



MANIPAL UNIVERSITY JAIPUR

School of Basic Sciences
Department Of Computer Application

PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES Bachelor of Computer Application

PROGRAM OUTCOMES

- [PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
- [PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
- [PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings 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.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
- [PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
- [PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
- [PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

PROGRAM SPECIFIC OUTCOMES

- [PSO.1]. Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other computer application areas to acquire knowledge in various domain-based prospects.
- [PSO.2]. Encourage to communicate effectively and to improve their competency skills to solve real time problems.
- [PSO.3]. Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies.

PROGRAM ARTICULATION MATRIX											
SEMESTER	COURSE CODE	PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES									
		Po 1	Po 2	Po 3	Po 4	PO 5	Po 6	PO 7	PSO 1	PSO 2	PSO 3
I	MA 1102	2	2	-	3	2	2	3	-	1	-
	CA 1101	3	3	3	2	1	-	1	1		
	CA 1102	2	3	2	3	1	3	3	1		
	CA 1103	3	3	3	2	1	1	1	.		-
	LN 1108	3	3	-	-	-	-	-	-	-	1
II	MA 1202	2	2	2	-	2	-	2			
	CM 1229	3	3	3	2	1	-	1	1		
	CA 1201	3	2	1	-	-	1	-			-
	CA 1202	3	1		-	-	-	-	1	-	-
	CA 1203	1	1	-	-	-	-	-			
III	MA1322	2	-	-	1	1	-	-	1	2	1
	CA 1301		3	3	3	3	3	-	-	-	3
	CA 1302		2	2	2	-	1	1	1		
	CA 1303	3	3	2	-	2	2		3		1
	CA 1304	3	3	3	-	-	-	-	2		
IV	MA 1422	2	2	-	3	2	2	3	-	1	-
	CA 1401	3	3	3	2	1	-	1	1		
	CA 1402	2	3	2	3	1	3	3	1		
	CA 1403	3	3	3	2	1	1	1	.		-
	CA 1404	3	3	-	-	-	-	-	-	-	1
V	CA 1501	2	2	2	-	2	-	2			
	CA 1502	3	3	3	2	1	-	1	1		
	CA 1503	3	2	1	-	-	1	-			-
	CA 1504	3	1		-	-	-	-	1	-	-
	CA 1505	1	1	-	-	-	-	-			
VI	CA 1601	2	-	-	1	1	-	-	1	2	1
	CA 1602		3	3	3	3	3	-	-	-	3
	CA 1603		2	2	2	-	1	1	1		
	CA 1604	3	3	2	-	2	2		3		1
	CA 1605	3	3	3	-	-	-	-	2		



MANIPAL UNIVERSITY JAIPUR

School of Basic Sciences

Department of Computer Applications

Course Hand-out

COMPUTER FUNDAMENTALS| CA 1101 | 4 Credits | 3 | 0 4

Session: July 2019 – November-2019| Faculty: Dr. Pradeep Kumar Tiwari | Class: Department Core Course

- A. Introduction:** The present era is evolving around computing devices. The one who is lacking the knowledge of computing devices is considered as illiterate. There for this course is targeted to bring awareness and knowledge of various computing devices and accessories. The main objectives of the course are as follows:
- Identify the main system elements of a computer system and describe their function.
 - Describe the main hardware components of a Personal Computer.
 - Describe the main software elements of a computer system.
 - Introduction to Operation Systems.

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

CO1:CA1101.1To understand basic elements of the computer system and to bring awareness about their functionality.

CO2:CA1101.2 To understand the hardware component of computer and its basic function.

CO3: CA1101.3To describe the main Software category and its utility.

CO4: CA1101.4 To Understand the types and function of Operating System.

CO5: CA1101.5To understand the programming languages: Machine Language, Assembly language, High level language. Assembler, Compilers and Interpreter.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

- PO.1: Critical Thinking:** Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
- PO.2: Effective Communication:** Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology
- PO.3: Social Interaction:** Elicit views of others, mediate disagreements and help reach conclusions in group settings
- PO.4: Effective Citizenship:** Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
- PO.5: Ethics:** Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them
- PO.6: Environment and Sustainability:** Understand the issues of environmental contexts and sustainable development.
- PO.7: Self-directed and Life-long Learning:** Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

PROGRAM SPECIFIC OUTCOMES

- PSO.1:** Prepare professionally trained in the areas of programming, databases, software engineering, web-designing and networking and other computer application areas to acquire knowledge in various domain-based prospects
- PSO.2:** Encourage to communicate effectively and to improve their competency skills to solve real time problems
- PSO.3:** Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	20
	Sessional Exam II (Closed Book)	20
	In class Quizzes and Written Assignments , Activity feedbacks (Accumulated and Averaged)	20
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: Basic Definitions, Data, information, bits, byte, software, hardware, memory, Characteristics of a computer. Block diagram of a computer. Generation of Computers, Types of Computers, Memory and its types, Input Devices, Output Devices, Monitors Characteristics, Digital and Analog signals. Video Standard: VGA, SVGA, Types of printer, Storage Devices: Primary Vs Secondary memory, Storage Fundamentals, Data Storage and Retrieval Methods, Various Storage Devices. Types of software: System Software, Application Software. Operating Systems: types and functions. Programming Languages: Machine Language, Assembly language, High level language. Assembler, Compilers and Interpreter. Introduction to MS-Office.

F. TEXT BOOKS

1. S.K. Basanadra, Computers Today, Galgotia Publications, (1e) 2010.
2. P.K. Sinha, P. Sinha, Computer Fundamentals, (6e), BPB Publications, 2007.
3. A. Leo, M. Leon, Introduction to Computers, (1e), Vikas Publishing House, 2009.

G. Lecture Plan:

Lec No	Major Topics	Topic	Session Outcome	Mode of Delivery	Corresponding CO	Mode Assessing of the Outcome
1	Computer Fundamentals	Basic Definitions	Introduction e of Computer	Lecture & Discussion	1101.1	In Class Quiz Mid Term I End Term
2		Data, information, bits, byte	Understand the Knowledge of Memory Size	Lecture & Discussion	1101.1 1101.2	In Class Quiz Mid Term I End Term
3		Software and Hardware	Understand the difference between Hardware and Software	Lecture & Discussion	1101.2	In Class Quiz Mid Term I End Term
4		Characteristics of a computer	Understand Characteristics of a computer	Lecture & Discussion	1101.1 1101.2	In Class Quiz Mid Term I End Term
5		Generation of Computers	Understand Generation of Computers	Lecture & Discussion	1101.1	In Class Quiz Mid Term I End Term
6-7		Types of Computers	Compare the different types of computers	Lecture & Discussion	1101.1	In Class Quiz Mid Term I End Term
8-9	Input Devices, Output Devices	Input Devices, Output Devices	Understand difference between Input Devices, Output Devices	Lecture & Discussion	1101.1 1101.2	In Class Quiz Mid Term I End Term
10		Monitors Characteristics	Understand Monitors Characteristics	Lecture & Discussion	1101.1 1101.2	In Class Quiz Mid Term I End Term
11		Digital and Analog signals	Compare the Digital and Analog signals	Lecture & Discussion	1101.1	In Class Quiz Mid Term I End Term

12			Understand the Video Standard: VGA, SVGA	Lecture & Discussion	1101.1	In Class Quiz Mid Term I End Term
13		Video Standard: VGA, SVGA				
		Types of printer	Understand and Compare Types of printer	Lecture & Discussion	1101.1	In Class Quiz Mid Term I End Term
14	Computer Memory	Memory and its types	Understand Memory and its types	Lecture & Discussion	1101.1 1101.2	In Class Quiz Mid Term I End Term
15		Primary Vs Secondary memory	Compare Primary Vs Secondary memory	Lecture & Discussion	1101.1 1101.2	In Class Quiz Mid Term I End Term
16		Storage Fundamentals	Understand the Storage Fundamentals	Lecture & Discussion	1101.1 1101.2	In Class Quiz Mid Term I End Term
17		Data Storage and Retrieval Methods, .	Basic mechanism Data Storage and Retrieval	Lecture & Discussion	1101.1 1101.2	In Class Quiz Mid Term I End Term
18		Various Storage Devices	Understand the Various Storage Devices	Lecture & Discussion	1101.1	In Class Quiz Mid Term I End Term
19-20	Operating Systems	Types of software System Software, Application Software	Understand the types of software and differentiate the System Software, Application Software	Lecture & Discussion	1101.3 1101.4	In Class Quiz Mid Term II End Term
21-24		Operating Systems: types Batch Operating System, Multi-Tasking/Time-sharing Operating systems	Understand the types of software	Lecture & Discussion	1101.4	In Class Quiz Mid Term II End Term

25		Real time and Distributed Operating System	Understand Real time and Distributed Operating System	Lecture & Discussion	1101.4	In Class Quiz Mid Term II End Term
26		Network Operating System, Mobile Operating SystemS	Understand the Network Operating System, Mobile Operating System	Lecture & Discussion	1101.4	In Class Quiz Mid Term II End Term
27		Operating Systems: functions	Understand the Operating Systems: functions	Lecture & Discussion	1101.4	In Class Quiz Mid Term II End Term
28-32		Bootting, Memory Management Execution, Data Security Disk Management Process Management Process Scheduling	Understand the Bootting, Memory Management Execution, Data Security Disk Management Process Management And Process Scheduling	Lecture & Discussion	1101.1 1101.4	In Class Quiz Mid Term II End Term
33-37		Process Synchronizations Device Management	Understand the Process Synchronizations and Device Management	Lecture & Discussion	1101.4	In Class Quiz Mid Term II End Term
38-41	Programming Languages	Programming Languages: Machine Language, Assembly language, High level language, Assembler Compilers and Interpreter	Understand the Programming Languages: Machine Language, Assembly language, High level language, Assembler, Compilers and Interpreter	Lecture & Discussion	1101.5	In Class Quiz Mid Term II
42-43	Introduction to MS-Office	MS-Word-Introduction Use of File, Home, Insert tab in word Use of Design, Layout, Reference tab in word, Use of Mailing, Review, View tab in word	Understand the use of MS office ,use of Home, Insert tab in word, use of Design, Layout, Reference tab in word, use of Mailling, Review, View tab in word	Lecture & Discussion	1101.3	In Class Quiz End Term II

44-45		MS-Excel-Introduction Use of File, Home Insert tab in Excel Use of Page Layout, Formulas, Data, Review, View in Excel Use of Different Chart and Preparation of Charts	Understand the use of MS-Excel, use of File, Home Insert tab in Excel use of Page Layout, Formulas, Data, Review, View in Excel, use of Different Chart and Preparation of Charts	Lecture & Discussion	1101.3	In Class Quiz End Term
46-48		Use of File, Home, Insert, Design tab in Power Point, Use of Transition, Animation, Slide Show, tab in Powerpoints, Use of Review, View tab in Powerpoints, How to make effective PowerPoint presentation	Understand the use of File, Home, Insert, Design tab in Power Point Use of Transition, Animation, Slide Show, tab in Powerpoints Understand the use of Review, View tab in Powerpoints, make effective PowerPoint presentation	Lecture & Discussion	1101.3	In 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	PSO 1	PSO 2	PSO 3
CA 1101.1	To understand basic elements of the computer system and to bring awareness about their functionality.	2	0	0	0	0	0	1	0	0	0
CA 1101.2	To understand the hardware component of computer and its basic function	0	0	0	0	0	1	0	0	0	0
CA 1101.3	To describe the main Software category and its utility	0	1	0	1	0	0	0	1	0	0
CA 1101.4	To Understand the types and function of Operating System.	0	0	1	0	1	0	0	0	1	0
CA 1101.5	To understand the programming languages: Machine Language, Assembly language, High level language. Assembler, Compilers and Interpreter.	0	0	0	1	0	0	0	0	0	1

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



A. Introduction: The main objective of this course is to obtain a basic level of Digital Electronics knowledge and set the stage to perform the analysis and design of complex digital electronic circuits.

B. Course Outcomes: After completion of this course student will be able to

[CAI I02.1] Be able to manipulate numeric information in different forms, e.g. different bases, signed Integers, various codes such as ASCII, Gray, and BCD.

[CAI I02.2] Apply the principles of Boolean algebra to manipulate and minimize logic expressions.

[CAI I02.3] Design two-level logic functions with AND, OR, NAND, NOR and XOR gates with minimum Number of gate delays or literals.

[CAI I02.4] Be able to design and Analyze small combinational circuits and use standard combinational functions / building blocks to build larger more complex circuits.

[CAI I02.5] 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.

Program Outcomes:

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

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[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Program Specific Outcomes

PSO1 Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other completer application areas to acquire knowledge in various domain-based prospects

PSO2 Encourage to communicate effectively and to improve their competency skills to solve real time problems

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C. Assessment Plan:

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	Total	100
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D. SYLLABUS

Introduction: Number system, Boolean Algebra, De-Morgan's law, simplification of Boolean algebra, **Logic Gates:** basic and universal gates, simplification method: K-map and tabulation method. **Combination circuit:** introduction to combinational circuit, half adder circuit, full adder circuit, half subtracted, full subtracted, binary parallel adder, carry propagation, magnitude comparator, decoder, encoder, multiplexer, de-multiplexer circuit, design of code converter, parity bit generator and checker. **Sequential circuit:** Introduction to flip flop. **Types of flip flop:** S-R, D, J-K, T, Clocked flip flop. S-R latch, Master-Slave flip flop, realization of one flip flop using other flip flop. Counter and **shift registers:** Synchronous counters, asynchronous counter, ring counter, serial-in-parallel out, parallel-in-serial out, parallel-in-parallel out, bidirectional shift registers.

E. TEXT BOOKS

1. S. Salivahanan, S. Pravin Kumar, "Digital Circuits and Design", Vikas Publishing House Pvt. Ltd.
2. 2012 Morris Mano, "Digital Logic and Computer Design", PHI, 2015.

F. REFERENCE BOOKS

1. Bartee, "Digital Computer Fundamentals", Tata McGraw Hill, 2004.
2. Taub and Schilling, "Digital Integrated Electronics", McGraw Hill International Edition, 2005.
3. Thomas L. Floyd, "Digital Fundamentals", Universal Book Stall, 2003.

