class Quiz Mid Term I End Term
3.	Data Pre-processing	To learn data pre-processing techniques	Lecture	1790.1	Class Quiz Mid Term 1 End term
4.	Data Cleaning and Data Integration	To learn data integration techniques	Lecture	1790.1	Home Assignment Class Quiz Mid Term 1 End Term
5.	Data Warehouse: Basic Concept	To understand basics about data warehousing	Lecture	1790.1, 1790.2	Class Quiz Mid Term 1 End Term
6.	Data Warehouse Modelling: Data Cube –Star Schema, Snow Flake Schema	To learn data warehouse modelling	Lecture	1790.1, 1790.2	Class Quiz Mid Term I End Term
7.	Data Warehouse Modelling: Dimensions, Measures & OLAP operations	To learn data warehouse modelling	Lecture	1790.1, 1790.2	Class Quiz End Term
8.	Data Warehouse Implementation: Indexing OLAP Data	To learn data warehouse implementation	Lecture	1790.1, 1790.2	Class Quiz Mid Term I End Term
9.	Data Warehouse Implementation: Efficient Processing of OLAP queries	To learn data warehouse implementation	Lecture	1790.2, 1790.3	Class Quiz Mid Term I End Term
10.	OLAP server Architecture	To understand OLAP server	Lecture	1790.1, 1790.2	Class Quiz Mid Term I End Term
11.	Data Cube Technology: Cube Materialization and Tactics	To learn data cube technique	Lecture	1790.2, 1790.3	Class Quiz Mid Term I

					End Term
12.	Data Cube Computation: Multi-way Array, BUC & Star Cubing	To learn data cube technique	Lecture	1790.2, 1790.3	Class Quiz End Term Mid Term II
13.	Frequent Item-set Mining Methods: Apriori Algorithm	To learn frequent item set mining methods	Lecture	1790.2, 1790.3	Class Quiz End Term Mid Term II
14.	Frequent Item-set Mining Methods: Generating Association Rules	To learn frequent item set mining methods	Lecture	1790.2, 1790.3	Class Quiz End Term Mid Term II
15.	Frequent Item-set Mining Methods: Mining Frequent Item-sets	To learn frequent item set mining methods	Lecture	1790.2, 1790.3	Class Quiz End Term Mid Term II
16.	Frequent Item-set Mining Methods: Mining Closed and Max Patterns	To learn frequent item set mining method	Lecture	1790.2, 1790.3	Class Quiz End Term Mid Term II
17.	Classification: Approaches to Classification	To understand classification approaches	Lecture	1790.3, 1790.4	Class Quiz End term Mid Term II
18.	Decision Tree Induction	To understand classification approaches	Lecture	1790.3, 1790.4	Class Quiz Mid Term II
19.	Decision Tree Induction	To understand classification approaches	Lecture	1790.3, 1790.4	Class Quiz Mid Term II End Term
20.	Bayes Classification Methods: Bayes Theorem	To understand classification approaches	Lecture	1790.3, 1790.4	Class Quiz Mid Term II End Term
21.	Bayes Classification Methods: Naïve Bayesian Classification	To understand classification approaches	Lecture	1790.3, 1790.4	Class Quiz Mid Term II End Term
22.	Techniques to Improve Classification Accuracy: Bagging	To understand classification approaches	Lecture	1790.3, 1790.4	Class Quiz End Term Mid Term II
23.	Boosting and Adaboost	To understand classification approaches	Lecture	1790.3, 1790.4	Class Quiz End Term Mid Term II
24.	Random Forests	To understand classification	Lecture	1790.3, 1790.4	Class Quiz

		approaches			End Term Mid Term II
25.	Bayesian Belief Network	To understand classification approaches	Lecture	1790.3, 1790.4	Class Quiz End Term
26.	Classification by Back Propagation -I	To understand classification approaches	Lecture	1790.3, 1790.4	Class Quiz End Term
27.	Classification by Back Propagation –II	To understand classification approaches	Lecture	1790.3, 1790.4	Class Quiz End Term
28.	Support Vector Machines	To understand support vector machines	Lecture	1790.3, 1790.4	In Class Quiz End Term
29.	Lazy Learners	To understand lazy learners	Lecture	1790.3, 1790.4	In Class Quiz (Not Accounted)
30.	Rough Set Approach	To understand rough set approach	Lecture	1790.4	In Class Quiz End Term
31.	Cluster Analysis	To learn cluster analysis	Lecture	1790.4	Home Assignment End Term
32.	Partitioning Methods	To understand partitioning	Lecture	1790.4	In Class Quiz End Term
33.	Hierarchical Methods-I	To understand hierarchical methods	Lecture	1790.4	Class Quiz End Term
34.	Hierarchical Methods-II	To understand hierarchical methods	Lecture	1790.4	Class Quiz End term
35.	Hierarchical Methods-III	To understand hierarchical methods	Lecture	1790.4	Home Assignment Class Quiz End Term
36.	Density Based Methods-I	To understand density based methods	Lecture	1790.4	Class Quiz End Term
37.	Density Based Methods-II	To understand density based methods	Lecture	1790.4	Class Quiz End Term
38.	Grid Based Methods	To understand grid based methods	Lecture	1790.4	Class Quiz End Term
39.	Evaluation of Clustering	To understand clustering	Lecture	1790.4, 1790.5	Class Quiz End Term
40.	Web Mining, Text Mining	To understand web and text	Lecture	1790.4, 1790.5	Class Quiz

		mining			End Term
41.	Spatial Mining	To understand mining methods	Lecture	1790.4, 1790.5	Class Quiz End Term
42.	Outliers and Outlier Analysis	To understand outliers	Lecture	1790.4, 1790.5	Class Quiz End Term
43.	Outliers Detection Methods	To understand outliers	Lecture	1790.4, 1790.5	Class Quiz End Term
44.	Proximity Based Approaches	To understand proximity based approaches	Lecture	1790.4, 1790.5	Class Quiz End Term
45.	Data Mining for Financial Data Analysis	To learn financial data analysis in data mining	Lecture	1790.4, 1790.5	Class Quiz End Term
46.	Data Mining for Intrusion Detection and Prevention	To learn security trends in data mining	Lecture	1790.4, 1790.5	Class Quiz End Term
47.	Data Mining for Visual and Audio Data	To learn data mining for visual and audio	Lecture	1790.4, 1790.5	Class Quiz End Term
48.	Revision Class-I	-	Lecture	-	Class Quiz End Term
49.	Revision Class-II	-	Lecture	-	Class Quiz End Term

J. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
1790.1	Interpret the contribution of data warehousing and data mining to the decision-support level of organizations	3	3	3	3	2							3	3	3	3	
1790.2	Categorize and carefully differentiate between situations for applying different data-mining techniques: frequent pattern mining, association, correlation, classification, prediction, and cluster and outlier analysis	3	3	3									3	3	3	2	
1790.3	Design and implement systems for data mining	3	2	3	3	3							3	3	3	3	
1790.4	Evaluate the performance of different data-mining algorithms	3	2	3		3							3	3	2	3	
1790.5	Propose data-mining solutions for different applications which enhance the employability and entrepreneurship skills.	3	2	2	3	3							3	3	3	2	

1- **Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation**

MANIPAL UNIVERSITY
JAIPUR

SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER & COMMUNICATION ENGG.
COURSE HAND-OUT

COMPILER DESIGN || CC1751|| 3 Credits|| [3 0 0 3]
Session: 2018-19 | Faculty NAME: Mr. JAYA KRISHNA R|| ELECTIVE

A. Introduction:

The objective of this course is to make students familiar with core area of Compilers which will enable students to focus on abstract models of computation. The course exposes students to the computability theory, as well as to the complexity theory. The objective is to make students familiar with the Compiler Design as well as various phases of compilation process of any source code. Throughout the semester they will learn about lexical analysis, different types of parsing techniques, code generation and optimization. The goal is to allow them to understand in detail about compilers and how works.

B. Course Outcomes: At the end of the course, students will be able to

[CC1751.1]:	The basic knowledge and concept of Compiler Design and importance of different phases of compilation hence develop employability skills.
[CC1751.2]:	Critically analyse the performances of each parser and understand compilation process
[CC1751.3]:	Construct optimized compiler using the concepts of intermediate code generation and code optimization.

C PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analysing, the B Tech CCE graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are called society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Quiz	5
	Mini project	10
	Assignments	15
	MTE1 ,MTE II(open Book)	30
End Term Exam (Summative)	End Term Exam (open Book)	40
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

E. SYLLABUS

Computability and Complexity Theory, Introduction to Compilers: Analysis of the source program, phases of a compiler; Lexical Analysis: The role of lexical analyzer, specification and recognition of tokens; Syntax Analysis: Various types of parsing, Syntax Directed Translations and Type Checking; Runtime Environments: Storage organization and allocation strategies, Intermediate code generation; Code generation: Issues in design of a code generator; Code Optimization : The principle sources of optimization, optimization of basic blocks, loops in flow graphs, efficient data flow algorithms.

F. TEXT BOOKS

1. M. Sipser, “Introduction to the Theory of Computation”, 3rd Edition, Cenage Learning, 2013.
2. A. V. Aho, M. S. Lam, R. Sethi, J. D. Ullman, "Compilers – Principles, Techniques and Tools", 2nd Edition, Pearson Education, 2007

G. REFERENCE BOOKS

1. J. Martin, “Introduction to Languages and the Theory of Computation”, 4th Edition, Tata McGraw Hill, 2010.

2. A. I. Holub, “Compiler Design in C”, Pearson Education, 2015.

H . Lecture Plan:

Sl. No.	Topic Name	Blown up Topics	No. of lectures	Mode of Delivery	Corresponding Couse outcome	Mode of Assessing the Outcome
1.	**Introduction to Compilers**	Structure of a Compiler; The Role of the Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens.	3	Lecture, Activity	**CC1751.1**	Class Quiz Mid Term I End Term
2.	**Finite Automata**	Finite Automata, From Regular Expression to Automata, Design of a Lexical-Analyzer Generator; Context-Free Grammars, Writing a Grammar	4	Lecture, Activity	**CC1751.1** **CC1751.2**	Class Quiz Mid Term I End Term
3.	**Top-Down Parsing**	Left recursion and Right recursion: Why left recursion is not acceptable, Elimination of left recursion, Left factoring and elimination of left factoring, Top down parsers and their types – an overview, Recursive Descent Parsing – may involve backtracking, Predictive Parsing – does not involve backtracking, non-recursive Predictive Parsing: Computing FIRST and FOLLOW, Construction of LL(1) parsing table to identify LL(1) grammar, LL(1) Parsing Algorithm with examples.	9	Lecture, Problem based learning, Flipped Class	**CC1751.2**	Class Quiz Mid Term I End Term
4.	**Bottom-Up Parsing**	Bottom-up parsing and its type – and Overview, Shift Reduce parsing – handle and viable prefix, Operator Precedence Parsing – Operator grammar, LR(k) parsers: LR(0) item-set construction, LR(0) parsing technique, SLR parsing technique, LR(1) item-set construction, CLR and LALR parsing technique	10	Lecture, Problem based learning, Flipped Class	**CC1751.2**	Class Quiz Mid Term I End Term

5.	**Syntax Directed Translation and Type Checking**	**Translation of Expressions:** Operations within Expressions, **Type Checking:** Rules for Type Checking, Storage Organization, Stack, Allocation of Space; Issues in the Design of a Code Generator, Target Language, Addresses in the Target Code, Basic Blocks and Flow Graphs	6	Lecture, Problem based learning, Flipped Class	**CC1751.2** **CC1751.3**	Class Quiz Mid Term I End Term
6.	**Code Optimization**	The principle sources of optimization, optimization of basic blocks, loops in flow graphs, efficient data flow algorithms.	6	Lecture, Activity	**CC1751.3**	Class Quiz Mid Term I End Term

I Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CC1751.1]:	The basic knowledge and concept of Compiler Design and importance of different phases of compilation.	2	1	1	1		1	1	1		1	1		2	1		1
[CC1751.2]:	Critically analyse the performances of each parser and understand compilation process		1	1	1	1		1						2	1		
[CC1751.3]:	Construct optimized compiler using the concepts of intermediate code generation and code optimization.		2	2	2		1			1	1	1	1	1		1	1

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

J Course Outcome Attainment Level Matrix:

CO	STATEMENT	ATTAINMENT OF PROGRAM OUTCOMES **THRESHOLD VALUE: 40%**												ATTAINMENT OF PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CC1751.1]:	The basic knowledge and concept of Compiler Design and importance of different phases of compilation hence develop employability skills.																
[CC1751.2]:	Critically analyse the performances of each parser and understand compilation process																
[CC1751.3]:	Identifying and applying appropriate technique to solve real time problems.																

0-No Attainment; 1- Low Attainment; 2- Moderate Attainment; 3- Substantial Attainment

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer & Communication Engineering
Course Hand-out

Real Time System CS 1758 | 3 Credits | 3 0 0 3

Session: 2018-19 | Faculty: Arvind Dhaka | Class: Department Elective (7th Semester)

A. Introduction The course will enable the students to get familiar with the implementation and application of real time system in various disciplines. This course is focused on abstract models of real time systems. The course exposes students to the timings constraint, deadlines, workloads, time scheduling algorithms and real time communication systems.

B. Course Objectives: At the end of the course, students will be able to

[1758.1] CO1: Analyse the need and use of Real Time System in different disciplines through it enhanced the employability.
[1758.2] CO2 Implement scheduling algorithms in real time applications
[1758.3] CO3: Implement real time scheduling uniprocessor algorithms
[1758.4] CO4: Evaluate the effect of Resource Contention and Resource sharing and Access Control (RAC)
[1758.5] CO5: Detailed understanding of real time database management systems

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

1. **PO1: Engineering knowledge**: : Apply the knowledge of basic science and fundamental computing in solving complex engineering problems

2. **PO2: Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **PO3: Design/development of Computing solutions**: Design solutions for complex IT engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the Information oriented public health and safety, and the cultural, societal, and environmental considerations

4. **PO4: Conduct investigations of complex problems**: Use IT domain research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

5. **PO5: Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

6. **PO6: The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

7. **PO7: Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

8. **PO8: Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

9. **PO9: Individual and team work**: Function effectively as an individual, and as a member or leader in diverse IT teams, and in multidisciplinary settings.

10. **PO10: Communication**: Communicate effectively on complex computing engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

11. **PO11:Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

12. **PO12: Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

D. PROGRAM SPECIFIC OUTCOMES

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

E. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	15
	Sessional Exam II (Closed Book)	15
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Closed Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	

F. SYLLABUS

Introduction to real-time systems, Modeling of a Real-Time System, Task assignment and scheduling, Resource management, Real-time operating systems, RTOS services, Programming language with real-time support, System

design techniques, Inter task communication, Fault tolerant techniques, Reliability evaluation methods; Performance analysis, Case studies of real-time systems.

G. TEXT BOOKS

1. Liu, Jane W.S., Real Time Systems, Pearson Education, 2000.
2. Laplante, Phillip A., Real-Time Systems Design and Analysis, WSE, 3rd Ed., 2004.

H. REFERENCE BOOKS

1. Li Quing, Real-Time Concepts for Embedded Systems, CMP books, paperback 2003.
2. Burns Allen and Wellings Andy, Concurrent and Real-Time Programming in ADA, Cambridge University Press, paperback 2007.

I. Lecture Plan:

S. No.	Lecture no.	Topic to be covered	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1.	L-1	Introduction	To learn basics about real time systems	Lecture	1758.1	In Class Quiz End Term
2.	L-2	Real - Time System Characteristics	To learn basic characteristics of real time systems	Lecture	1758.1	Class Quiz Mid Term I End Term
3.	L-3	Few Basic Issues	To analyse basic issues of real time systems	Lecture	1758.1	Class Quiz Mid Term 1 End term
4.	L-4	Modelling Timing Constraints	To learn timing constraints in real time systems	Lecture	1758.1	Home Assignment Class Quiz Mid Term 1 End Term
5.	L-5	Modelling Timing Constraints (Contd.)	To learn timing constraints in real time systems	Lecture	1758.1	Class Quiz Mid Term 1 End Term
6.	L-6	Basics of Real - Time Task Scheduling	To understand scheduling	Lecture	1758.1	Class Quiz Mid Term I End Term
7.	L-7	Cyclic Scheduler	To understand scheduling algorithms	Lecture	1758.1, 1758.2	Class Quiz End Term
8.	L-8	Event - Driven Scheduling	To understand scheduling algorithms	Lecture	1758.1, 1758.2	Class Quiz Mid Term 1 End Term
9.	L-9	Rate Monotonic Scheduler	To understand scheduling algorithms	Lecture	1758.1, 1758.2	Class Quiz Mid Term 1 End Term
10.	L-10	RMA Scheduling : Further Issues	To understand scheduling algorithms	Lecture	1758.1, 1758.2	Class Quiz Mid Term 1 End Term