G. Lecture Plan:

Lectures	Major Topics	Topics	Session outcome	Mode of Delivery	Corresponding CO	Mode Of Assessing CO
1.	Introduction	Number System: Binary, Decimal, Hexadecimal, Octal	Knowledge of number system	Lecture	CAI I02.1	Mid Term I, Assignment/Quiz & End Term
2.		1's and 2's Complements	Knowledge of various complement methods	Lecture	CAI I02.1	Mid Term I, Assignment/Quiz & End Term
3.		Binary Coded Decimal (BCD), Gray Code	Knowledge of compute codes	Lecture	CAI I02.1	Mid Term I, Assignment/Quiz & End Term
4.		Tutorial	Analysis of number system	Practice	CAI I02.1	Mid Term I, Assignment/Quiz & End Term
5.	Boolean Algebra	Introduction, Development of Boolean Algebra	Analysis of Boolean algebra	Lecture	CAI I02.2	Mid Term I, Assignment/Quiz & End Term
6.		Boolean Logic Operation: Logical AND, Logical OR and Logical Complementation(Inversion)	Applications of Boolean algebra	Lecture	CAI I02.2	Mid Term I, Assignment/Quiz & End Term
7.		Boolean Addition, Boolean Multiplication, Properties of Boolean Algebra and Principle of Duality.	Applications of Boolean algebra	Lecture	CAI I02.2	Mid Term I, Assignment/Quiz & End Term
8.		Tutorial	Evaluation of Boolean algebra	Activity	CAI I02.2	Mid Term I, Assignment/Quiz & End Term
9.		Demorgan's Theorems, minimization of Boolean expression using algebraic method	Applications of Boolean algebra	Lecture	CAI I02.2	Mid Term I, Assignment/Quiz & End Term
10.	Simplification Methods	Sum of Products and Product of Sums : Minterm, Maxterm	Synthesis of Boolean algebra	Lecture	CAI I02.2	Mid Term I, Assignment/Quiz & End Term
11.		Deriving Sum of Products (SOP) Expressions from a Truth Table, Deriving Product of Sum (POS) Expressions from a Truth Table	Applications of Boolean algebra	Lecture	CAI I02.2	Mid Term I, Assignment/Quiz & End Term
12.		Tutorial	Synthesis of Boolean algebra	Activity	CAI I02.2	Mid Term I, Assignment/Quiz & End Term
13.		Karnaugh Map :Two-variable map, Three-variable map	Synthesis of Boolean	Lecture	CAI I02.2	Mid Term I, Assignment/Quiz

			algebra			& End Term
14.		Four-variable map	Synthesis of Boolean algebra	Lecture	CAI I02.2	Mid Term I, Assignment/Quiz & End Term
15.	Logic Gates	Logic Gates: OR, AND, NOT, NAND, NOR	Knowledge of logical gates	Lecture	CAI I02.3	Mid Term I, Assignment/Quiz & End Term
16.		Tutorial	Knowledge of logical gates	Activity	CAI I02.3	Mid Term I, Assignment/Quiz & End Term
17.		Universal Gates: Realisation of logic function using NAND gates	Knowledge of logical gates	Lecture	CAI I02.3	Mid Term I, Assignment/Quiz & End Term
18.		Realisation of logic function using NOR gates	Knowledge of logical gates	Lecture	CAI I02.3	Mid Term I, Assignment/Quiz & End Term
19.		Exclusive-OR (Ex-OR) Gate, Exclusive-NOR (Ex-NOR) Gate	Knowledge of logical gates	Lecture	CAI I02.3	Mid Term I, Assignment/Quiz & End Term
20.		Tutorial	Knowledge of logical gates	Practice	CAI I02.3	Mid Term I, Assignment/Quiz & End Term
21.		Arithmetic Circuits: Half Adder, Full Adder , K-Map Simplification	Synthesis logical circuit	Lecture	CAI I02.4	Mid Term II, Assignment/Quiz & End Term
22.	Combination circuit	Half Subtractor , Full Subtractor	Synthesis logical circuit	Lecture	CAI I02.4	Mid Term II, Assignment/Quiz & End Term
23.		4-bit Parallel Adder/Subtractor	Synthesis logical circuit	Lecture	CAI I02.4	Mid Term II, Assignment/Quiz & End Term
24.		Tutorial	Synthesis logical circuit	Activity	CAI I02.4	Mid Term II, Assignment/Quiz & End Term
25.		Fast Adder	Synthesis logical circuit	Lecture	CAI I02.4	Mid Term II, Assignment/Quiz & End Term
26.		BCD Adder	Application of combinational circuit	Lecture	CAI I02.4	Mid Term II, Assignment/Quiz & End Term
27.		Combinational Circuits: Multiplexers – Basic Four input Multiplexer	Application of combinational circuit	Lecture	CAI I02.4	Mid Term II, Assignment/Quiz & End Term
28.		Tutorial	Application of combinational	Flipped class	CAI I02.4	Mid Term II, Assignment/Quiz

			circuit			& End Term
29.		Implementation of Boolean Expression using Multiplexers	Application of combinational circuit	Lecture	CAI I02.4	Mid Term II, Assignment/Quiz & End Term
30.		Demultiplexers : 1-to-4 Demultiplexer, 1-to-8 Demultiplexer,	Application of combinational circuit	Lecture	CAI I02.4	Mid Term II, Assignment/Quiz & End Term
31.		Decoders: Basic Binary Decoder, 3-to-8 Decoder	Application of combinational circuit	Lecture	CAI I02.4	Mid Term II, Assignment/Quiz & End Term
32.		Tutorial	Application of combinational circuit	Activity	CAI I02.4	Mid Term II, Assignment/Quiz & End Term
33.		4-to-16 Decoder	Synthesis combinational circuit	Lecture	CAI I02.4	Mid Term II, Assignment/Quiz & End Term
34.		Encoders: Octal-to-Binary, Encoder, Decimal-to-BCD Encoder	Application of combinational circuit	Lecture	CAI I02.4	Mid Term II, Assignment/Quiz & End Term
35.		Code Converters: BCD-to-Binary Converters	Application of combinational circuit	Lecture	CAI I02.4	Mid Term II, Assignment/Quiz & End Term
36.		Tutorial	Synthesis combinational circuit	Flipped class	CAI I02.4	Mid Term II, Assignment/Quiz & End Term
37.		Binary-to-Gray Code Converters, Gray Code-to-Binary Converters	Application of combinational circuit	Lecture	CAI I02.4	Mid Term II, Assignment/Quiz & End Term
38.		parity bit generator and checker	Application of combinational circuit	Lecture	CAI I02.4	Mid Term II, Assignment/Quiz & End Term
39.	Sequential circuit	Flip-Flops: Latches	Knowledge of sequential circuit	Lecture	CAI I02.5	Assignment/Quiz & End Term
40.		Tutorial	Knowledge of sequential circuit	Activity	CAI I02.5	Assignment/Quiz & End Term
41.		S-R Flip-Flop, D Flip-Flop	Analysis of sequential circuit	Lecture	CAI I02.5	Assignment/Quiz & End Term
42.		J-K Flip-Flop, T Flip-Flop	Analysis of sequential circuit	Lecture	CAI I02.5	Assignment/Quiz & End Term
43.		Triggering of Flip-Flop: Level Triggering, Edge triggering	Analysis of sequential circuit	Lecture	CAI I02.5	Assignment/Quiz & End Term

44.		Tutorial	Synthesis sequential circuit	Flipped class	CAI I02.5	Assignment/Quiz & End Term
45.		Master Slave Flip-Flop	Synthesis sequential circuit	Lecture	CAI I02.5	Assignment/Quiz & End Term
46.		Realisation of One Flip-Flop using other Flip-Flops.	Synthesis sequential circuit	Lecture	CAI I02.5	Assignment/Quiz & End Term
47.	Counter and shift registers	Design of Synchronous Counters	Applications of sequential circuit	Lecture	CAI I02.5	Assignment/Quiz & End Term
48.		Tutorial	Applications of sequential circuit	Practice	CAI I02.5	Assignment/Quiz & End Term
49.		Design of Synchronous Counters	Synthesis sequential circuit	Lecture	CAI I02.5	Assignment/Quiz & End Term
50.		Ring Counter	Applications of sequential circuit	Lecture	CAI I02.5	Assignment/Quiz & End Term
51.		Serial-in-parallel out shift registers	Applications of sequential circuit	Lecture	CAI I02.5	Assignment/Quiz & End Term
52.		parallel-in-serial out shift registers	Applications of sequential circuit	Lecture	CAI I02.5	Assignment/Quiz & End Term
53.		bidirectional shift registers.	Synthesis sequential circuit	Lecture	CAI I02.5	Assignment/Quiz & End Term

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

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												PSO 1	PSO 2	PSO 3
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12			
CA1102.1	Be able to manipulate numeric information in different forms, e.g. different bases, signed Integers, various codes such as ASCII, Gray, and BCD.	1		1												
CA1102.2	Apply the principles of Boolean algebra to manipulate and minimize logic expressions.	2	1												1	
CA1102.3	Design two-level logic functions with AND, OR, NAND, NOR and XOR gates with minimum Number of gate delays or literals.	3	1					2						2	1	
CA1102.4	Be able to design and Analyze small combinational circuits and use standard combinational functions /building blocks to build larger more complex circuits	2		1		1	1	2						3	2	2
CA1102.5	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.	2				1	1	2						3	2	2

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Science

Department of Computer Applications

Course Hand-out

C Programming| CA I I03 | 4 Credits | 3 I 0 4

Session: Jul 19 – Dec 19 | Faculty: Kuntal gaur| Class: BCA I SEMESTER

- A. Introduction:** The objectives of the course can be grouped into two categories. The first one relates to understanding the basics of C Programming. The second objective is to increase the logical abilities of the students so that they can develop their own logics to solve problems using computer. The course will be taught with the help of GCC compiler.

The main objective of the course are as follows:

- Get knowledge about the basic concept of writing a program.
- Role of token (constants, variables, identifiers, operators, data type) and other building blocks of C Language.
- Use of conditional statements and looping statements to solve problems associated with decision making and repetitions.
- Concept of Array (1D, and 2D) and pointers dealing with memory management.
- Concept of Functions involving the idea of re-usability and modularity.
- Used defined data type : Structures and unions through which can be derived from basic data type
- Programming using GCC compiler in Linux.

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

[CAI I03.1]. Design flow chart, write algorithm and pseudo code parallel with Control Statements to understand flow of program execution.

[CAI I03.2]. Use branching control statements and iterative control statements.

[CAI I03.3]. Demonstrate the concepts of Reusability through the use of functions.

[CAI I03.4]. Understand various categorization of operators into arithmetic, logical, relational, bitwise etc.

[CAI I03.5]. Debug the programs of any logical or syntactical errors.

[CAI I03.6]. Analyse the problem statement and decide their own logic to solve the problem using C Programming.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

- [PO.1].** Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
- [PO.2].** Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
- [PO.3].** Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings 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.4].** Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
- [PO.5].** Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
- [PO.6].** Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
- [PO.7].** Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

PROGRAM SPECIFIC OUTCOMES

- [PSO.1].** Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other completer application areas to acquire knowledge in various domain-based prospects.
- [PSO.2].** Encourage to communicate effectively and to improve their competency skills to solve real time problems.
- [PSO.3].** Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies.

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	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.	

E. SYLLABUS

Introduction to Computers: Block diagram of a computer, Introduction to operating system; Number System; Algorithms and Flowcharts: Algorithmic notations; Space and Time complexity; **C Fundamentals:** C program structure, Simple I/O operations; **Operators and Expressions:** Operator precedence and associativity, bitwise operators, arithmetic expressions, evaluation of expressions; **Flow of Control:** Statements and blocks, switch–case statement, looping constructs; **Arrays:** arrays- Declaration Initialization, sorting; **Strings:** String operations on strings, built-in string handling functions, programs on strings; **Functions:** Modular programming, function declaration, definition and function call, Types of functions, function returning more values, function with operators, function and Decision Statements, function and loop operators, function with Arrays

F. TEXT BOOKS

E.Balaguruswamy, “Computing Fundamentals & C Programming”, TataMcGraw Hill, 2008.

G. REFERENCE BOOKS

1. B. A. Forouzan & R. F. Gilberg “Computer Science – A structured programming Approach Using C”, 2011
2. E.Balaguruswamy, “*Programming in ANSI*” Tata McGraw Hill, 2011.

H. Lecture Plan:

Lectures	Major Topics	Topics	Session Outcome	Mode of delivery	Corresponding CO	Mode Of Assessing CO
1.	Introduction to Computers (1-7 Lecture)	Introduction and Course Hand-out briefing	Understand Cos, POs and PSOs	POWERPOINT PRESENTATION	NA	
2.		Block diagram of a computer, Introduction to operating system	Learn basics of Computers	POWERPOINT PRESENTATION	1103.1	Mid Term I, Quiz & End Term
3.		Number System	Understand Number system	Lecture	1103.1	Mid Term I, Quiz & End Term
4.		Algorithms and Flowcharts	Learn to basics of algorithms and flowcharts	Lecture	1103.1	Mid Term I, Quiz & End Term
5.		Algorithmic notations	Write algorithms and flowcharts	Lecture	1103.1	Mid Term I, Quiz & End Term
6.		Space and Time complexity	Understand notion of complexity	Lecture	1103.1	Mid Term I, Quiz & End Term
7.		Tutorial	Tutorial	Activity	1103.1	Mid Term I, Quiz & End
8.	C Fundamentals (8-12 Lecture)	C program structure	Basic of C program	Lecture	1103.1	Mid Term I, Quiz & End
9.		Simple I/O operations	Learn I/O statements	Flipped Class	1103.1	Mid Term I, Quiz & End Term
10.		I/O examples	Learn I/O statements	Lecture	1103.1	Mid Term I, Quiz & End Term
11.		Various data types in C	Understand data types	lecture	1103.1	Mid Term I, Quiz & End
12.		Tutorial	Tutorial	Activity	1103.1	Mid Term I, Quiz & End
13.	Operators and Expressions (13-19 Lecture)	Types of operators	Learn types of Operators	POWERPOINT PRESENTATION	1103.4	Mid Term I, Quiz & End Term
14.		Types of operators	Learn types of Operators	POWERPOINT PRESENTATION	1103.4	Mid Term I, Quiz & End Term
15.		Examples of operators	Activity	Lecture	1103.4	Mid Term I, Quiz & End
16.		Tutorial	Tutorial	Activity	1103.4	Mid Term I, Quiz & End
17.		precedence and associativity expressions	Understand sequence of evaluation	POWERPOINT PRESENTATION	1103.4	Mid Term I, Quiz & End Term
18.		evaluation of expressions	Understand evaluation of expression	Lecture	1103.4	Mid Term I, Quiz & End Term
19.		Tutorial	Tutorial	Activity	1103.4	Mid Term I, Quiz & End
20.	Flow of	Statements and blocks,	Blocks-if, elseif	Lecture	1103.2&1103.5	Mid Term I, Quiz & End Term

21.	Control (20-29 lecture)	switch–case statement	Switch case	Lecture	1103.2&1103.5	Mid Term I, Quiz & End
22.		Tutorial	Tutorial	Activity	1103.2&1103.5	Mid Term I, Quiz & End
23.		While- loop	while	Lecture	1103.2&1103.5	Mid Term I, Quiz & End
24.		Examples of While -loop	Tutorial	Activity	1103.2&1103.5	Mid Term I, Quiz & End
25.		For -loop	For loop	Lecture	1103.2&1103.5	Mid Term I, Quiz & End
26.		Examples of For-Loop	Tutorial	Activity	1103.2&1103.5	Mid Term I, Quiz & End
27.		Do-while loop	Exit controlled loop	Lecture	1103.2&1103.5	Mid Term I, Quiz & End
28.		Examples of Do-while loop	Tutorial	Activity	1103.2&1103.5	Mid Term I, Quiz & End
29.		Tutorial	Tutorial	Activity	1103.2&1103.5	Mid Term I, Quiz & End
30.	Arrays (30-39 lecture)	Introduction of arrays, Declaring Arrays	Basics of Array	Lecture	1103.5 & 1103.6	Mid Term II, Quiz & End
31.		Reading and Displaying arrays	Reading Array	Lecture	1103.5 & 1103.6	Mid Term II, Quiz & End
32.		Examples	Tutorial	Flipped Class	1103.5 & 1103.6	Mid Term II, Quiz & End
33.		Bubble Sorting	Bubble sort	Lecture	1103.5 & 1103.6	Mid Term II, Quiz & End
34.		Insertion Sorting	Sorting	Lecture	1103.5 & 1103.6	Mid Term II, Quiz & End
35.		Selection Sorting	Sorting	Lecture	1103.5 & 1103.6	Mid Term II, Quiz & End
36.		Matrix declaration	2D arrays	Lecture	1103.5 & 1103.6	Mid Term II, Quiz & End
37.		Matrix reading and displaying	2 D arrays	Lecture	1103.5 & 1103.6	Mid Term II, Quiz & End
38.		Examples	Tutorial	Flipped class	1103.5 & 1103.6	Mid Term II, Quiz & End
39.		Tutorial	Tutorial	Activity	1103.5 & 1103.6	Mid Term II, Quiz & End
40.	Strings (40-43 Lecture)	operations on strings	Learn about Strings	Lecture	1103.5 & 1103.6	Mid Term II, Quiz & End
41.		built-in string handling functions	Sting Functions	Lecture	1103.5 & 1103.6	Mid Term II, Quiz & End
42.		Programs based on string operations	String based program	Lecture	1103.5 & 1103.6	Mid Term II, Quiz & End
43.		Tutorial	Tutorial	Activity	1103.5 & 1103.6	Mid Term II, Quiz & End
44.	Functions (44-52 lecture)	Introduction of Modular Programming and functions	Intro to Modular Programming	Lecture	1103.3 & 1103.6	Mid Term II, Quiz & End Term
45.		Function declaration, Definition and function call	Learn basics of functions	Lecture	1103.3 & 1103.6	Mid Term II, Quiz & End Term
46.		Types of Functions	Functions in detail	Lecture	1103.3 & 1103.6	Mid Term II, Quiz & End
47.		Function returning value	Function	Lecture	1103.3 & 1103.6	Quiz & End Term
48.		Function with operators	Function	Lecture	1103.3 & 1103.6	Quiz & End Term
49.		Function and Decision Statements	Function	Lecture	1103.3 & 1103.6	Quiz & End Term
50.		Function and loop operators	Function	Lecture	1103.3 & 1103.6	Quiz & End Term
51.		Function with Arrays	Function	Lecture	1103.3 & 1103.6	Quiz & End Term
52.		Tutorial	Tutorial	Activity	1103.3 & 1103.6	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
CA 1103.1	Design flow chart, write algorithm and pseudo code parallel with Control Statements to understand flow of program execution	1	2	2	2	2	-	1	-	-	-	-	-	2	-	-
CA 1103.2	Use branching control statements and iterative control statements	2	2	2	2	-	2	-	-	-	-	-	-	2	1	-
CA 1103.3	Demonstrate the concepts of Reusability through the use of functions	3	2	2	1	1	-	-	-	-	-	-	-	3	-	1
CA 1103.4	Understand various categorization of operators into arithmetic, logical, relational, bitwise etc.	3	2	2	1	-	1	-	-	-	-	-	-	2	-	-
CA 1103.5	Debug the programs of any logical or syntactical errors.	3	2	2	2	-	-	-2	-	-	-	-	-	2	2	-
CA1103.6	Analyse the problem statement and decide their own logic to solve the problem using C Programming.	1	2	1	1	1	-	-	-	-	-	-	-	2	-	2

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Science

Department of Computer Applications

Course Hand-out

Technical Communication | LNI 108 | 2 Credits | [2 0 0 2]

Session: July 19 – Dec 19 | Faculty: Dr Arun Dev Pareek | Class: BCA I Semester

A. Introduction: This course is offered by Department of Languages as a core course to the students of BCA in 1st Semester. The course offers an in depth knowledge of Language and grammar skills as an important branch of English language studies. It covers basic concepts such as properties of Communication Skills, word formation, Grammar, Comprehension and Composition. There is no specific prerequisite on the part of students as the course begins with the very basics of the field of study.

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

[LNI 108.1]: Interpret the basic principles and importance of effective communication.

[LNI 108.2]: Develop vocabulary for communicative competence.

[LNI 108.3]: Analyse and acquire knowledge of essential grammar.

[LNI 108.4]: Improve ideas with precision and coherence in making formal written communication to enhance employability skills.

[LNI 108.5]: Recognize the importance of speaking skills through debates and discussions.

C. PROGRAM OUTCOMES

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

PROGRAM SPECIFIC OUTCOMES

[PSO1]. Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other completer application areas to acquire knowledge in various domain-based prospects

[PSO2]. Encourage to communicate effectively and to improve their competency skills to solve real time problems

[PSO3]. Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	MTE I (Closed Book)	20
	MTE II (Closed Book)	20
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	20
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)	Student 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 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: Definition, Process, Principles, General and technical communication, Modes of communication, Importance of technical communication; Barriers to Communication; **Vocabulary:** Word formation, Affixes, Compound words, Synonyms, Antonyms, Homophones and Homonyms, Misspelt words; **Grammar:** Punctuations, Parts of speech, Active and passive voice, Direct and indirect speech, Concord, Common errors; **Effective Writing:** Précis writing, Letter types, Memos, E-Mails, Circulars, Press Releases, Newsletters, Notices, Statement of Purpose, Resume writing; **Art of Public Speaking:** Tips for effective presentations; **Group discussion.**

F. Reference Books:

1. A Koneru, “*Professional Communication*”, Tata McGraw Hill, 2017.
2. L Sen, “*Communication Skills*”, New Delhi: Prentice Hall, 2007.
3. L. C. Bovee and J. V. Thill, “*Business Communication Today*”, 13th Edition, Pearson Education, 2015.
4. M Raman and S Sharma, “*Technical Communication: Principles and Practice 2/e*”, Oxford University Press, 2015.
5. N Krishnaswamy, “*Modern English: A Book of Grammar Usage and Composition, New Delhi*”, Macmillan India, 2009.
6. R V Lesikar and M E Flatley, “*Basic Business Communication: Skills for Empowering the Internet Generation*”, Tata McGraw-Hill, 2014.
7. V K Jain and O P Biyani, “*Business Communication*”, S. Chand, 2007.

G. 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 the teacher's expectation and understand the students' expectations	Lecture	NA	NA
2	Communication: Definition, Process	Interpret the basic principles and importance of effective communication	Lecture & discussion	LNII08.1	Mid Term I End Term
3	Principles of communication	Interpret the basic principles and importance of effective communication	Lecture & discussion	LNII08.1	Mid Term I End Term
4	General and technical communication	Interpret the basic principles and importance of effective communication	Lecture & discussion	LNII08.1	Mid Term I End Term
5	Modes of communication	Interpret the basic principles and importance of effective communication	Lecture & discussion	LNII08.1	Mid Term I End Term
6	Importance of technical communication	Interpret the basic principles and importance of effective communication	Lecture & discussion	LNII08.1	Mid Term I End Term
7	Barriers to Communication	Interpret the basic principles and importance of effective communication	Lecture	LNII08.1	Mid Term I End Term
8	Vocabulary: Word formation, Affixes, Compound words	Develop vocabulary for communicative competence	Lecture	LNII08.2	Mid Term I End Term
9	Synonyms, Antonyms	Develop vocabulary for communicative competence	Lecture	LNII08.2	Mid Term I End Term
10	Homophones and Homonyms, Misspelt words	Develop vocabulary for communicative competence	Lecture	LNII08.2	Mid Term I End Term
11	Grammar: Punctuations	Analyse and acquire knowledge of essential grammar	Lecture	LNII08.3	Mid Term I End Term
12	Parts of speech	Analyse and acquire knowledge of essential grammar	Lecture	LNII08.3	Mid Term I End Term
13	Active and passive voice	Analyse and acquire knowledge of essential grammar	Lecture	LNII08.3	Mid Term I End Term
14	Direct and indirect speech	Analyse and acquire knowledge of essential grammar	Lecture	LNII08.3	Mid Term I End Term
15	Concord	Analyse and acquire knowledge of essential grammar	Lecture	LNII08.3	Mid Term I End Term
16	Common errors	Analyse and acquire knowledge of essential grammar	Lecture	LNII08.3	Mid Term I End Term
17	Effective Writing: Précis writing	Improve ideas with precision and coherence in making formal written	Discussion	LNII08.4	Mid Term II End Term

		communication to enhance employability skills			
18	Letter types, Memos	Improve ideas with precision and coherence in making formal written communication to enhance employability skills	Discussion	LN1108.4	Mid Term II End Term
19	E-Mails, Circulars, Press Releases, Newsletters, Notices	Improve ideas with precision and coherence in making formal written communication to enhance employability skills	Discussion	LN1108.4	Mid Term II End Term
20	Statement of Purpose	Improve ideas with precision and coherence in making formal written communication to enhance employability skills	Lecture & activity	LN1108.4	Mid Term II End Term
21	Resume writing	Improve ideas with precision and coherence in making formal written communication to enhance employability skills	Lecture & activity	LN1108.4	Mid Term II End Term
22	Art of Public Speaking: Tips for effective presentations	Recognize the importance of speaking skills through debates and discussions	Lecture & activity	LN1108.5	Mid Term II End Term
23	Group discussion	Recognize the importance of speaking skills through debates and discussions	Lecture & activity	LN1108.5	Mid Term II End Term
24-26	Revision and Discussion	NA	Revision, Activity & Presentation	NA	NA

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

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES									
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3
[LN1108.1]	Interpret the basic principles and importance of effective communication	1	2		1	1		1		2	
[LN1108.2]	Develop vocabulary for communicative competence		2	1						1	
[LN1108.3]	Analyse and acquire knowledge of essential grammar		1	1						1	1
[LN1108.4]	Improve ideas with precision and coherence in making formal written communication to enhance employability skills	1	2	1				3		2	1
[LN1108.5]	Recognize the importance of speaking skills through debates and discussions		3	2	1			2		3	

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Sciences

Department of Computer Applications

Course Hand-out

MATHEMATICS-I | MA1102 | 4 Credits | 3 | 0 | 4

Session: Aug 1 – November 30 | Faculty: Dr. Garima Agarwal | Class : MA1102

A. Introduction: This course is offered by Dept. of Computer Application, targeting students who wish to pursue research & development in industries or higher studies. The aim of the department of Computer Application is to produce highly, well qualified and motivated graduates possessing fundamental knowledge of Computer Application and research of software who can provide leadership and service to our nation and world. The main focus of the department of Computer Application is to be recognized as a trendsetter of its undergraduate programme through focus on core competencies, multidisciplinary collaborations, and quality in education. This course provides the fundamentals of mathematical functions, limit and continuity. Differentiation and integration is also included in this course. Student will be able to understand the concept of maxima and minima of the function along with its application in real life.

B. Course Outcomes: At the end of the course, students will be able to
[1102.1]. To understand the concept of mathematical functions, Limit, Continuity and its properties.
[1102.2]. To understand the concept of special functions.
[1102.3]. To understand the differentiability and its application.
[1102.4]. To understand the concept of maxima and minima of the function and its applications.
[1102.5]. To understand the concept of integration and its applications.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

PROGRAM SPECIFIC OUTCOMES

PSO1 Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other computer application areas to acquire knowledge in various domain-based prospects

PSO2 Encourage to communicate effectively and to improve their competency skills to solve real time problems

PSO3 Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies.

A. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	20
	Sessional Exam II (Close Book)	20
	In class Quizzes	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.	

B. SYLLABUS

Function: Definition, domain and range of function, types of functions (into, onto, one to one), composite function. **Limit:** Definition, first principle, properties, and simple problems related to limit. Some standard limits. **Continuity:** Definition, continuity of sum, product, difference and quotient of two continuous functions, simple problems. **Special Functions:** Trigonometric functions and their properties, exponential functions, logarithmic functions, hyperbolic functions, inverse circular functions and related properties, simple problems. Rational functions, partial fraction and simple problems. **Differentiation:** Definition, differentiation of simple functions using first principle, differentiation of trigonometric functions and inverse circular functions, method of substitution, differentiation of product and quotient of functions, maxima and minima of a function of single variable. **Integration:** Definition, integration of simple functions using substitution, integration of trigonometric and inverse circular functions and related problems, integration by parts, integration of rational functions. Definite integral and their properties, simple problems. Reduction formula and simple problems.

C. TEXT BOOKS

1. Shanti Narayan, “*Differential calculus*”, S. Chand & Co, Delhi, 2012.
2. Shanti Narayan, “*Integral calculus*”, S. Chand & Co, Delhi, 2012.
3. M.D. Raisinghania, et.al, “*Differential calculus*”, Delhi, 2010.

D. REFERENCE BOOKS

1. Das Mukherjee, “*Integral Calculus*”, U.N. Dhur, 1977.
2. N. Piskunov, “*Differential and integral calculus*”, Vol I & Vol II, CBS, 2000.

E. Lecture Plan:

S.No	Major Topic	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of assessing COs
1.	FUNCTION, LIMIT, CONTINUITY	Introduction and course handout briefing	Understand POS, PSO and COS	Lecture	NA	NA
2.		Definition of Function	Introduce Function	Lecture	1102.1	Mid Term I, quiz and end term
3.		Type of functions	Understand Functions	Lecture	1102.1	Mid Term I, quiz and end term
4.		Domain and co domain of the function	Learn range of Functions	Lecture	1102.1	Mid Term I, quiz and end term
5.		Illustrative examples	Practice Questions	Lecture	1102.1	Mid Term I, quiz and end term
6.		Mapping of functions	Implementation of Functions	Lecture	1102.1	Mid Term I, quiz and end term
7.		Illustrative examples	Practice Questions	Lecture	1102.1	Mid Term I, quiz and end term
8.		Definition of Limit	Understand Limit	Lecture	1102.1	Mid Term I, quiz and end term
9.		Properties of limit	Learn Limit	Lecture	1102.1	Mid Term I, quiz and end term
10.		Illustrative examples	Practice Questions	Lecture	1102.1	Mid Term I, quiz and end term
11.		Some standard Limit	Understanding of limits	Lecture	1102.1	Mid Term I, quiz and end term
12.		Illustrative examples	Practice Questions	Lecture	1102.1	Mid Term I, quiz and end term
13.		Definition of Continuity	Introduce Continuity	Lecture	1102.1	Mid Term I, quiz and end term
14.		Properties of Continuity	Understanding Continuity	Lecture	1102.1	Mid Term I, quiz and end term

15.		Illustrative examples	Practice Questions	Lecture	1102.1	Mid Term I, quiz and end term
16.		Tutorial	Tutorial	Activity	1102.1	Mid Term I, quiz and end term
17.	SPECIAL FUNCTIONS	Introduction of Trigonometric functions	Introduce Trigonometric functions	Lecture	1102.2	Mid Term I, quiz and end term
18.		Properties of Trigonometric functions	Understanding Trigonometric functions	Lecture	1102.2	Mid Term I, quiz and end term
19.		Illustrative examples	Practice Questions	Lecture	1102.2	Mid Term I, quiz and end term
20.		exponential functions and its properties	Introduce exponential functions	Lecture	1102.2	Mid Term I, quiz and end term
21.		Illustrative examples	Practice Questions	Lecture	1102.2	Mid Term I, quiz and end term
22.		logarithmic functions and its properties	Introduce logarithmic functions	Lecture	1102.2	Mid Term I, quiz and end term
23.		Illustrative examples	Practice Questions	Lecture	1102.2	Mid Term I, quiz and end term
24.		hyperbolic functions	Introduce hyperbolic functions	Lecture	1102.2	Mid Term I, quiz and end term
25.		Properties of hyperbolic functions	Learn hyperbolic functions	Lecture	1102.2	Mid Term I, quiz and end term
26.		Illustrative examples	Practice Questions	Lecture	1102.2	Mid Term I, quiz and end term
27.		inverse circular functions	Introduce inverse circular functions	Lecture	1102.2	Mid Term I, quiz and end term
28.		Illustrative examples	Practice Questions	Lecture	1102.2	Mid Term I, quiz and end term
29.		Rational and partial fractions	Learn Rational and partial fractions	Lecture	1102.2	Mid Term I, quiz and end term

30.		Illustrative examples	Practice Questions	Lecture	1102.2	Mid Term I, quiz and end term
31.		Tutorial	Tutorial	Activity	1102.2	Mid Term I, quiz and end term
32.	DIFFERENTIATION	Definition	Introduce Definition	Lecture	1102.3	Mid Term II quiz and end term
33.		Differentiation of different functions	learn Definition	Lecture	1102.3	Mid Term II quiz and end term
34.		Illustrative examples	Practice Questions	Lecture	1102.3	Mid Term II quiz and end term
35.		Illustrative examples	Practice Questions	Lecture	1102.3	Mid Term II quiz and end term
36.		First principal of Differentiation	Implementing Differentiation	Lecture	1102.3	Mid Term II quiz and end term
37.		Illustrative examples	Practice Questions	Lecture	1102.3	Mid Term II quiz and end term
38.		Methods of Differentiation	Learn Differentiation	Lecture	1102.3	Mid Term II quiz and end term
39.		Illustrative examples	Practice Questions	Lecture	1102.3	Mid Term II quiz and end term
40.		Tutorial	Tutorial	Activity	1102.3	Mid Term I, quiz and end term
41.	MAXIMA AND MINIMA	Definition and basic concept	Introduce maxima and minima	Lecture	1102.4	Mid Term II quiz and end term
42.		Application of maxima and minima	Implementation of maxima and minima	Lecture	1102.4	Mid Term II quiz and end term
43.		Illustrative examples	Practice Questions	Lecture	1102.4	Mid Term II quiz and end term
44.		Illustrative examples	Practice Questions	Lecture	1102.4	Mid Term II quiz and end term
45.		Tutorial	Tutorial	Activity	1102.4	Mid Term I, quiz and end term
46.	INTEGRATION	Definition	Introduce integration	Lecture	1102.5	quiz and end term
47.		Methods of integration	Learn integration	Lecture	1102.5	quiz and end term
48.		Illustrative examples	Practice Questions	Lecture	1102.5	quiz and end term
49.		Integration of various functions	Understand integration	Lecture	1102.5	quiz and end term

50.		Reduction formula	Understand integration	Lecture	1102.5	quiz and end term
51.		Illustrative examples	Practice Questions	Lecture	1102.5	quiz and end term
52.		Tutorial	Tutorial	Activity	1102.5	Mid Term I, quiz and end term

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
MA 1102.1	To understand the concept of mathematical functions, Limit, Continuity and its properties.	1					1					1		1		
MA 1102.2	To understand the concept of special functions.		1		1				1		1		1		1	
MA 1102.3	To understand the differentiability and its application.		1					1		1				1		
MA 1102.4	To understand the concept of maxima and minima of the function and its applications.	1				1	1				1					1
MA 11025	To understand the concept of integration and its applications.			1											1	

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

G. 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
MA 1102.1	To understand the concept of mathematical functions, Limit, Continuity and its properties.															
MA 1102.2	To understand the concept of special functions.															
MA 1102.3	To understand the differentiability and its application.															
MA 1102.4	To understand the concept of maxima and minima of the function and its applications.															
MA 11025	To understand the concept of integration and its applications.															