11.	L-11	Deadline Monotonic Scheduling and Other Issues	To understand scheduling algorithms	Lecture	1758.1, 1758.2, 1758.3	Class Quiz Mid Term 1 End Term
12.	L-12	Few Issues in Use of RMA	To understand issues in scheduling algorithms	Lecture	1758.3	Class Quiz End Term Mid Term II
13.	L-13	Resource Sharing Among Real-Time Tasks	To understand resource sharing	Lecture	1758.3	Class Quiz End Term Mid Term II
14.	L-14	Highest Locker and Priority Ceiling Protocols	To understand priority protocols	Lecture	1758.3	Class Quiz End Term Mid Term II
15.	L-15	An Analysis of Priority Ceiling Protocol	To understand priority protocols	Lecture	1758.3	Class Quiz End Term Mid Term II
16.	L-16	Handling Task Dependencies	To understand task dependencies	Lecture	1758.3	Class Quiz End Term Mid Term II
17.	L-17	Real-Time Task Scheduling on Multiprocessors and Distributed Systems	To understand scheduling algorithms	Lecture	1758.3, 1758.4	Class Quiz End term Mid Term II
18.	L-18	Real-Time Task Scheduling on Multiprocessors and Distributed Systems (Contd.)	To understand scheduling algorithms in distributed systems	Lecture	1758.3, 1758.4	Class Quiz Mid Term II
19.	L-19	Clock Synchronization in Distributed Real-Time Systems	To understand clock synchronization in real time systems	Lecture	1758.3, 1758.4	Class Quiz Mid Term II End Term
20.	L-20	Internal Clock Synchronization in Presence of Byzantine Clocks	To understand clock synchronization in real time systems	Lecture	1758.4	Class Quiz Mid Term II End Term

21.	L-21	A Few Basic Issues in Real-Time Operating Systems	To understand basic issues in real time systems	Lecture	1758.4	Class Quiz Mid Term II End Term
22.	L-22	MCQ Based Quiz	-	Lecture	1758.4	Class Quiz End Term Mid Term II
23.	L-23	A Few Basic Issues in Real-Time Operating Systems (Contd.)	To understand basic issues in real time systems	Lecture	1758.4	Class Quiz End Term Mid Term II
24.	L-24	Unix and Windows as RTOS	To learn operating systems as real time system	Lecture	1758.4	Class Quiz End Term Mid Term II
25.	L-25	Real - Time POSIX	To learn POSIX as real time system	Lecture	1758.4	Class Quiz End Term
26.	L-26	Real - Time POSIX (Contd.)	To learn POSIX as real time system	Lecture	1758.4	Class Quiz End Term
27.	L-27	Open Source and Commercial RTOS	To learn commercial real time system	Lecture	1758.4	Class Quiz End Term
28.	L-28	Open Source and Commercial RTOS (Contd.)	To learn commercial real time system	Lecture	1758.4	Class Quiz End Term
29.	L-29	Benchmarking Real - Time Computer & Operating Systems	To learn commercial real time system	Lecture	1758.4	In Class Quiz (Not Accounted)
30.	L-30	Benchmarking Real - Time Computer & Operating Systems (Contd.)	To learn commercial real time system	Lecture	1758.4, 1758.5	In Class Quiz End Term
31.	L-31	Real - Time Communications	To understand real time communication	Lecture	1758.4, 1758.5	Home Assignment End Term

32.	L-32	Few Basic Issues in Real - Time Communications	To understand basic issues in real time systems	Lecture	1758.4, 1758.5	In Class Quiz End Term
33.	L-33	Review of Computer Networking	To understand computer networking	Lecture	1758.4, 1758.5	Class Quiz End Term
34.	L-34	Real - Time Communication in a LAN	To understand computer networking	Lecture	1758.4, 1758.5	Class Quiz End term
35.	L-35	Real - Time Communication in a LAN (Contd.)	To understand computer networking	Lecture	1758.4, 1758.5	Home Assignment Class Quiz End Term
36.	L-36	Performance of Two Real -Time Communication Protocols	To understand real time communication in networks	Lecture	1758.4, 1758.5	Class Quiz End Term
37.	L-37	Real - Time Communication over Packet Switched Networks	To understand real time communication in networks	Lecture	1758.4, 1758.5	Class Quiz End Term
38.	L-38	Real - Time Communication over Packet Switched Networks (Contd.)	To understand real time communication in networks	Lecture	1758.4, 1758.5	Class Quiz End Term
39.	L-39	Real - Time Communication over Packet Switched Networks (Contd.)	To understand real time communication in networks	Lecture	1758.4, 1758.5	Class Quiz End Term
40.	L-40	Real - Time Databases	To learn real time databases	Lecture	1758.4, 1758.5	Class Quiz End Term

J. Course Articulation Matrix: (Mapping of COs with POs and PSOs)

	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
CO STATEMENTS	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**	**PSO4**
[1758.1]: CO1: Analyse the need and use of Real Time System in different disciplines through it enhanced the employability.	**3**	**3**			**3**	**3**						**3**	3	3	3	
[1758.2]: CO2: Understand the parameters affecting the Real Time System including timing constraints, deadlines, Temporal Parameters of Real Time Workload, etc	**3**	**3**											3	3	2	
[1758.3] : CO3 : Implement real time scheduling algorithms	**3**	**3**	**3**										3	3	2	
[1758.4]: CO4: Evaluate the effect of Resource Contention and Resource Access Control (RAC)	**3**	**3**						**3**	**2**	**3**		**3**	3	3	2	
[1758.5]: CO5: Detailed understanding of real time communication systems	**3**	**3**								**2**	**2**		3	3	3	

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY
JAIPUR

SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER & COMMUNICATION ENGG.
COURSE HAND-OUT

NETWORK SECURITY LAB || CC1730|| 1 Credits|| [0 0 2 1]
Session:2018-19 | Faculty NAME: Dr.ARJUN SINGH/ Mr. GAURAV PRASAD|| CORE

A. Introduction:

This course is meant to offer to computer & communication engineering undergraduate students in their seventh semester to have a broad overview of the field of security. Students will learn the basic concepts in security like security attacks, scanning, analysis and defence, networking and wireless security with cryptography. Students will also learn the fundamental methodology for how to design and analyse security critical systems.

B. Course Outcomes: At the end of the course, students will be able to

[CC1730.1]:	Identify basic factors driving the need for network security and identify physical points of vulnerability in simple networks
[CC1730.2]:	Identify and perform different attacks and their mitigation techniques.
[CC1730.3]:	Use of software tools for performing scanning, attack and to mitigate the attacks, hence develop employbility skills.
[CC1730.4]:	To identify the depth of the problem and to propose the solution.
[CC1730.5]:	Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack.

C PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analysing, the B Tech CCE graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are called society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Weekly evaluation (record+execution+viva)	35
	Mini project	35
End Term Exam (Summative)	End Term Exam	30
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

E. SYLLABUS

Implementation of Symmetric Key Algorithms: SDES, DES, AES; Implementation of Asymmetric Key Algorithms: RSA, Elgamal; Implementation of Key Management Algorithms: Diffie Helman, Certification Authority; Implementation of Security Protocols: Mutual Authentication, Digital Signature, Hash Functions, MAC; Open Source Security Tools: Wireshark, Ethercap, Penetration Testing tools; Mini project Implementation.

F TEXT BOOK

T1. W. Stallings, "Cryptography and Network Security Principles and Practice", 6th Edition, Pearson Education, 2014

G REFERENCE

R1. D. Hook, “Beginning Cryptography with Java”, 1st Edition, John Wiley & Sons, 2005.

H . Lecture Plan

Lec No	**Topics**	**Session Outcome**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing the Outcome**
1-2	Introduction and Course Hand-out briefing	To acquaint and clear teachers expectations and understand student expectations	Lecture	NA	NA
3-6	Nmap Tool Dump Sec tool.	To perform Port scanning using NMAP and to find the following • Open ports on a system • Find the machines which are active • Find the version of remote OS on other systems • Find the version of s/w installed on other system • Active and passive finger printing	Lecture Demonstration	CC1730.1 CC1730.2 CC1730.3	Internal Evaluation
7-9	Intrusion Detection System Firewall	• Demonstrate INTRUSION DETECTION SYSTEM (IDS) using snort or any other software. • Setup a HONEY POT and monitor the HONEYPOT on network.	Demonstration	CC1730.1 CC1730.2 CC1730.3	Internal Evaluation Project End Sem Exam
10-14	Asymmetric, Symmetric Encryption Wireshark	Learn the configuration of JCRYPT tool (or any other equivalent) and demonstrate asymmetric, symmetric crypto algorithm, hash and DIGITAL/PKI signatures	Lecture Demonstration	CC1730.4 CC1730.5 CC1730.2 CC1730.3	Internal Evaluation Project End Sem Exam

I Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CC1730.1]:	Identify basic factors driving the need for network security and identify physical points of vulnerability in simple networks	1		1	1					1		1		2			1
[CC1730.2]:	Identify and perform different attacks and their mitigation techniques.	1	1	1	1	2	1			1					1		
[CC1730.3]:	Use of software tools for performing scan-ning, attack and to mitigate the attacks, hence develop employbility skills.	1	1		1	2		1	1	1		1		1		1	1
[CC1730.4]:	To identify the depth of the problem and to propose the solution.	1	1	1	1	2	1	1	1		1	1		1	2	2	1
[CC1730.5]:	Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack.	1		1				1	1			1		1	1	1	

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY
JAIPUR

SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER & COMMUNICATION ENGG.
LAB COURSE HANDOUT

MACHINE LEARNING LAB || CC1731|| 1 Credits|| [0 0 2 1]
Session: 2018-19 Faculty NAME: Dr. SANDEEP CHAURASIA / Mr. NITESH PRADHAN|| CORE

A. Introduction:

This course will serve as a comprehensive introduction to various topics in machine learning. At the end of the course, the students should be able to design and implement machine-learning solutions to classification, regression, and clustering problems; and be able to evaluate and interpret the results of the algorithms.

B. Course Outcomes: At the end of the course, students will be able to

[CC1731.1]:	Identify the tool & libraries to implement fundamental principles and concepts of Machine Learning.
[CC1731.2]:	Identify and perform different classification techniques and their optimization techniques.
[CC1731.3]:	Identify and perform different regression techniques and their optimization techniques.
[CC1731.4]:	To identify the depth of the problem and to propose the solution by applying the algorithm on realistic data.
[CC1731.5]:	To gain experience of doing independent study and research.

C PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analysing, the B Tech CCE graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are called society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Weekly evaluation (record+execution+viva)	50
	Mini project	20
End Term Exam (Summative)	End Term Exam	30
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

E. SYLLABUS

Introduction: Introduction and applications of machine learning; Supervised learning: perceptron network, multiple Adaptive linear neuron, Back propagation network. Gaussian discriminant analysis, Naive Bayes, Support vector machine, KNN algorithm, basic/variance tradeoff, linear regression and feature selection; Neural network: forward/backward network, Deep learning; Unsupervised learning: clustering, K-means algorithm, Kohonen self-organizing map.

F Text Book:

1. M. Mohri, A. Rostamizadeh, A. Talwalker, “Foundations of Machine Learning”, MIT Press, Cambridge, MA, 2012.
2. T.M. Mitchell, “Machine learning”, 1 st Indian Edition, McGraw-Hill India, 2013

G Reference Book(s):

1. T. Hastie, R. Tibshirani, J. Friedman, “The Elements of Statistical Learning”, 2nd Edition, Springer, 2009.
2. C.M. Bishop, “Pattern Recognition and Machine Learning”, 1st Edition, Springer Verlag, 2010.
3. S.N. Sivanandam, S.N. Deepa, “Principles of Soft Computing”, 2nd Edition, Wiley, 2011

H . Lecture Plan

Lec No	**Topics**	**Session Outcome**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing the Outcome**
1	Introduction and Course Hand-out briefing	To acquaint and clear teachers expectations and understand student expectations	Lecture	NA	NA
2-3	Scikit python library Pandas & numpy library	1. Write a program to Load Machine Learning Data How to load a CSV file. • How to convert strings from a file to floating point numbers. • How to convert class values from a file to integers.	Lecture Demonstration	CC1731.1 CC1731.2	Internal Evaluation
4-5	Pre-processing of data Resampling Methods Machine Learning Algoithm Performance Metrics	2. Write a program to scale Machine Learning Data • How to normalize your data from scratch. • How to standardize your data from scratch. • When to normalize as opposed to standardize data • How to implement a train and test split of your data. • How to implement a k-fold cross validation split of your data.	Demonstration	CC1731.1 CC1731.2	Internal Evaluation Lab Assessment 1
6-7	Simple Linear Regression Implement the Perceptron Algorithm Implement Linear Regression with Stochastic Gradient Descent	• How to estimate statistical quantities from training data. • How to estimate linear regression coefficients from data. • How to make predictions using linear regression for new data. • How to train the network weights for the Perceptron. • How to make predictions with the Perceptron. • How to implement the Perceptron algorithm for a real-world classification problem. • How to estimate linear regression coefficients using stochastic gradient descent.	Lecture Demonstration	CC1731.4 CC1731.5 CC1731.2 CC1731.3	Internal Evaluation Lab Assessment 2