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Sciences

Department of Computer Application

Course Hand-out

DATA STRUCTURES | CA 1201 | 4 Credits | 3 1 0 4

Session: Jan 20 – June 20 | Faculty: Linesh Raja | Class: BCA (II Sem)

A. Introduction: Data Structure is a way of collecting and organising data in such a way that we can perform operations on these data in an effective way. Data Structures is about rendering data elements in terms of some relationship, for better organization and storage. Data Structures are structures programmed to store ordered data, so that various operations can be performed on it easily. It represents the knowledge of data to be organized in memory. It should be designed and implemented in such a way that it reduces the complexity and increases the efficiency.

A good algorithm usually comes together with a set of good data structures that allow the algorithm to manipulate the data efficiently. In this course, we consider the common data structures that are used in various computational problems. You will learn how these data structures are implemented in different programming languages and will practice implementing them in our programming assignments. This will help you to understand what is going on inside a particular built-in implementation of a data structure and what to expect from it. You will also learn typical use cases for these data structures.

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

[I201.1]. Understand computer algorithm and their applications.

[I201.2]. Learn and apply the concepts of Linear and non linear data structure and their complexity.

[I201.3]. Describe and Implement various linear data structure concepts in terms of array, stack and queue.

[I201.4]. Learn and Implement various non linear data structure concept in terms of linked list, tree and graph.

[I201.5]. Understand, Learn and finally Implement the use of advanced programming constructs/features in real-life programming domains for improving employability.

[I201.6]. Visualize a real world problem in the form of programming statement.

C. Program Outcomes and Program Specific Outcomes

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

[PSO.1]. Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other completer application areas to acquire knowledge in various domain-based prospects.

[PSO.2]. Encourage to communicate effectively and to improve their competency skills to solve real time problems.

[PSO.3]. Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	20
	Sessional Exam II (Close Book)	20
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	20
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: Definitions, Concept of Data Structures, Overview of Data Structures. Arrays: Definitions, terminologies, 1D Array: Memory allocation, Operations on array, Application of Arrays, 2D and 3D Array representation,

Linked Lists: Definition, Single Linked List: Representation in memory, operations (insertion, deletion, modify etc.), Circular Linked List, Double Linked List.

Stacks: Definition, Array and linked-list representation of stack, Operations on Stack: Push, Pop, application of stack: infix to postfix, evaluation of arithmetic expression, tower of Hanoi. **Queues:** Definition, Array and linked-list representation of Queue. Operations on Queue: Insertion, Deletion. Various Queue Structure: Circular Queue, Priority Queue. Insertion, Deletion operations on a Circular Queue and Priority Queue,

Sorting and Searching: Insertion Sort, Selection Sort, Merge Sort, Linear Search, Binary Search.

Tree: Definitions and Concepts, Representation of binary tree, Binary tree traversal (Inorder, postorder, preorder), Threaded binary tree, insertion and deletion, Binary search trees, Applications of Trees- Some balanced tree mechanism, e.g. AVL trees, 2-3 trees, Height Balanced, Weight Balance, B Tree, B+ Tree, **Graph**-Matrix Representation of Graphs, Elementary Graph operations.

F. Text Books

T1. Data Structures and Algorithms using C, By R. S. Salaria

G. Reference Books

R1. A. M. Tenenbaum, Data Structures Using C, (1e), Pearson Education, 2008.

R2. R. Thareja, Data Structures Using C, (2e), Oxford University Press, 2014.

H. Lecture Plan:

Lec No	Major Topics	Topics	Session outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	Introduction to Data Structure	Introduction and Course Hand-out briefing	Overview	Lecture	NA	NA
2		Definitions, Concept of Data Structures	Basics of Data Structure	Lecture	I201.1	In Class Quiz (Not Accounted)
3		Overview of Data Structures	Basics of Data Structure	Lecture	I201.1	In Class Quiz End Term
4		Arrays: Definitions, terminologies	Basics of Data Structure	Guided Self-Study	I201.1	Home Assignment End Term
5		1D Array: Memory allocation, Operations on array	Basics of Data Structure in terms of array & their applications	Lecture	I201.2	In Class Quiz End Term
6		Application of Arrays, 2D and 3D Array representation	Basics of Data Structure in terms of array & their applications	Activity	I201.2	Class Quiz Mid Term I End Term
7	Linked List	Definition, Single Linked List: Representation in memory	Overview of Linked list	Lecture	I201.2	Class Quiz Mid Term I End term
8-9		operations (insertion, Deletion, modify etc.)	Linked implementation list	Lecture	I201.2	Home Assignment Class Quiz Mid Term I End Term
10		Circular Linked List	Linked implementation list	Activity	I201.2	Class Quiz Mid Term I End Term
11-12		Double Linked List	Linked implementation list	Lecture	I201.2	Class Quiz Mid Term I End Term
13	Stack	Definition, Array and linked-list representation of stack	Applications of Linked List	Lecture	I201.2	Class Quiz End Term
14		Operations on Stack: Push	Basics of Stack and their operations	Lecture	I201.4	Class Quiz Mid Term II End Term
15		Operations on Stack: Pop	Basics of Stack and their operations	Lecture	I201.4	Class Quiz Mid Term II End Term
16		application of stack: infix to postfix	Stack applications	Lecture	I201.4	Class Quiz Mid Term II End Term
17		evaluation of arithmetic expression	Stack applications	Lecture	I201.4	Class Quiz Mid Term II End Term
18		tower of Hanoi	Stack applications	Lecture	I201.4	Class Quiz End Term
19	Queues	Definition, Array and linked-list representation of Queue	Applications of Linked List	Lecture	I201.4	Class Quiz End Term

20		Operations on Queue: Insertion, Deletion	Operations of Queue	Lecture	I201.4	Class Quiz End Term
21		Various Queue Structure: Circular Queue, Priority Queue	Applications of Queue	Lecture	I201.4	Class Quiz End Term
22-24		Insertion, Deletion operations on a Circular Queue and Priority Queue	Operations of Circular Queue	Lecture	I201.5	Class Quiz End Term
25-26	Sorting and Searching	Insertion Sort, Selection Sort	Operations on sorting	Lecture	I201.5	Class Quiz End term
27-28		Merge Sort	Operations on sorting	Lecture	I201.5	Class Quiz
29-30		Linear Search, Binary Search	Operations on searching	Lecture	I201.5	Class Quiz Mid Term II End Term
31	Tree	Definitions and Concepts, Representation of binary tree	Basics of Tree and their operations	Lecture	I201.3 I201.5	Class Quiz Mid Term II End Term
32		Binary tree traversal (Inorder, postorder, preorder)	Tree functions	Lecture	I201.3 I201.5	Class Quiz Mid Term II End Term
33		Threaded binary tree, insertion and deletion	Tree operations	Lecture	I201.3 I201.5	Class Quiz End Term
34		Binary search trees, Applications of Trees	Tree operations	Lecture	I201.4 I201.6	Class Quiz End Term
35-36		AVL trees, 2-3 trees, Height Balanced, Weight Balance, B Tree, B+ Tree	Tree applications	Lecture	I201.6	Class Quiz End Term
37-38	Graph	Matrix Representation of Graphs	Basics of Graph and their operations	Lecture	I201.6	Class Quiz End Term
39-40		Elementary Graph operations	Graph implementation	Lecture	I201.6	Class Quiz End Term
41-42		Revision	Outcome of course	Lecture	I201.6	Class Quiz End Term
LAB SESSIONS	Java & their applications	Data Structure & Their Application Development using C Programming	Data structure concept implemetations	Lab Sessions	I201.1 - I201.6	Experimental results 14 lab sessions End Term Practical End Term Theory

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	PSO 1	PSO 2	PSO 3
CA 1201.1	Understand computer algorithm and their applications.	3						1			2
CA 1201.2	Learn and apply the concepts of Linear and non linear data structure and their complexity.		2	2							2
CA 1201.3	Describe and Implement various linear data structure concepts in terms of array, stack and queue.				2	2			3		
CA 1201.4	Learn and Implement various non linear data structure concept in terms of linked list, tree and graph.						2		3		
CA 1201.5	Understand, Learn and finally Implement the use of advanced programming constructs/features in real-life programming domains for improving employability.			1					3	2	
CA 1201.6	Visualize a real world problem in the form of programming statement.	3	2	2	2				3	2	

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Science

Department of Computer Application

Course Hand-out

Database Management System| CA 1202 | 4 Credits | 3 | 0 | 4

Session: Jan – May 2020 | Faculty: Pradeep Kumar | Class: BCA II

A. Introduction: This course provides basic information about Database Management System. It provides the basic Conceptual background necessary to design and develop simple database system. The main Emphasize is to know the main features and functions of the DBMS and the features of Relational Database and ER models

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

[1202.1]. Describe main features and functions of the DBMS.

[1202.2]. Design data independence and data models for database systems.

[1202.3]. Classify features of Relational Database and ER Models.

[1202.4]. Recite relational algebra concepts and use it to translate queries to relational algebra.

[1202.5]. Outline and explain SQL queries.

[1202.6]. Explain the concept of transaction, concurrency and recovery.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Program Specific Outcomes

PSO1 Prepare professionally trained in the areas of programming, databases, software engineering, web-designing and networking and other completer application areas to acquire knowledge in various domain-based prospects

PSO2 Encourage to communicate effectively and to improve their competency skills to solve real time problems

PSO3 Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I	20
	Sessional Exam II	20
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	20
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 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 to Database management system, some examples, characteristics of the database approach, Relational Model. **ER Models:** Database modeling using the entity-relationship model, entity types, entity sets attributes and keys, relationships. **Database Design:** Functional dependencies and normalization for relational databases. **SQL the Relational Database Standard:** Data definition, constraints, Basic Queries in SQL, More complex SQL queries, Insert, Update and Delete Statements in SQL. **Transaction Processing:** Transaction processing concepts: Introduction to transaction processing, transaction and system concepts, desirable properties of transactions, schedules and recoverability.

F. TEXT BOOKS

1. Ehmasri & Navathe, *"Fundamentals of Database Systems"*, (3rd Edition), Addison-Wesley, 1999
2. Korth & S.Sudarshan, *"Database System Concepts"*, (5th edition), TATA McGraw Hill, 2002

G. REFERENCE BOOKS

1. C.J. Date, *"Introduction to Database Systems"*, Addison-Wesley, 1995.

Lecture Plan:

Lecture No.	Main Topics	Topic	Session outcome	Mode of delivery	Corresponding CO	Mode Of Assessing CO
1	Introduction to DBMS	Introduction to Database	Understanding of CO PO,PSO	Lecture	CA1202.1	Mid Term-I,Quiz & End Term
2		Database Vs File System	Introduction to Database	Lecture	CA1202.1	Mid Term-I,Quiz & End Term
3		Introduction to Database Management System & Database Management System-Examples	Knowledge of Database with examples	Lecture	CA1202.1	Mid Term-I,Quiz & End Term
4		TUTORIAL	Knowledge of Database with examples	Activity	CA1202.1	Mid Term-I,Quiz & End Term
5		Characteristics of the database approach	Applications of database	Lecture	CA1202.1	Mid Term-I,Quiz & End Term
6		Components of database system	Synthesis of DBMS structure	Lecture	CA1202.1	Mid Term-I,Quiz & End Term
7		actors on the scene, Workers behind the scene Database user and database application	Synthesis of DBMS structure	Lecture	CA1202.1	Mid Term-I,Quiz & End Term
8		TUTORIAL	Synthesis of DBMS structure	Lecture	CA1202.1	Mid Term-I,Quiz & End Term
9		Functions of DBMS	Knowledge of DBMS	Lecture	CA1202.1	Mid Term-I,Quiz & End Term
10		Advantages & Disadvantages of DBMS	Knowledge of DBMS	Flipped class	CA1202.1	Mid Term-I,Quiz & End Term
11		Database Architecture-Two Tire client/Server Architecture	Synthesis of DBMS structure	Lecture	CA1202.1	Mid Term-I,Quiz & End Term
12		Database Architecture-Three Tire client/Server Architecture	Synthesis of DBMS structure	Lecture	CA1202.1	Mid Term-I,Quiz & End Term
13		TUTORIAL	Synthesis of DBMS structure	Lecture	CA1202.1	Mid Term-I,Quiz & End Term

14	Database Modeling	Database Models- OverviewRelational Model with Examples	Knowledge of DBMS models	Lecture	CA1202.2 & CA1202.3	Mid Term-I, Quiz & End Term
15		Relational Model and Relational algebra	Analyse dbms models	Lecture	CA1202.2 & CA1202.3 & CA1202.4	Mid Term-II, Quiz & End Term
16		ER Models with examples Database modeling using the entity-relationship model	Analyse dbms models	Activity	CA1202.2 & CA1202.3	Mid Term-II, Quiz & End Term
17		TUTORIAL	Analyse dbms models	Lecture	CA1202.2 & CA1202.3	Mid Term-II, Quiz & End Term
18		Entity types, Entity sets	Knowledge of database models	Lecture	CA1202.2 & CA1202.3	Mid Term-II, Quiz & End Term
19		attributes, relationships	Knowledge of database models	Lecture	CA1202.2 & CA1202.3	Mid Term-II, Quiz & End Term
20		Concept of keys	Knowledge of keys	Lecture	CA1202.2 & CA1202.3	Mid Term-II, Quiz & End Term
21		TUTORIAL	Knowledge of keys	Lecture	CA1202.2 & CA1202.3	Mid Term-II, Quiz & End Term
22		Database Design-I & Database Design-II	Introduction to Database Design	Activity	CA1202.2 & CA1202.3	Mid Term-II, Quiz & End Term
23		Functional Dependencies	Introduction to functional dependencies	Lecture	CA1202.2 & CA1202.3	Mid Term-II, Quiz & End Term
24	Relation Model	Normalization for relational databases-Overview	Introduction to normalization	Lecture	CA1202.2 & CA1202.3	Mid Term-II, Quiz & End Term
25		Problem without Normalization	Introduction to normalization	Lecture	CA1202.2 & CA1202.3	Mid Term-II, Quiz & End Term
26		TUTORIAL	Introduction to normalization	Lecture	CA1202.2 & CA1202.3	Mid Term-II, Quiz & End Term
27		Normal forms-I & Normal forms-II	Introduction to normalization	Lecture	CA1202.2 & CA1202.3	Mid Term-II, Quiz & End Term
28		Example of Normal Form	Introduction to normalization	Activity	CA1202.2 & CA1202.3	Mid Term-II, Quiz & End Term

29	SQL	Database languages and interfaces	Comprehension on SQL	Lecture	CA1202.5	Mid Term-II, Quiz & End Term
30		TUTORIAL	Comprehension on SQL	Lecture	CA1202.5	Mid Term-II, Quiz &
31		Introduction to SQL & Introduction to SQL Commands-DDL,DML,DCL,TCL	Introduction to SQL	Flipped Class	CA1202.5	Mid Term-I & II, Quiz & End Term
32		DDL: Data Definition Language(Basic Queries)-I	Introduction to SQL	Lecture	CA1202.5	Mid Term-I & II, Quiz & End Term
33		DDL: Data Definition Language(Basic Queries)-II	Introduction to SQL	Lecture	CA1202.5	Mid Term-I & II, Quiz & End Term
34		TUTORIAL	Introduction to SQL	Lecture	CA1202.5	Mid Term-I & II, Quiz & End Term
35		DML: Data Manipulation Language(Basic Queries)-I & DML: Data Manipulation Language(Basic Queries)-II	Introduction to SQL-dml	Lecture	CA1202.5	Mid Term-I & II, Quiz & End Term
36		DCL: Data Control Language(Basic Queries)	Introduction to SQL-dcl	Lecture	CA1202.5	Mid Term-I & II, Quiz & End Term
37	Transaction Concept	TCL: Transaction Control Language(Basic Queries)	Introduction to SQL-tcl	Lecture	CA1202.5	Mid Term-I & II, Quiz & End Term
38		TUTORIAL	Introduction to SQL-tcl	Lecture	CA1202.5	Mid Term-I & II, Quiz & End Term
39		More complex SQL queries	Synthesis-sql queries	Activity	CA1202.5	Mid Term-I & II, Quiz & End Term
40		Specifying general constraints as assertion and Additional features of SQL-I	Synthesis-constraints	Lecture	CA1202.5	Quiz & End Term
41		Specifying general constraints as assertion and Additional features of SQL-II	Synthesis-integrity constraints	Lecture	CA1202.5	Quiz & End Term
42		TUTORIAL	Synthesis-integrity constraints	Lecture	CA1202.5	Quiz & End Term
43		Introduction to transaction & Introduction to transaction processing-concepts	Introduction to transaction	Lecture	CA1202.6	Quiz & End Term
44		Transaction and system concepts	Knowledge and	Flipped class	CA1202.6	Quiz & End Term

		Introduction to transaction			
45		Desirable properties of transactions	Application to SQL Transaction	Lecture	CA1202.6 Quiz & End Term
46		TUTORIAL	Application to SQL Transaction	Lecture	CA1202.6 Quiz & End Term
47		Techniques for concurrency-I	Introduction Techniques for concurrency	Lecture	CA1202.6 Quiz & End Term
48		Introduction to concurrency & Techniques for concurrency-II	Introduction Techniques for concurrency	Lecture	CA1202.6 Quiz & End Term
49		TUTORIAL	Introduction Techniques for concurrency	Lecture	CA1202.6 Quiz & End Term
50		Database Recovery Techniques-I	Introduction to recovery	Lecture	CA1202.6 Quiz & End Term
51		Database Recovery Techniques-II	Introduction to recovery techniques	Lecture	CA1202.6 Quiz & End Term
52		TUTORIAL	Introduction to recovery techniques	Lecture	CA1202.6 Quiz & End Term

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	PSO 3
CA 1202.1	Describe main features and functions of the DBMS.				2									1		
CA 1202.2	Design data independence and data models for database systems.			1		2									2	
CA 1202.3	Classify features of Relational Database and ER Models.				2			2						3		
CA 1202.4	Recite relational algebra concepts and use it to translate queries to relational algebra.	2														
CA 1202.5	Outline and explain SQL queries.					2								2		
CA 1202.6	Explain the concept of transaction, concurrency and recovery.				2	1										2

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Science

Bachelor of Computer Application

Course Hand-out

Principles of Programming Languages | CA 1204 | 4 Credits | 3 1 0 4

Session: Jan – May 2020 | Faculty: Dr. Vaibhav Bhatnagar | Class: BCA II SEMESTER

- **Introduction:** This course will introduce students to the fundamental concepts programming languages. Main objective of the course is to familiarize students about core concepts and principles in programming languages like program compilation, programming environments, data types, scope, binding and object oriented concepts. It will cover high order evaluation, logic languages, functional programming, stack layout, parameter passing, file input and output. The emphasis is on studying and analysing fundamental issues in programming design.

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

[1204.1] Analyze the concepts of programming languages and programming paradigms.

[1204.2] List out various Data bindings and Scope rules in programming languages.

[1204.3] Recall the Concepts of Structured and unstructured flow, Function, Recursion, Pointers, Lists, Expression evaluation, Files and Input/Output.

[1204.4] Understanding the basic Concepts of Object-Oriented Programming Language.

[1204.5] Implement logic programming concepts by using PROLOG.

PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Program Specific Outcomes

[PSO1]. Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other computer application areas to acquire knowledge in various domain-based prospects

[PSO2]. Encourage to communicate effectively and to improve their competency skills to solve real time problems

[PSO3]. Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

B. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	20
	Sessional Exam II (Closed Book)	20
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	20
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.	

C. SYLLABUS

Introduction: Programming language - design, spectrum and the study motivation, Compilation and interpretation; Programming environments; Names, Scope, and Bindings: Concept of binding time, Object lifetime and storage management, Scope rules and implementing scope, The binding of reference environments, Binding within a scope, Separate compilation; Control Flow: Expression evaluation, Structured and unstructured flow, Sequencing, Selection, Iteration, Recursion, Non-determinacy; Data Types: Type systems and checking, Records and variants, Arrays, Strings, Sets, Pointers and recursive types, Lists, Files and Input/Output, Equality testing and assignment; Subroutines and Control Abstraction: Stack layout, Calling sequences, Parameter passing, Generic subroutines and modules, Exception handling, Co-routines; Data Abstraction, Object Orientation: Object oriented programming, Encapsulation and Inheritance, Dynamic method binding; Functional Languages: Origins, Concepts, Scheme, Evaluation order, Higher-order functions, Functional programming in perspective; Logic Languages: Concepts, Prolog, Logic programming in perspective; Scripting Languages: Common characteristics.

D. TEXT BOOKS

1. M.L. Scott, "Programming Language Pragmatics", 2nd Edition, Elsevier, 2006.

E. REFERENCE BOOKS

1. R. Sethi, "Programming languages Concepts and Constructs", 2nd Edition, Pearson Education, 1996.
2. R Sebesta, "Concepts of Programming Languages", 8th Edition, Pearson Education, 2008.
3. A. Tucker, R.Nonan, "Programming languages", Tata McGraw-Hill, 2002.M.M. Mano, "Computer System Architecture", PHI, 2009.

Lecture Plan:

LEC NO	Major Topics	TOPICS	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Accessing CO
1	Introduction	Programming language – design	Understanding CO and PO	Lecture	1204.1	Mid Term I, Quiz & End Term
2		Programming Spectrum	Concept of PPL	Lecture	1204.1	Mid Term I, Quiz & End Term
3		Motivation study	Concept of PPL	Lecture	1204.1	Mid Term I, Quiz & End Term
4		Compilation and interpretation	Concept of PPL	Lecture	1204.1	Mid Term I, Quiz & End Term
5		Programming environments	Concept of PPL	Lecture	1204.1	Mid Term I, Quiz & End Term
6	Names, Scope, and Bindings	Concept of binding time	Data Binding	Lecture	1204.2	Mid Term I, Quiz & End Term
7		Object lifetime	Data Binding	Lecture	1204.2	Mid Term I, Quiz & End Term
8		storage management	Data Binding	Lecture	1204.2	Mid Term I, Quiz & End Term
9		Scope rules and implementing scope	Scope of Variable	Lecture	1204.2	Mid Term I, Quiz & End Term
10		The binding of reference environments	Scope of Variable	Flipped Class	1204.2	Mid Term I, Quiz & End Term
11		Binding within a scope	Binding	Lecture	1204.2	Mid Term I, Quiz & End Term
12		Separate compilation	Binding	Lecture	1204.2	Mid Term I, Quiz & End Term
13	Control Flow	Expression evaluation	Expression Evaluation	Lecture	1204.3	Mid Term I, Quiz & End Term
14		Structured and unstructured flow	Structured Flow	Lecture	1204.3	Mid Term I, Quiz & End Term
15		Sequencing	Structured Flow	Lecture	1204.3	Mid Term I, Quiz & End Term

16		Selection	Structured Flow	Lecture	1204.3	Mid Term I, Quiz & End Term
17		Iteration	Structured Flow	Lecture	1204.3	Mid Term I, Quiz & End Term
18		Recursion	Structured Flow	Lecture	1204.3	Mid Term I, Quiz & End Term
19		Non-determinacy	Structured Flow	Flipped Class	1204.3	Mid Term I, Quiz & End Term
20	Data Types	Type systems	Structured Flow	Lecture	1204.3	Mid Term I, Quiz & End Term
21		Type Checking	Structured Flow	Activity	1204.2, 1204.3	Mid Term I, Quiz & End Term
22		Records and variants	Structured Flow	Lecture	1204.2	Mid Term II, Quiz & End Term
23		Arrays	Data Storage	Lecture	1204.3	Mid Term II, Quiz & End Term
24		Strings	Data Storage	Lecture	1204.3	Mid Term II, Quiz & End Term
25		Sets	Data Storage	Lecture	1204.2, 1204.3	Mid Term II, Quiz & End Term
26		Pointers	Data Storage	Lecture	1204.3	Mid Term II, Quiz & End Term
27		recursive types	Data Storage	Lecture	1204.1	Mid Term II, Quiz & End Term
28		Lists	Data Storage	Lecture	1204.2	Mid Term II, Quiz & End Term
29		Files and Input/Output	File Handling	Lecture	1204.3	Mid Term II, Quiz & End Term
30		Equality testing and assignment	Data Storage	Lecture	1204.3	Mid Term II, Quiz & End Term
31	Subroutines and Control Abstraction	Stack layout	Data Storage	Lecture	1204.3	Mid Term II, Quiz & End Term
32		Calling sequences, Parameter passing	Unstructured Flow	Lecture	1204.3	Mid Term II, Quiz & End Term

33		Generic subroutines and modules	Unstructured Flow	Lecture	1204.3	Mid Term II, Quiz & End Term
34		Exception handling	Unstructured Flow	Flipped Class	1204.3	Mid Term II, Quiz & End Term
35		Co-routines	Unstructured Flow	Lecture	1204.3	Mid Term II, Quiz & End Term
36	Data Abstraction, Object Orientation	Object oriented programming	Concepts of OOPs	Activity	1204.4	Mid Term II, Quiz & End Term
37		Encapsulation and Inheritance	Concepts of OOPs	Lecture	1204.4	Mid Term II, Quiz & End Term
38		Dynamic method binding	Concepts of OOPs	Lecture	1204.2, 1204.4	Mid Term II, Quiz & End Term
39	Functional Languages	Origins, Concepts	Concepts of OOPs	Lecture	1204.4	Mid Term II, Quiz & End Term
40		Functional programming Scheme	Concepts of OOPs	Lecture	1204.4	Quiz & End Term
41		Evaluation order	Concepts of OOPs	Lecture	1204.4	Quiz & End Term
42		Higher-order functions	Concepts of OOPs	Lecture	1204.4	Quiz & End Term
43		Functional programming in perspective	Concepts of OOPs	Lecture	1204.4	Quiz & End Term
44	Logic Languages	Concepts	Prolog Implementation	Lecture	1204.3	Quiz & End Term
45		Prolog	Prolog Implementation	Lecture	1204.5	Quiz & End Term
46		Logic programming in perspective	Prolog Implementation	Lecture	1204.5	Quiz & End Term
47	Scripting Languages	Common characteristics	Prolog Implementation	Lecture	1204.5	Quiz & End Term
48		Common characteristics	Prolog Implementation	Lecture	1204.5	Quiz & End Term
49		Revision-1	PPL	Activity	1204.1,	Quiz & End Term
50		Revision-2	Binding	Activity	1204.2	Quiz & End Term
51		Revision-3	OOPs Concepts	Activity	1204.4	Quiz & End Term

52		Revision-4	Prolog Concept	Activity	1204.5	Quiz & End Term
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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
CA 1204.1	Analyze the concepts of programming languages and programming paradigms.	3						2						1		
CA 1204.2	List out various Data bindings and Scope rules in programming languages.		2	2				1							3	
CA 1204.3	Recall the Concepts of Structured and unstructured flow, Function, Recursion, Pointers, Lists, Expression evaluation, Files and Input/Output.	1			2	3								3		
CA 1204.4	Understanding the basic Concepts of Object-Oriented Programming Language				2		3	2								2
CA 1204.5	Implement logic programming concepts by using PROLOG.							3							2	

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Science

Department of Computer Applications

Course Hand-out

Mathematics-II | MA 1202 | 4 Credits | 3 | 0 4

Session: Jan 20 – Jun 20 | Faculty: Dr. Garima Agarwal | Class: BCA II SEMESTER

A. Introduction: This course aims to discuss basic concept of Differential calculus. Course is intended to provide the students the experience in applications of differential calculus and to emphasize the practical aspects of differential calculus.

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

[1202.1]. Demonstrate the concepts of Differential calculus and its applications.

[1202.2]. Illustrate Partial derivatives with applications.

[1202.3]. understand the basic concept of linear algebra.

[1202.4]. Demonstrate the concepts of Infinite series.

C Program Outcomes:

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Program Specific Outcomes

PSO1 Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other computer application areas to acquire knowledge in various domain-based prospects

PSO2 Encourage to communicate effectively and to improve their competency skills to solve real time problems

PSO3 Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

C. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	20
	Sessional Exam II (Closed Book)	20
	In class Quizzes	20
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.	
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.	

D. SYLLABUS

Differential Calculus: Successive differentiation, Leibnitz's theorem, polar curve, angle between radius vector and tangent, angle of intersection between two curves, derivative of arc (Cartesian and polar), curvature, radius of curvature, evolute, related problems. Rolle's Theorem, mean value theorem (Cauchy's and Lagrange's), in determinant form, **partial derivatives**, Euler's theorem, maxima and minima of functions of two variables. **Linear Algebra:** Basic concepts, matrix addition, scalar multiplication, matrix multiplication, linear system of equations, Gauss elimination, rank of a matrix, Solution of Linear Systems: Existence, uniqueness, determinants, Cramer's rule, inverse of a matrix, Gauss-Jordan elimination. **Infinite Series:** Convergence, divergence, comparison test, ratio test, Cauchy's root test, Cauchy's integral test, alternating series, Leibnitz's theorem, absolute and conditional convergence, expansion of functions into Taylor's and Maclaurin's series.

E. TEXT BOOKS

1. S. Narayan, P.K. Mittal, *Differential calculus*, S. Chand & Co, Delhi, 2012.
2. S. Narayan, P.K. Mittal, *Integral calculus*, S. Chand & Co, Delhi, 2012.

F. REFERENCE BOOKS

1. M.D. Raisinghania, *Differential calculus*, S. Chand & Co, Delhi, 2010.
2. B. N. Mukherjee, *Integral Calculus*, U.N. Dhur, 1977.
3. N. Piskunov, *Differential and integral calculus*, Vol I & Vol II, CBS, 2000.