		• How to make predictions for multivariate linear regression. • How to implement linear regression with stochastic gradient descent to make predictions on new data.			
8-12	Implement Logistic Regression with Stochastic Gradient Descent implement the Backpropagation Algorithm implement Decision Tree Algorithm implement k-Nearest Neighbours implement Naive Bayes	• How to train the network weights for the classifier. • How to make predictions with different classifier • How to implement the various classifiers	Lecture Demonstration		Internal Evaluation Project
13	Final Lab Examination	•			Lab Evaluation

I Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CC1731.1]:	Identify the tool & libraries to implement fundamental principles and concepts of Machine Learning.		1		1	1				1		1		2			1
[CC1731.2]:	Identify and perform different classification techniques and their optimization techniques.	1	1		1	1	1			1	1				1		
[CC1731.3]:	Identify and perform different regression techniques and their optimization techniques.	1	1	1	1	1	1				1	1		1		1	1
[CC1731.4]:	To identify the depth of the problem and to propose the solution by applying the algorithm on realistic data.	1	1		1	1		1						1	2	2	1
[CC1731.5]:	To gain experience of doing independent study and research.		1	1			1	1		1		1		1	1	1	

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY JAIPUR

School of Computing and IT

Department of Computer and Communication Engineering
Course Hand-out

Introduction to IoT| CC1791| 3 Credits | 3 0 0 3

Session: 2018-19 | Faculty: Vidyadhar Aski | Class: Open Elective (V/VII Sem)

A. Introduction: Internet of Things (IoT) is presently a hot technology worldwide. Government, academia, and industry are involved in different aspects of research, implementation, and business with IoT. IoT cuts across different application domain verticals ranging from civilian to defence sectors. These domains include agriculture, space, healthcare, manufacturing, construction, water, and mining, which are presently transitioning their legacy infrastructure to support IoT. Today it is possible to envision pervasive connectivity, storage, and computation, which, in turn, gives rise to building different IoT solutions. IoT-based applications such as innovative shopping system, infrastructure management in both urban and rural areas, remote health monitoring and emergency notification systems, and transportation systems, are gradually relying on IoT based systems. Therefore, it is very important to learn the fundamentals of this emerging technology.

B. Course Objectives: At the end of the course, students will be able to

[1791.1]. Describe the need of upgrading interconnectivity of objects from M2M communication to Internet of Things.

[1791.2]. Interpret and illustrate the formation of different devices that are used for measuring parameters of any physical object and store the data storage unit using communication protocols.

[1791.3]. Design an application on Microcontrollers, wireless modules and wireless sensors and integrating a mobile application with the system for monitoring and controlling purpose.

[1791.4]. Describe the problem statement, sensors requirement and Microcontroller selection on real life problems in the field of Home automation, Industrial automation, environmental monitoring and healthcare sectors.

[1791.5]. Design sensors based applications and interface sensors to electronic data processing units to demonstrate application based approach in healthcare, industry, home automation, safety and vehicles.

C. Program Outcomes and Program Specific Outcomes

[PO.1]. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems

[PO.2]. **Problem analysis**: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health

and safety, and the cultural, societal, and environmental considerations

[PO.4]. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

[PO.5]. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding

of the
limitations

[PO.6]. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

[PO.8]. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

[PO.9]. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings

[PO.10]. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

[PO.11]. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

[PO.12]. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

[PSO.1] Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

[PSO.2] Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

[PSO.3] Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

[PSO.4] Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	15
	Sessional Exam II (Close Book)	15
	In class Quizzes and Assignments, video assignment and Project	30
End Term Exam (Summative)	End Term Exam (Close Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses the class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	

E. Syllabus

Introduction to IoT: Sensing, Actuation, M2M to IoT, Basics of Networking, Characteristics;

Architecture of IoT: Sensors, Mobile application development, IoT hardware (IoT sensors, wearable devices, standard devices), IoT software; **Introduction to Arduino programming**: Arduino microcontroller, GPIOs, Wireless data transmission. Embedded C programming introduction, Basic application development with Arduino**; Introduction to Wireless modules**: Wifi, Bluetooth, Zigbee, Infrared communication modules; **Applications of IoT:** Healthcare IoT, Industrial IoT, Smart cities, Government, safety, Smart home, Environmental monitoring, Vehicular IoT.

F. Text Books:

T1. J. Holler, V. Tsiatsis, C. Mulligan, S. Avesand, S. Karnouskos, D. Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.

G. Reference Book:

R1. V. Madisetti, A. Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014.