G. Lecture Plan:

Lectures	Major Topics	Topics	Session outcome	Delivery Mode	Corresponding CO	Mode Of Assessing CO
1.		Introduction to PO,CO,PSO	Understand PO,CO,PSO	Lecture	NA	Mid Term I, Quiz & End Term
2.	Differential Calculus	Introduction of Differential calculus	basic concept of Calculus	Lecture	1202.1	Mid Term I, Quiz & End Term
3.		Successive Differentiation	understanding Calculus	Lecture	1202.1	Mid Term I, Quiz & End Term
4.		Leibnitz Theorem	understanding Calculus	Lecture	1202.1	Mid Term I, Quiz & End Term
5.		Illustrative examples	Class problems	Tutorial	1202.1	
6.		Angle between radius vector and tangents	applications of Differential calculus	Lecture	1202.1	Mid Term I, Quiz & End Term
7.		Angle of intersection between two	applications of Differential	Lecture	1202.1	Mid Term I, Quiz & End Term

8.		Derivatives of arc (Cartesian and Polar)	applications of Differential	Lecture	1202.1	Mid Term I, Quiz & End Term
9.		Curvature, Radius of curvature	applications of Differential	Lecture	1202.1	Mid Term I, Quiz & End Term
10.		Evolutes and related problems	applications of Differential	Lecture	1202.1	
11.		Rolle's Theorem and related problems	applications of Differential	Lecture	1202.1	Mid Term I, Quiz & End Term
12.		Mean value theorem (cauchy's and Lagrange's)	applications of Differential	Lecture	1202.1	Mid Term I, Quiz & End Term
13.		Illustrative examples	Class problems	Tutorial	1202.1	
14.		Quiz-1	evaluation	Activity	1202.1	
15.	Partial Derivatives	Introduction	understanding partial	Lecture	1202.2	Mid Term I, Quiz & End Term
16.		Euler's Theorem	concept of Partial	Lecture	1202.2	Mid Term I, Quiz & End Term
17.		Illustrative examples	Class problems	Tutorial	1202.2	
18.		Maxima and minima of two variable function	applications of Partial Derivatives	Lecture	1202.2	Mid Term I, Quiz & End Term
19.		Illustrative examples	Class problems	Tutorial	1202.2	
20.		Quiz-2	evaluation	Activity	1202.2	
21.	Linear Algebra	Introduction	understanding Linear Algebra	Lecture	1202.3	Mid Term I, Quiz & End Term
22.		Matrix addition and multiplication	application of Linear Algebra	Lecture	1202.3	Mid Term I, Quiz & End Term
23.		Illustrative examples	Class problems	Tutorial	1202.3	
24.		Solution of Linear system of equation	application of Linear Algebra	Lecture	1202.3	Mid Term I, Quiz & End Term
25.		Gauss elimination Method	application of Linear Algebra	Lecture	1202.3	
26.		Illustrative examples	Class problems	Tutorial	1202.3	
27.		Gauss-Jorden elimination	application of Linear Algebra	Lecture	1202.3	Mid Term I, Quiz & End Term
28.		Illustrative examples	Class problems	Tutorial	1202.3	
29.		Rank of matrix	application of Linear Algebra	Lecture	1202.3	Mid Term I, Quiz & End Term
30.		Illustrative examples	Class problems	Tutorial	1202.3	
31.		Inverse of matrix	application of Linear Algebra	Lecture	1202.3	Mid Term I, Quiz & End Term
32.		Solution of linear system of equations	application of Linear Algebra	Lecture	1202.3	Mid Term II, Quiz & End Term
33.		Illustrative examples	Class problems	Tutorial	1202.3	
34.		Cramers Rule	application of Linear Algebra	Lecture	1202.3	Mid Term II, Quiz & End Term
35.		Illustrative examples	Class problems	Tutorial	1202.3	

36.		Quiz-3	evaluation	Activity	1202.3	
37.	Infinite Series	Introduction	understanding Infinite Series	Lecture	1202.4	Mid Term II, Quiz & End Term
38.		Comparison test	concept of Infinite Series	Lecture	1202.4	Mid Term II, Quiz & End Term
39.		Illustrative examples	Class problems	Tutorial	1202.4	
40.		Ration test	understanding Infinite Series	Lecture	1202.4	Mid Term II, Quiz & End Term
41.		Illustrative examples	Class problems	Tutorial	1202.4	
42.		Cauchy's root test	understanding Infinite Series	Lecture	1202.4	Mid Term II, Quiz & End Term
43.		Illustrative examples	Class problems	Tutorial	1202.4	
44.		Cauchy's integral test	understanding Infinite Series	Lecture	1202.4	
45.		Leibnitz Theorem	understanding Infinite Series	Lecture	1202.4	Mid Term II, Quiz & End Term
46.		Absolute convergence	understanding Infinite Series	Lecture	1202.4	Mid Term II, Quiz & End Term
47.		Conditional convergence	understanding Infinite Series	Lecture	1202.4	Mid Term II, Quiz & End Term
48.		Expansion of function into Taylors series	understanding Infinite Series	Lecture	1202.4	Mid Term II, Quiz & End Term
49.		Expansion of function into Maclaurin	understanding Infinite Series	Lecture	1202.4	Mid Term II, Quiz & End Term
50.		Illustrative examples	Class problems	Tutorial	1202.4	
51.		Quiz-4	evaluation	Activity	1202.4	

[illegible]

MA 1202.3	Understand the basic concept of linear algebra.		1		1									2			
MA 1202.4	Demonstrate the concepts of Infinite series.				1											1	

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Sciences

Department of Computer Application
Course Hand-out

Computer Organization and Architecture | CA 1301 | 4 Credits | 3 | 0 | 4

Session: July 19 – Dec 19 | Faculty: Vanita Jaitly | Class: BCA (III Sem)

- A. Introduction:** This course will introduce students to the fundamental concepts underlying modern computer organization and architecture. Main objective of the course is to familiarize students about hardware design including logic design, basic structure and behavior of the various functional modules of the computer and how they interact to provide the processing needs of the user. It will cover machine level representation of data, instruction sets, computer arithmetic, CPU structure and functions, memory system organization and architecture, system input/output, multiprocessors, and digital logic. The emphasis is on studying and analyzing fundamental issues in architecture design and their impact on performance.
- B. Course Outcomes:** At the end of the course, students will be able to
- [1301.1] Conceptualize the basics of organizational and architectural issues of a digital computer.
 - [1301.2] Design the concept of memory organization that uses banks for different word size operations.
 - [1301.3] Create an assembly language program to program a microprocessor system.
 - [1301.4] Compare the generations of Computer with their advancements.
 - [1301.5] Analyse the processor performance improvement using instruction level parallelism

PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

PROGRAM SPECIFIC OUTCOME

[PSO1] Prepare professionally trained in the areas of programming, databases, software engineering, web-designing and networking and other completer application areas to acquire knowledge in various domain-based prospects

[PSO2] Encourage to communicate effectively and to improve their competency skills to solve real time problems

[PSO3] Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

C. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	20
	Sessional Exam II (Closed Book)	20
	In class Quizzes and Assignments, Activity feedbacks (Accumulated and Averaged)	10
End Term Exam (Summative)	End Term Exam (Closed 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.	

D. SYLLABUS

General Computer Architecture: Block Diagram of typical Computer, Memory Section, Input/Output Section, CPU, Registers, Arithmetic Unit, Instruction handling Areas, Stacks. Micro operations: Register Transfer, Bus and Memory Transfer, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, Arithmetic Logic Shift Unit.

Basic Computer Organization and Design: Instruction Codes, Operation code, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input Output Instructions and Interrupts.

Control Memory: Control Word, Microinstruction, Microprogramming, Control Memory, Hardwired.

Central Processing Unit: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, RISC, CISC.

Pipelining and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, Vector Processing, Array Processors

Input Output Organization: I/O Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA, IOP, Serial Communication.

Memory Organization: Associative Memory, Cache Memory, Virtual Memory.

Introduction to Microprocessor: Machine Language, Assembly Language, Assembler, High Level Language, Compiler, Interpreter, Internal Architecture 8085.

E. TEXT BOOKS

1. Carl Hamacher, "Computer Organization" (5th Edition), TMH, 2011.

F. REFERENCE BOOKS

1. M.M. Mano, "Computer System Architecture", PHI, 2009.
2. Govindarajulu, "Computer Architecture and Organization", (2nd Edition), TMH, 2008.

G. Lecture Plan:

LEC NO	Major Topics	TOPI CS	Session outcome	Mod e of Deli very	Corresp on di ng C O	Mode of Accessing
1	Genera l Comp uter Archit ecture	Block Diagram of typical Computer,Memory Section	Understanding of structure of information processing system.	Lecture	1301.1	Mid Term I, Quiz & End Term
2		Input/Output Section,	I/O Section	Lecture	1301.1	Mid Term I, Quiz & End Term
3		CPU	Working of processing system	Lecture	1301.1	Mid Term I, Quiz & End Term
4		Registers	Different types of registers	Lecture	1301.1	Mid Term I, Quiz & End Term
5		Arithmetic Unit	Understanding the logical structure of system	Lecture	1301.1	Mid Term I, Quiz & End Term
6		Instruction handling Areas	Working of instruction areas	Lecture	1301.1	Mid Term I, Quiz & End Term
7		Stacks	Understanding of job accumulation	Lecture	1301.1, 1301.2	Mid Term I, Quiz & End Term
8		Microoperations: Register Transfer	Functions of registers	Lecture	1301.1, 1301.3	Mid Term I, Quiz & End Term
9		Bus and Memory Transfer	Alternative of registers	Lecture	1301.1, 1301.2	Mid Term I, Quiz & End Term
10		Arithmetic Micro operations	Working of logical methods of system	Flip ped Cla ss	1301.1, 1301.3	Mid Term I, Quiz & End Term
11		Logic Micro operations	Understanding of types of micro operations	Lecture	1301.1, 1301.3	Mid Term I, Quiz & End Term
12		Shift Micro operations	Understanding of types of micro operations	Lecture	1301.1, 1301.3	Mid Term I, Quiz & End Term
13		Arithmetic Logic Shift Unit	Understanding of types of micro operations	Lecture	1301.1, 1301.3	Mid Term I, Quiz & End Term
14	Basic Computer Organization and	Instruction Codes	Understanding of various reference codes	Lecture	1301.3	Mid Term I, Quiz & End Term
15		Operation code	Understanding of various opcodes	Lecture	1301.3	Mid Term I, Quiz & End Term
16		Timing and Control	Understanding of Timing of operations	Lecture	1301.3	Mid Term I, Quiz & End Term

17	Design:	Instruction Cycle	Timing wise instructions	Lecture	1301.3	Mid Term I, Quiz & End Term
18		Memory Reference Instructions	Memory Reference opcodes	Lecture	1301.2, 1301.3	Mid Term I, Quiz & End Term
19		Input Output Instructions	Understanding of instructions	Flipped Class	1301.3	Mid Term I, Quiz & End Term
20		Interrupts	Understanding of Interrupts	Lecture	1301.3	Mid Term I, Quiz & End Term
21		Tutorial	Activity	Activity	1301.2, 1301.3	Mid Term I, Quiz & End Term
22	Control Memory	Control Word	Working of Micro instructions and control word	Lecture	1301.2	Mid Term II, Quiz & End Term
23		Microinstruction	Working of Micro instructions and control word	Lecture	1301.3	Mid Term II, Quiz & End Term
24		Microprogramming	Instructions of micro programming	Lecture	1301.3	Mid Term II, Quiz & End Term
25		Control Memory	Instructions of micro programming	Lecture	1301.2, 1301.3	Mid Term II, Quiz & End Term
26		Hardwired	Instructions of micro programming	Lecture	1301.3	Mid Term II, Quiz & End Term
27	Central Processing Unit	General Register Organization	Organization of registers	Lecture	1301.1	Mid Term II, Quiz & End Term
28		Stack Organization	Organization of stacks	Lecture	1301.2	Mid Term II, Quiz & End Term
29		Instruction Formats	Various forms of instructions	Lecture	1301.3	Mid Term II, Quiz & End Term
30		Addressing Modes	Ways to address parameters	Lecture	1301.3	Mid Term II, Quiz & End Term
31		RISC and CISC	Difference between RISC and CISC	Lecture	1301.4	Mid Term II, Quiz & End Term
32	Pipelining and Vector Processing	Parallel Processing	Various parallel processing methods	Lecture	1301.4, 1301.5	Mid Term II, Quiz & End Term
34		Pipelining and Arithmetic Pipeline	Understanding of Pipelining and Arithmetic Pipeline	Lecture	1301.4, 1301.5	Mid Term II, Quiz & End Term
35		Instruction Pipeline	Understanding of Instruction Pipeline	Flipped Class	1301.4, 1301.5	Mid Term II, Quiz & End Term
36		Vector Processing, Array Processors	Understanding of Vector	Lecture	1301.4	Mid Term II, Quiz & End Term

			Processing and Array Processors			
37		Tutorial	Activity	Activity	1301.4	Mid Term II, Quiz & End Term
38	Input Output Organization	I/O Interface	Interface of Input Output	Lecture	1301.4	Mid Term II, Quiz & End Term
39		Asynchronous Data Transfer	Understanding of various modes of data transfer	Lecture	1301.2, 1301.4	Mid Term II, Quiz & End Term
40		Modes of Transfer	Understanding of various modes of data transfer	Lecture	1301.4	Mid Term II, Quiz & End Term
41		Priority Interrupt	Organization of Input Output of the system	Lecture	1301.4	Quiz & End Term
42		DMA	Organization of Input Output of the system	Lecture	1301.4	Quiz & End Term
43		IOP	Organization of Input Output of the system	Lecture	1301.4	Quiz & End Term
44		Serial Communication	Organization of Input Output of the system	Lecture	1301.4	Quiz & End Term
45	Memory Organization	Associative Memory	Various types of memory organization	Lecture	1301.2	Quiz & End Term
46		Cache Memory	Various types of memory organization	Lecture	1301.2	Quiz & End Term
47		Virtual Memory	Various types of memory organization	Lecture	1301.2	Quiz & End Term
48	Introduction to Microprocessor	Machine Language and Assembly Language	Fundamentals of Microprocessor	Lecture	1301.3	Quiz & End Term
49		Assembler, High Level Language	Understanding of languages	Lecture	1301.1, 1301.3	Quiz & End Term
50		Compiler, Interpreter	Difference between Compiler and Interpreter	Flipped Class	1301.1, 1301.3	Quiz & End Term
51		Internal Architecture 8085.	Basic architecture kit	Lecture	1301.3	Quiz & End Term
52		Tutorial	Activity	Activity	1301.1, 1301.3	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
CA 1301.1	Conceptualize the basics of organizational and architectural issues of a digital computer		3						1						2	
CA 1301.2	Design the concept of memory organization that uses banks for different word size operations		2	2											2	
CA 1301.3	Create an assembly language program to program a microprocessor system.				2	3								3		
CA 1301.4	Compare the generations of Computer with their advancements.		3													1
CA 1301.5	Analyse the processor performance improvement using instruction level parallelism.				2										1	2

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



SCHOOL OF BASIC SCIENCE

DEPARTMENT OF COMPUTER APPLICATIONS

COURSE HAND-OUT

Web Technology| CA 1302 | 4 Credits | 3 | 0 | 4

Session: Jul 19 – Dec 19 | Faculty: Dr. Shilpa Kulkarni Sharma | Class: BCA III

A. Introduction: This course is an extended course of Internet & HTML covered in the II semester. It introduces students about the C#, an object-oriented programming language intended to create simple yet robust programs. Designed specifically to take advantage of CLI features. C# is the core language of the .NET framework. In this course, students gain the skills to exploit the capabilities of C# and of the .NET Framework to develop programs useful for a broad range of desktop and Web applications using ASP.NET along with the ADO.NET for database connectivity.

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

[1302.1] .Create, compile and run object-oriented C# programs using Visual Studio.

[1302.2].Plan, design, and develop web applications using ASP.NET

[1302.3].Access databases using ADO.NET

[1302.4].Develop web components via interface realization and standard design patterns

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

PROGRAM SPECIFIC OUTCOMES

PSO1 Prepare professionally trained in the areas of programming, databases, software engineering, web-designing and networking and other completer application areas to acquire knowledge in various domain-based prospects

PSO2 Encourage to communicate effectively and to improve their competency skills to solve real time problems

PSO3 Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	20
	Sessional Exam II (Close Book)	20
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	10
End Term Exam (Summative)	End Term Exam (Close 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.	

D. SYLLABUS

Overview: Overview of .Net framework and C#, Structure of C# programming language & features, Variables, Data types, Loops, Classes and Objects, Array, Methods, Inheritance, Polymorphism, Event handling, Abstraction and Encapsulation, **ASP.NET:** Understanding ASP.NET Controls, Applications, Web servers, installation of WS- Web forms, web form controls, Running a web application, creating a multiform web project, Internet Explorer Control-State management- View state, Session state, Application state, **ADO.NET:** Architecture of ADO.NET, Connected and Disconnected Database, Create Connection using ADO.NET Object Model, Connection Class, Command Class, Data Adapter Class, Dataset Class, Display data on data bound Controls and Data Grid, **Web applications:** Database Accessing on web applications: Data Binding concept with web, creating data grid, Binding standard web server controls. Display data on web form using Data bound controls. Application deployment.

E. TEXT BOOKS

- Shelly Powers, "Dynamic Web Publishing", Techmedia, 1998.
- Jamie Jaworski, "Java 1.2 Unleashed", Techmedia, 1998

F. REFERENCE BOOKS

- Robert Niles, "CGI by Example", Que, 1996
- Scot Johnson, "Using Active Server Pages", Que, 2000

G. Lecture Plan:

Lecture s	Major Topics	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode Of Assessing CO
1.	Overview	Overview of .Net framework and C#	Understanding COs, Pos and PSOs	Lecture	CA 1302 .1	Mid Term I, Assignment/ Quiz
2.		Structure of C# programming language & features	Understanding C# basics	Lecture	CA 1302 .1	Mid Term I, Assignment/ Quiz
3.		Variables	Introduction to variables used in C#	Lecture	CA 1302 .1	Mid Term I, Assignment/ Quiz
4.		Data types	Introduction to data types valid in C#	Practice	CA 1302 .1	Mid Term I, Assignment/ Quiz
5,6		Loops	Defining loops	Lecture	CA 1302 .1	Mid Term I, Assignment/ Quiz
7,8		Classes and Objects, Methods, Abstraction and Encapsulation.	Identify with OOPs concepts	Lecture	CA 1302 .1	Mid Term I, Assignment/ Quiz
9-10		Inheritance	Understanding use of Inheritance	Lecture	CA 1302 .1	Mid Term I, Assignment/ Quiz
11-13		Polymorphism	Understanding use of polymorphism	Activity	CA 1302 .1	Mid Term I, Assignment/ Quiz
14-15		Event handling	Recognizing events and handling	Lecture	CA 1302 .1	Mid Term I, Assignment/ Quiz

16-17	ASP.NET	ASP.NET Controls, Applications	Understanding ASP.NET Controls, Applications	Lecture	CA 1302 .2	Mid Term II, Assignment/ Quiz
18-19		Web servers, installation of WS	Installation of Web server	Practical	CA 1302 .2	Mid Term II, Assignment/ Quiz
20		Web forms, web form controls	Recognizing web forms and controls	Activity	CA 1302 .2	Mid Term II, Assignment/ Quiz
21-22		Running a web application, creating a multiform web project.	Understanding web application	Activity	CA 1302 .2	Mid Term II, Assignment/ Quiz
23-27		Internet Explorer Control-State management- View state, Session state, Application state	Identifying Various states	Lecture	CA 1302 .2	Mid Term II, Assignment/ Quiz
28-29	ADO.NET	Architecture of ADO.NET, Connected and Disconnected Database	Introduction to ADO	Lecture	CA 1302 .3	Assignment/ Quiz & End Term
30		Connection using ADO.NET Object Mode	Creating ADO	Activity	CA 1302 .3	Assignment/ Quiz & End Term
29-31		Connection Class, Command Class, Data Adapter Class, Dataset Class	Understanding classes	Lecture	CA 1302 .3	Assignment/ Quiz & End Term
32-33		Display data on data bound Controls and Data Grid	Identifying data display and grid	Lecture	CA 1302 .3	Assignment/ Quiz & End Term
34-35	Web applications	Database Accessing on web applications	Introducing database web	Lecture	CA 1302 .4	Assignment/ Quiz & End Term

36.		Data Binding concept with web	Understanding web concepts	Practice	CA 1302 .4	Assignment/ Quiz & End Term
37.		Creating data grid	Application of grid	Lecture	CA 1302 .4	Assignment/ Quiz & End Term
38-39		Binding standard web server controls	Understanding server controls	Lecture	CA 1302 .4	Assignment/ Quiz & End Term
40-41.		Display data on web form using Data bound controls	Understanding data controls	Lecture	CA 1302 .4	Assignment/ Quiz & End Term
42-45		Application deployment.	Implementing application	Activity	CA 1302 .4	Assignment/ Quiz & End Term

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

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CA 130 2.1	Create, compile and run object-oriented C# programs using Visual Studio	1					1							1	1		
CA 130 2.2	Plan, design, and develop web applications using ASP.NET		1	2										1	2		
CA 130 2.3	Access databases using ADO.NET													1	2		
CA 130 2.4	Develop web components via interface realization and standard design patterns		1	1		1								1	3	3	

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Science

Department of Computer Applications

Course Hand-out

Object Oriented Programming Using C++ | CA 1303 | 4 Credits | 3 | 0 4

Session: Jul 19 – Dec 19 | Faculty: Pradeep Kumar | Class: BCA III SEMESTER

A. Introduction: This course aims to discuss basic concept of object oriented concepts. Course is intended to provide the students the experience in program design using OOP's concepts and to emphasize the practical aspects of program efficiency.

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

[1303.1]. Identify the difference between object oriented programming and procedural oriented language and data types in C++.

[1303.2]. Illustrate C++ features such as composition of objects, class, constructor etc for developing coding skills.

[1303.3]. Demonstrate the concepts of Reusability and polymorphism.

[1303.4]. Integrate robustness, reusability, and portability into large-scale software development for better employability.

[1303.5]. Analyze advanced features of C++ specifically stream I/O, templates and operator overloading.

[1303.6]. Apply C++ functions and concepts related to good modular design.

C Program Outcomes:

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Program Specific Outcomes

PSO1 Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other completer application areas to acquire knowledge in various domain-based prospects

PSO2 Encourage to communicate effectively and to improve their competency skills to solve real time problems

PSO3 Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

C. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	20
	Sessional Exam II (Closed Book)	20
	In class Quizzes	10
End Term Exam (Summative)	End Term Exam (Closed 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.	
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.	

D. SYLLABUS

Overview of C++: Concepts of Object Oriented Programming, Introduction to C++ classes and objects, basic concepts of OOP; **Classes & Objects:** Classes, Structure & classes, Union & Classes, Inline function, Friend function, Friend Classes, Scope resolution operator, Static data member, Static member function, passing objects to function, Returning objects; **Constructor & Destructor:** Introduction, Constructor, Parameterized constructor, Multiple Constructor in a Class, Copy constructor, Destructor, Array, Pointers: Array of Objects, Pointers to Object, Type checking C++ pointer; **Function & Operator overloading:** Function overloading, Overloading unary and binary operators, Overloading; **Inheritance:** Introduction to Inheritance; **Types of Inheritance:** Single, Multiple, Multilevel, Hierarchical and Hybrid inheritance, Making private member inheritable, virtual base class, abstract class; **Virtual Functions & Polymorphism:** Virtual function, pure virtual functions, early vs. late binding; **Templates:** Introduction, class template and function template.

E. TEXT BOOKS

1. E. Balaguruswamy, “Object Oriented Programming with C++”, (2nd Edition), TMH, 2010

F. REFERENCE BOOKS

1. Herbert Schildt, “C++ The Complete Reference”, (3rd Edition), TMH, 2011

G. Lecture Plan:

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

Lectur es	Major Topics	Topics	Session outcome	Delivery Mode	Correspond ing CO	Mode Of Assessing CO
1.	Overview of C++	Introduction to OOPS	Understand PO,CO,PSO	Lecture	1303.1	Mid Term I, Quiz & End Term
2.		Introduction to Concepts of Object Oriented Programming	Difference b/w procedural and oop	Lecture	1303.2	Mid Term I, Quiz & End Term
3.	Classes & Objects	Classes & Objects	oop concepts	Lecture	1303.2	Mid Term I, Quiz & End Term
4.		OOP, Classes & Objects	Class program	Tutorial	1303.1, 1303.2	Mid Term I, Quiz & End Term
5.		Structure ,Union & Classes	Difference between c & c++	Lecture	1303.2	Mid Term I, Quiz & End Term
6.		Inline function	Understanding of inline function	Lecture	1303.2	Mid Term I, Quiz & End Term
7.		Friend function	Understanding of friend function	Lecture	1303.2	Mid Term I, Quiz & End Term
8.		Inline & Friend function	Application of inline and friend	Flipped Classroom	1303.2, 1303.4	Mid Term I, Quiz & End Term
9.		Quiz-1	evaluation	Activity	1303.1, 1303.2	
10.		Scope resolution operator	Introduction to c++Operator	Lecture	1303.2	Mid Term I, Quiz & End Term
11.		Static data member, Static member function	static property	Lecture	1303.2	Mid Term I, Quiz & End Term
12.		Passing objects to function, Returning function	Function ptototyping	Lecture	1303.2	Mid Term I, Quiz & End Term
13.		Objects as an arguments	Function ptototyping	Tutorial	1303.1, 1303.2	Mid Term I, Quiz & End Term
14.	Constructor & Destructor	Introduction to Constructor, Parameterized Constructor	Implementing class using constructor	Lecture	1303.2	Mid Term I, Quiz & End Term
15.		Copy constructor, Multiple Constructor in a Class	Implementing class using construuctor	Lecture	1303.2	Mid Term I, Quiz & End Term
16.		Destructor	Implementing class using destructor	Lecture	1303.2	Mid Term I, Quiz & End Term
17.		Complex Problems on Constructor	Implementing class using construuctor	Flipped Classroom	1303.2	Mid Term I, Quiz & End Term
18.		Quiz-2	Evaluation constructor	Activity	1303.2	
19.		Introduction to Array and Pointers	Array and pointer in C++	Lecture	1303.2	Mid Term I, Quiz & End Term
20.		Array of Objects, Pointers to Object	Array and pointer in C++	Lecture	1303.2	Mid Term I, Quiz & End Term
21.		Type checking C++ pointer	Array and pointer in C++	Lecture	1303.2 & 1303.3	Mid Term I, Quiz & End Term
22.		This pointer, Pointer to class members	Array and pointer in C++	Lecture	1303.2	Mid Term II, Quiz & End Term
23.		Pointers of Object	Array and pointer in C++	Tutorial	1303.2 & 1303.3	Mid Term II, Quiz & End Term
24.	Function & Operator Overloading	Function overloading	Implementing function overloading in c++	Lecture	1303.2 & 1303.3	Mid Term II, Quiz & End Term
25.		Operator Overloading-Ist	Implementing operator overloading in c++	Lecture	1303.5	Mid Term II, Quiz & End Term
26.		Operator Overloading-IIInd	Implementing operator overloading in c++	Lecture	1303.5	Mid Term II, Quiz & End Term

27.		Overloading of Operators	Implementing operator overloading in c++	Tutorial	1303.1 & 1303.2	Mid Term II, Quiz & End Term
28.		Quiz-3	Evaluation-overloading	Activity	1303.3, 1303.5	
29.	Inheritance & Types of Inheritance	Introduction to Inheritance	Reusability in c++	Lecture	1303.4, 1303.6	Mid Term II, Quiz & End Term
30.		Types of Inheritance	Reusability in c++	Lecture	1303.4, 1303.6	Mid Term II, Quiz & End Term
31.		Virtual base class	Reusability in c++	Lecture	1303.4, 1303.6	Mid Term II, Quiz & End Term
32.		Abstract class	Reusability in c++	Lecture	1303.4, 1303.6	Mid Term II, Quiz & End Term
33.		Virtual base & abstract	Reusability in c++	Flipped Classroom	1303.4, 1303.6	Mid Term II, Quiz & End Term
34.	Polymorphism & Virtual Functions	Polymorphism & its types	Implementing polymorphism concept	Lecture	1303.3	Mid Term II, Quiz & End Term
35.		Virtual Constructor & virtual destructor	Implementing polymorphism concept	Lecture	1303.3	Mid Term II, Quiz & End Term
36.		Quiz-4	evaluation	Activity	1303.4, 1303.6	
37.		Virtual function	Implementing polymorphism concept	Lecture	1303.3	Mid Term II, Quiz & End Term
38.		Pure virtual function	Implementing polymorphism concept	Lecture	1303.3	Mid Term II, Quiz & End Term
39.		Early Vs late binding	Implementing dynamic binding	Lecture	1303.3	Mid Term II, Quiz & End Term
40.		Run time polymorphism	Implementing polymorphism concept	Tutorial	1303.3	Mid Term II, Quiz & End Term
41.	Templates	Introduction to Templates	Templates implementantion	Lecture	1303.5	Mid Term II, Quiz & End Term
42.		Class template	Templates implementantion	Lecture	1303.5	Quiz & End Term
43.		Function template	Templates implementantion	Lecture	1303.5	Quiz & End Term
44.		Templates	Templates implementantion	Tutorial	1303.5	Quiz & End Term
45.		Quiz-5	evaluation	Activity	1303.3, 1303.5	
46.	I/O Operations & File Handling	Unformatted I/O operations	I/o operators	Lecture	1303.5	Quiz & End Term
47.		Formatted console I/O operations	I/o operators	Lecture	1303.5	Quiz & End Term
48.		Managing output using manipulators	manipulators	Lecture	1303.5	Quiz & End Term
49.		File handling	Handling files in c++	Lecture	1303.4, 1303.6	Quiz & End Term
50.		Opening and closing files- Using constructors	Handling files in c++	Lecture	1303.4, 1303.6	Quiz & End Term
51.		File modes	Handling files in c++	Lecture	1303.4, 1303.6	Quiz & End Term
52.		File handling	Handling files in c++	Flipped Classroom	1303.4, 1303.6	Quiz & End Term

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
CA 1303.1	Identify the difference between object oriented programming and procedural oriented language and data types in C++.	1	2		1									2			
CA 1303.2	Illustrate C++ features such as composition of objects, class, constructor etc.		2											2			
CA 1303.3	Demonstrate the concepts of Reusability and polymorphism.		1		1									2			
CA 1303.4	Integrate robustness, reusability, and portability into large-scale software development.				1												
CA 1303.5	Analyze advanced features of C++ specifically stream I/O, templates and operator overloading.															1	
CA 1303.6	Apply C++ functions and concepts related to good modular design.		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

CA 1303.1	Identify the difference between object oriented programming and procedural oriented language and data types in C++.														
CA 1303.2	Illustrate C++ features such as composition of objects, class, constructor etc.														
CA 1303.3	Demonstrate the concepts of Reusability and polymorphism.														
CA 1303.4	Integrate robustness, reusability, and portability into large-scale software development.														
CA 1303.5	Analyze advanced features of C++ specifically stream I/O, templates and operator overloading.														
CA 1303.6	Apply C++ functions and concepts related to good modular design.														