R2. F. daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013

H. Lecture Plan:

Lec No	**Topics**	**Session Outcome**	**Mode of Delivery**	**Corresponding CO**	**Mode of Assessing the Outcome**
1	Introduction and Course Hand-out briefing	To acquaint and clear teachers expectations and understand student expectations	Lecture	NA	NA
2,3	IoT – Introduction	Recall Embedded systems, components of microcontroller and describe need for IoT.	Lecture	1791.1	In Class Quiz (Not Accounted)
4,5	Sensing, actuation	Identify different physical parameters that can be sensed, activated and respective sensors are connected to an MCU	Lecture	1791.1	In Class Quiz End Term
6,7	Basics of networking	Explain and recall the basic communication protocol and their layers.	Lecture	1791.1	Home Assignment End Term
8	Communication Network Characteristics	Recall characteristics of TCP IP protocol and communication layers	Lecture	1791.2	In Class Quiz End Term
9,10	Architecture of IoT	Understand different phases of an IoT architecture like Data acquisition system, Internet gateways and cloud data centres	Lecture	1791.2	Class Quiz Mid Term I End Term
11	Sensors and actuators	Recall Sensing, sensor technology and wireless sensor area network	Lecture	1791.2	Class Quiz Mid Term I End term
12	Mobile application development	Introduction to basic android development with snippets of a hello android.	Lecture	1791.2	Home Assignment Class Quiz Mid Term I End Term
13	IoT hardware	Briefing the IoT sensors, wearable devices, standard devices	Lecture	1791.2	Class Quiz Mid Term I End Term
14	IoT software	Understand design principles of web communication protocols for connected devices	Lecture	1791.2	Class Quiz Mid Term I End Term
15	Introduction to Arduino programming	Recall Microcontrollers and Microprocessor introduction and their differences	Lecture	1791.2	Class Quiz End Term
16,17	Arduino Microcontroller and Architecture	Understand the basic architecture of Arduino microcontroller with description of Pin.	Lecture	1791.3	Class Quiz Mid Term II End Term

18	Arduino GPIOs	Understand the basic architecture of Arduino microcontroller with description of Pin.	Lecture, Activity	1791.3	Class Quiz Mid Term II End Term
19,20	Wireless data transmission	Understand different types of wireless communication modules and interfacing with Arduino	Lecture, Activity	1791.3	Class Quiz Mid Term II End Term
21	Embedded C programming introduction	Recall C programming language and basic programs in C language.	Lecture	1791.4	Class Quiz Mid Term II End Term
22,23	Basic application development with Arduino	Design some analog and digital read write Arduino application development	Lecture	1791.4	Class Quiz End Term
24	Introduction to Wireless modules	Describe the working of wireless protocol	Lecture	1791.4	Class Quiz End Term
25	WiFi	Describe the working of wireless protocol	Lecture	1791.4	Class Quiz End Term
26	Bluetooth	Describe the working of wireless protocol	Lecture	1791.4	Class Quiz End Term
27	Zigbee	Describe the working of wireless protocol	Lecture	1791.5	Class Quiz End Term
28,29	Infrared communication modules	Describe the working of wireless protocol	Lecture	1791.5	Class Quiz End term
30	Applications of IoT	Describe the broader application areas of IoT	Lecture	1791.5	Class Quiz
31,32	Healthcare IoT	Identify different biomedical parameters and sensors and design an application	Lecture	1791.5	Class Quiz Mid Term II End Term
33	Industrial IoT	Explain the need for industrial IoT	Lecture	1791.5	Class Quiz Mid Term II End Term
34	Industry 4.0 technologies	Explain the need for industrial IoT and automation	Lecture	1791.5	Class Quiz Mid Term II End Term
35	Smart cities	Understand Smart city application design and development	Lecture	1791.5	Class Quiz End Term
36	Government	Understand IoT empowered government projects	Lecture	1791.5	Class Quiz End Term
37	Safety	Understand integration of IoT in safety application	Lecture	1791.5	Class Quiz End Term
38	Smart Home	Understand integration of IoT in smart home application	Lecture	1791.5	Class Quiz End Term
39	Environmental monitoring	Describe environmental sensors and their application	Lecture	1791.5	Class Quiz End Term

40	Vehicular IoT	Describe IoT application for different vehicles	Lecture	1791.5	Class Quiz End Term
41	Conclusion and Course Summarization	NA	NA		NA

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSo4
CC 1791.1	Describe the need of upgrading interconnectivity of objects from M2M communication to Internet of Things.		2						1		2			2		1	
CC 1791.2	Interpret and illustrate the formation of different devices that are used for measuring parameters of any physical object and store the data storage unit using communication protocols.		2	2				2				2		2	1		2
CC 1791.3	Demonstrate an experimentation on Microcontrollers, wireless modules and wireless sensors and integrating a mobile application with the system for monitoring and controlling purpose.	1			2	2										1	
CC 1791.4	Identify the problem statement, sensors requirement and Microcontroller selection on real life problems in the field of Home automation, Industrial automation, environmental monitoring and healthcare sectors.						2		2				2				
CC 1791.5	Fabricate sensors and electronic data processing units to create and application based approach in healthcare, industry, home automation, safety and vehicles.			1			2			1				2			2

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

MANIPAL UNIVERSITY
JAIPUR

SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER & COMMUNICATION ENGG.
COURSE HAND-OUT

MAJOR PROJECT || CC1882|| 12 Credits|| [0 0 24 12]
Session: 2018-19

A. Introduction:

In this practical course, each student is expected to design and develop practical solutions to real life problems related to industry, institutions and computer science research. Software life cycle should be followed during the development. The theoretical knowledge, principles and practices gained from various subjects would be applied to develop effective solutions to various computing problems. The knowledge gained to work with various software tools, Designing tools, programming languages, operating systems, etc. would be utilized in various stages of project. Structured/ Object Oriented design techniques may be used for the project. Software Requirements Specification (SRS), Modeling Techniques, Design and Testing strategies would be part of document of the work. A committee consisting of minimum three faculty members shall perform internal assessment of the minor projects. A report on minor project would be submitted for evaluation, Project work would be presented and demonstrated before the panel of examiners.

B. Course Outcomes: At the end of the course, students will be able to

[CC1882.1]:	Identify the basics of the concepts related to the selected topic of the project and also identify the open issues
[CC1882.2]:	To identify the depth of the problem and propose the solution
[CC1882.3]:	Solve real time problems and contribute to open community with ethical values by undergoing systematic study and to communicate the proposed solution
[CC1882.4]:	Work in team with proper contribution from individuals and managing the project with lifelong learning hence the chances the employability increased.

C PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analysing, graduate should be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are called society builders and transformers. B. Tech CCE graduate should be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE should understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student should be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student should be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Progress I	30
	Progress II	40
End Term Exam (Summative)	End Term Exam	30
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

I Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CC1882.1]	Identify the basics of the concepts related to the selected topic of the project and also identify the open issues	2	2		2									2	2	1	1
[CC1882.2]	To identify the depth of the problem and to propose the solution		1	1	1											1	1
[CC1882.3]	Solve real time problems and contribute to open community with ethical values by undergoing systematic study and to communicate the proposed solution	1	1	1	1	3									1		
[CC1882.4]	Work in team with proper contribution from individuals and managing the project with lifelong learning					1	1		1								

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation

Course Outcome Attainment Level Matrix:

CO	STATEMENT	ATTAINMENT OF PROGRAM OUTCOMES **THRESHOLD VALUE: 40%**												ATTAINMENT OF PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CC1882.1]	Identify the basics of the concepts related to the selected topic of the project and also identify the open issues																
[CC1882.2]	To identify the depth of the problem and to propose the solution																
[CC1882.3]	Solve real time problems and contribute to open community with ethical values by undergoing systematic study and to communicate the proposed solution																
[CC1882.4]	Work in team with proper contribution from individuals and managing the project with lifelong learning																

0-No Attainment; 1- Low Attainment; 2- Moderate Attainment; 3- Substantial Attainment

MANIPAL UNIVERSITY JAIPUR

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SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY

DEPARTMENT OF COMPUTER & COMMUNICATION ENGG.
COURSE HAND-OUT

Minor Project: CC1634 || 3 Credits||3 0 0 3

Session: JAN 19 – MAY 189 | Faculty Name: Dr. Punit Gupta Class: Core

A. **Introduction:** In this practical course, each group consisting of two/three members is expected to design and develop practical solutions to real life problems related to industry, institutions and computer science research. Software life cycle should be followed during the development. The theoretical knowledge, principles and practices gained from various subjects would be applied to develop effective solutions to various computing problems. The knowledge gained to work with various software tools, Designing tools, programming languages, operating systems, etc. would be utilized in various stages of project. Structured/ Object Oriented design techniques may be used for the project. Software Requirements Specification (SRS), Modeling Techniques, Design and Testing strategies would be part of document of the work. A committee consisting of minimum three faculty members shall perform internal assessment of the minor projects. A report on minor project would be submitted for evaluation, Project work would be presented and demonstrated before the panel of examiners.

B. **Course Outcomes:** At the end of the course, students will be able to

[CC1634.1]: Identify the basic of the concepts related to the selected topics of the project and also identify the open issues.

[CC1634.2]: To identify the depth of the problem and to propose the solution.

[CC1634.3]: Use of software tools for analysis, reporting and implementation.

[CC1634.4]: Solve real time problem and contribute to open community with ethical values by understanding systematic study.

[CC1634.5]: Work in team with proper contribution from individual and managing lifelong learning.

C. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, computer science, and communication engineering fundamentals to the solution of complex engineering problems.

PO2. **Problem analysis**: The sophisticated curriculum would enable a graduate to identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using basic principles of mathematics, computing techniques and communication engineering principles.

PO3. **Design/development of solutions**: Upon analysing, the B Tech CCE graduate will be able to devise solutions for complex engineering problems and design system components or processes that meet the specified requirements with appropriate consideration for law, safety, cultural & societal obligations with environmental considerations.

PO4. **Conduct investigations of complex problems**: To imbibe the inquisitive practices to have thrust for innovation and excellence that leads to use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: The engineers are called society builders and transformers. B. Tech CCE graduate will be able to apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: The zero effect and zero defect is not just a slogan, it is to be practised in each action. Thus a B Tech CCE will understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Protection of IPR, staying away from plagiarism are important. Student will be able to apply ethical principles and commit to professional ethics, responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: United we grow, divided we fall is a culture at MUJ. Thus an outgoing student will be able to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively for all engineering processes & activities with the peer engineering team, community and with society at large. Clarity of thoughts, being able to comprehend and formulate effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in varied environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes (PSOs)

At the end of the B Tech CCE program, the student:

PSO1. Should be able to clearly understand the basic principles, concepts and applications in the field of computer based Communication/networking, information sharing, signal processing, web based systems, smart devices and communication technology.

PSO2. Should be able to nail down the issues prevalent in the field of Computer and Communication Engineering.

PSO3. Should be able to identify the existing open problems in the field of computing and propose the best possible solutions.

PSO4. Should be able to apply the contextual knowledge in the field of computing and communication to assess social, health, safety and cultural issues and endure the consequent responsibilities relevant to the professional engineering practice.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	I progress Presentation	15
	II progress Presentation	15
	Guide Marks	30
End Term Exam (Summative)	End Term Exam (Open Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	

E. Execution Plan:

S. No	Month	Phase	Outcome/Deliverable	Assessment
1	First	Problem Identification and Requirement Analysis	SRS cum Detail Design Document	Continuous Assessment-I
2	Second	Design and Implementation	Project Version 1.0	Continuous Assessment-II

3	Third	Testing and Debugging	Project final Version	Continuous Assessment-III
4	Fourth	Presentation and Report Writing	Report	Final Assessment

F. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
[CC1634.1]:	Identify the basic of the concepts related to the selected topics of the project and also identify the open issues.	2	2		2									2	2	1	1
[CC1634.2]:	To identify the depth of the problem and to propose the solution.		1	1	1											1	1
[CC1634.3]:	Solve real time problem and contribute to open community with ethical values by understanding systematic study.	1	1	1	1	3									1		
[CC1634.4]:	Design and execute the web based solutions pertaining to any real life need.				1	1		1									
[CC1634.5]:	Work in team with proper contribution					1	1		1	1	1	1	1				

	from individual and managing lifelong learning.																

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[CC1634.2]:	To identify the depth of the problem and to propose the solution.		1	1	1											1	1
[CC1634.3]:	Solve real time problem and contribute to open community with ethical values by understanding systematic study.	1	1	2	1	3		3		2					1		
[CC1634.4]:	Design and execute the web based solutions pertaining to any real life need.				1	1		1									
[CC1634.5]:	Work in team with proper contribution					1	1		1	1	1	2	1	1			

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