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

MANIPAL UNIVERSITY JAIPUR

School of Basic Science



Department of Computer Applications

Course Hand-out

Multimedia Technologies | CA 1304 | 4 Credits | 3 | 0 | 4

Session: Jul 19 – Dec 19 | Faculty: Kuntal Gaur | Class: BCA III SEMESTER

- A. Introduction:** This course is offered by Department of Computer Applications as the core course for the third semester undergraduate students of Bachelors of Computer Applications. The aim of the course is to provide the students exposure to multimedia system, coding, storage and communication. The course offers in depth knowledge about the techniques and technologies related to multimedia signal processing and communication. It offers an elementary knowledge on multimedia format and standards, data compression techniques and multimedia analysis. There is no specific prerequisite for this course.
- B. Course Outcomes:** At the end of the course, students will be able to
- [CA1304.1].** Describe the multimedia systems in terms of its architecture, requirements, representation and integration capability.
 - [CA1304.2].** Understand and have in-depth knowledge of multimedia standards for audio, image and video compression/decompression.
 - [CA1304.3].** Experiment different techniques to construct multimedia such as graphics, images and computer based animation.
 - [CA1304.4].** Identify and evaluate advanced future multimedia systems, input and output technologies and design components.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

- [PO.1].** Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
- [PO.2].** Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
- [PO.3].** Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings 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.4].** Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
- [PO.5].** Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
- [PO.6].** Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
- [PO.7].** Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

PROGRAM SPECIFIC OUTCOMES

- [PSO.1]. Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other completer application areas to acquire knowledge in various domain-based prospects.
- [PSO.2]. Encourage to communicate effectively and to improve their competency skills to solve real time problems.
- [PSO.3]. Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed 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 (Closed 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 TO MULTIMEDIA SYSTEMS: Multimedia elements, applications, architecture; system components, types, evolving technologies; Defining objects for multimedia systems; Multimedia Data Interface Standards; Storage requirements and multimedia Databases; **MEDIA AND DATA STREAMS:** Media of Perception, Representation, Presentation, Storage, Transmission, Information Exchange; Discrete, continuous and independence media, Characterizing Data Streams; **AUDIO TECHNOLOGY:** Audio representation on computers; Three Dimensional Sound Projection; Speech Signals; Speech input, output and transmission; **GRAPHICS AND IMAGES, VIDEO TECHNOLOGY, COMPUTER-BASED ANIMATION:** Capturing graphics and images, Reconstructing Images; Graphics and Image Output Options; Specification, controlling, display and transmission of animation; **DATA COMPRESSION:** Basic Compression Techniques; JPEG, Hierarchical Mode H.261 (Px64) and H.263, MPEG: Video Encoding, Audio Coding, Data Stream, MPEG-2, MPEG-4, MPEG-7; Fractal Compression; **OPTICAL STORAGE MEDIA:** History and basics of optical technology; Video Discs and Other WORMs; CD Digital Audio; CD-ROM Extended Architecture; CD-Recordable; CD Magneto-Optical; CD Read/Write; DVD; **CONTENT ANALYSIS :** Simple Vs. Complex Features; Analysis of Individual Images; Analysis of Image Sequences; Audio Analysis; **DATA AND FILE FORMAT STANDARDS:** Rich-Text, TIFF, RIFF, MIDI, JPEG,DIB, AVI, MPEG Standards, TWAIN.

F. TEXT BOOKS

1. R. Steinmetz, K. Narstedt, “*Multimedia Fundamentals: Vol 1-Media Coding and Content Processing*”, 2nd Edition, Prentice Hall India Learning Private Limited, 2003.
2. R. Steinmetz, K. Nahrstedt, “*Multimedia, computing, communications and applications*”, 1st Edition, Pearson Education, 2002.

3. P.K. Andleigh, K. Thakrar, “*Multimedia Systems Design*”, PHI, 2003.

G. REFERENCE BOOKS

1. K.R Rao, Z. S. Bojkovic and D. A. Milovanovic,” *Multimedia Communication Systems: Techniques, Standards, and Networks*”, Pearson Education, 2002.
2. N. K Sharad, “*Multimedia information Networking*”, PHI, 2002.
3. Li Ze-Nian and Drew Mark S, “*Fundamentals of Multimedia*”, Pearson Prentice-Hall, 2004.
4. Tay Vaughan, “*Multimedia making It work*”, TMH 5th Edition 2001.
5. Weixel, Fulton, Barksdale.Morse, “*Multimedia Basics*”, Easwar Press 2004.
6. Subramanian V. S., “*Principles of Multimedia Database Systems*”, Elsevier Publishers, 2013.

H. Lecture Plan:

Lec. No	Major Topic	Topic	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1.	Introduction (Lecture 1-6)	Introduction and Course Hand-out briefing	Understand CO, PO and PSO	Lecture	-	NA
2.		Multimedia elements, applications, architecture	Intro to Multimedia	Lecture	CA 1304 .1	Class Quiz Home Assignments
3		Multimedia system components, types, evolving technologies	Learn Components of Multimedia	Lecture	CA 1304 .1	Class Quiz Home Assignments
4-5		Defining objects for multimedia systems; Multimedia Data Interface Standards	Multimedia Interfaces	Lecture	CA 1304 .1	Class Quiz Home Assignments
6.		Storage requirements and multimedia Databases	Storage Requirements and Databases	Lecture	CA 1304 .1	Class Quiz Home Assignments I Sessional End Term
7	MEDIA AND DATA STREAMS (Lecture 7-9)	Media of Perception, Representation, Presentation, Storage, Transmission, Information Exchange	Learn about basics of Media and data streams	Lecture	CA 1304 .1	Class Quiz Home Assignments I Sessional End Term
8.		Discrete, Continuous and independent media	Types of Media	Lecture	CA 1304 .1	Class Quiz Home Assignments I Sessional End Term

9.		Characterizing Data Streams	Characteristics of Data Streams	Lecture	CA 1304 .1	Class Quiz Home Assignments I Sessional
10-12	AUDIO AND IMAGE REPRESENT ATION ON COMPUTERS (Lecture 10-20)	Audio Representation on Computers	Introduction to Audio media	Lecture	CA 1304 .2	Class Quiz Home Assignments I Sessional End Term
13.		Three-Dimensional Sound Projection	Sound Projection	Lecture	CA 1304 .2	Class Quiz Home Assignments
14-15		Speech Signals; Speech input, output and transmission;	Input-output	Lecture	CA 1304 .2	Class Quiz Home Assignments
16		Capturing graphics and images	Image Representation	Lecture	CA 1304 .2	Class Quiz Home Assignments
17		Reconstructing Images	Image Reconstruction	Lecture	CA 1304 .2	Class Quiz Home Assignments I Sessional End Term
18-20		Graphics and Image Output Options	Graphics Input and Output	Lecture	CA 1304 .2	Class Quiz Home Assignments I Sessional End Term
21		Introduction to Computer based Animation	Intro to animation	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term

22.	COMPUTER BASED ANIMATION AND AUDIO VIDEO COMPRESSION (Lecture 21-36)	Specification, controlling, display and transmission of animation	Basics of animation and its components	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
23.		Video Technology- Random and raster scan	Display Techniques	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
24.		Introduction to Compression Techniques- Basics	Intro to Compression	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
25.		JPEG Compression	JPEG	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
26.		Hierarchical Mode H.261 (Px64) and H.263	H.261 and H.263	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
27-28		MPEG: Video Encoding, Audio Coding-MPEG-2, MPEG-4, MPEG-7	MPEG and its flavors	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
29.		Fractal Compression	Fractal technique	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term

30.		History and basics of optical technology;	Intro to optical technology	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional
31.		Video Discs and Other WORMs	WORM	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
32.		CD Digital Audio CD-ROM Extended Architecture	CD architecture	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
33.		CD-Recordable; CD Magneto-Optical	CD Magnetic	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional
34.		CD Read/Write; DVD	Reading and writing CD	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
35-36		Content Analysis-Simple Vs. Complex Features	Comparison	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
37.		Analysis of Individual Images and Image Sequences	Image Sequence	Lecture/Expert Lec.	CA 1304 .4	Class Quiz Home Assignments
38.		Audio Analysis	Analysis of Audio	Lecture/Expert Lec	CA 1304 .4	Class Quiz Home Assignments End Term

39-41	ANALYSIS OF MULTIMEDIA DATA Sequences	Data and File Format Standards-Rich- Text, TIFF, RIFF, MIDI, JPEG, DIB, AVI, MPEG Standards, TWAIN	Various file formats	Lecture	CA 1304 .4	Class Quiz Home Assignments End Term
42.		Conclusion and Course Summarization		Lecture		
43-46		Applications of Multimedia data and corresponding applications		Lecture & Project	CA 1304 .4	Home Assignments 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	PO 1	PO 2	PO 3
CA130 4.1	Describe the multimedia systems in terms of its architecture, requirements, representation and integration capability.										2				1	
CA130 4.2	Understand and have in-depth knowledge of multimedia standards for audio, image and video compression/decompression.	2	2	3	1											3
CA130 4.3	Experiment different techniques to construct multimedia such as speech, graphics, images and computer based animation.	1	2			3								2		
CA130 4.4	Identify and evaluate advanced future multimedia systems, input and output technologies and design components.					3							1	2		1

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Science

Department of Computer Applications

Course Hand-out

Basic Statistics and Probability | MA 1322 | 4 Credits | 3 | 0 | 4

Session: Jul 19 – Dec 19 | Faculty: Garima Agarwal | Class: BCA III SEMESTER

A. Introduction: This course is offered by Dept. of Computer Application, targeting students who wish to pursue research & development in industries or higher studies. The aim of the department of Computer Application is to produce highly, well qualified and motivated graduates possessing fundamental knowledge of Computer Application and research of software who can provide leadership and service to our nation and world. The main focus of the department of Computer Application is to be recognized as a trendsetter of its undergraduate programme through focus on core competencies, multidisciplinary collaborations, and quality in education. This course provides the Basic concept of statistic and central tendency and measure of dispersion. Student will find the permutation and combination as well. Basic concept of probability is also incorporated in this course.

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

[1322.1]. To understand the concept of Basic Statistics.

[1322.2]. To understand the concept of Central tendency and Dispersion.

[1322.3]. To understand the concept of Dispersion.

[1322.4]. To understand the application of Permutation and combination.

[1322.5]. To understand the concept of Probability.

C Program Outcomes:

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Program Specific Outcomes

PSO1 Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other completer application areas to acquire knowledge in various domain-based prospects

PSO2 Encourage to communicate effectively and to improve their competency skills to solve real time problems

PSO3 Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

C. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	20
	Sessional Exam II (Closed Book)	20
	In class Quizzes	10
End Term Exam (Summative)	End Term Exam (Closed 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.	
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.	

D. SYLLABUS

Population, Sample and Data Condensation Definition and scope of statistics, concept of population and simple with Illustration, Raw data, attributes and variables, classification, frequency distribution, Cumulative frequency distribution.

Measures of Central Tendency Concept of central Tendency, requirements of a good measure of central tendency, Arithmetic mean, Median, Mode, Harmonic Mean, Geometric mean for grouped and ungrouped data.

Measures of Dispersion: Concept of dispersion, Absolute and relative measure of dispersion, range variance, Standard deviation, Coefficient of variation

Permutations and Combinations Permutations of 'n' dissimilar objects taken 'r' at a time (with or without repetitions). $nPr = n!/(n-r)!$ (without proof). Combinations of 'r' objects taken from 'n' objects. $nCr = n!/(r!(n-r)!)$ (Without proof). Simple examples, Applications.

Sample space, Events and Probability Experiments and random experiments, Ideas of deterministic and non-deterministic experiments; Definition of sample space, discrete sample space, events; Types of events, Union and intersections of two or more events, mutually exclusive events, Complementary event, Exhaustive event; Simple examples. Classical definition of probability, Addition & multiplication theorems of probability without Proof (upto three events are expected). Definition of conditional probability Definition of independence of two events, total probability theorem and Bay's theorem, simple numerical problems. Multiple Correlation and Regression (for the three variables only).

E. TEXT BOOKS

1. S. C. Gupta - Fundamentals of statistics - Sultan chand & sons, Delhi.
2. Goon, Gupta And Dasgupta - Fundamentals of statistics - The World Press Pvt. Ltd., Kolkata.

F. REFERENCE BOOKS

1. Rohtagi, V.K., "An Introduction to Mathematical Statistics", John Wiley & Sons, 1976.
2. Mood A.M., Greybill, F.A. and Bose D.C., "Introduction to the Theory of Statistics", McGraw Hill, 1974.
3. S.P. Gupta, "Statistical Methods", Sultan Chand & Sons, New Delhi, 2008

G. Lecture Plan:

Lectures	Major Topics	Topics	Session outcome	Delivery Mode	Corresponding CO	Mode Of Assessing CO
1.	BASIC STATISTICS	Concept of population	Understanding population	Lecture	1322.1	Mid Term I, Quiz & End Term
2.		Illustrative examples	Class problems	Tutorial	1322.1	Mid Term I, Quiz & End Term
3.		Concept of data and its type	Introduction of Data	Lecture	1322.1	Mid Term I, Quiz & End Term
4.		Illustrative examples	Class problems	Tutorial	1322.1	Mid Term I, Quiz & End Term
5.		Frequency distribution	Concept of Frequency	Lecture	1322.1	Mid Term I, Quiz & End Term
6.		Illustrative examples	Class problems	Tutorial	1322.1	Mid Term I, Quiz & End Term
7.		Quiz-1	evaluation	Activity	1322.1	Mid Term I, Quiz & End Term
8.	MEASURE OF CENTRAL TENDENCY	Concept of central tendency	Understanding of central	Lecture	1322.2	Mid Term I, Quiz & End Term
9.		Illustrative examples	Class problems	Tutorial	1322.2	Mid Term I, Quiz & End Term
10.		Arithmetic Mean	Concept of Arithmetic Mean	Lecture	1322.2	Mid Term I, Quiz & End Term
11.		Illustrative examples	Class problems	Tutorial	1322.2	Mid Term I, Quiz & End Term
12.		harmonic mean	Concept of harmonic	Lecture	1322.2	Mid Term I, Quiz & End Term
13.		Illustrative examples	Class problems	Tutorial	1322.2	Mid Term I, Quiz & End Term
14.		geometric mean	Concept of geometric mean	Lecture	1322.2	Mid Term I, Quiz & End Term
15.		Illustrative examples	Class problems	Tutorial	1322.2	Mid Term I, Quiz & End Term
16.		mean and mode	Concept of mean and mode	Lecture	1322.2	Mid Term I, Quiz & End Term
17.		Illustrative examples	Class problems	Tutorial	1322.2	Mid Term I, Quiz & End Term
18.		median	Understanding median	Lecture	1322.2	Mid Term I, Quiz & End Term
19.		Illustrative examples	Class problems	Tutorial	1322.2	Mid Term I, Quiz & End Term
20.		Quiz-2	evaluation	Activity	1322.2	Mid Term I, Quiz & End Term
21.		Templates	Templates implementatio	Tutorial	1322.2	Quiz & End Term
22.	MEASURE OF DISPERSION	Basic concept of dispersion	understanding dispersion	Lecture	1322.3	Mid Term I, Quiz & End Term
23.		Range variance	Basic concept of Range	Lecture	1322.3	Mid Term I, Quiz & End Term
24.		Standard Deviation	understanding Standard	Lecture	1322.3	Mid Term II, Quiz & End Term
25.		Coefficient of variation	understanding Coefficient of variation	Lecture	1322.3	Mid Term II, Quiz & End Term
26.		Quiz-3	evaluation	Activity	1322.3	Mid Term II, Quiz & End Term

27.	PERMUTATION AND COMBINATION	Definition and basic concept of Permutation	Understanding Permutation	Lecture	1322.4	Mid Term II, Quiz & End Term
28.		Illustrative examples	Class problems	Tutorial	1322.4	Mid Term II, Quiz & End Term
29.		Definition and basic concept of Combination	concept of Combination	Tutorial	1322.4	Mid Term II, Quiz & End Term
30.		Illustrative examples	Class problems	Tutorial	1322.4	Mid Term II, Quiz & End Term
31.		Quiz-4	evaluation	Activity	1322.4	Mid Term II, Quiz & End Term
32.	PROBABILITY	Concept of Sample space	Introduction of Sample space	Lecture	1322.5	Mid Term II, Quiz & End Term
33.		Concept of events and its types	understanding of events	Lecture	1322.5	Mid Term II, Quiz & End Term
34.		Properties of an event	understanding of events	Lecture	1322.5	Mid Term II, Quiz & End Term
35.		Illustrative examples	Class problems	Tutorial	1322.5	Mid Term II, Quiz & End Term
36.		Concept of probability	Understanding Probability	Lecture	1322.5	Mid Term II, Quiz & End Term
37.		Total Probability	Concept of Total Probability	Lecture	1322.5	Mid Term II, Quiz & End Term
38.		Illustrative examples	Class problems	Tutorial	1322.5	Mid Term II, Quiz & End Term
39.		Bayes Theorem	Concept of probability	Lecture	1322.5	Quiz & End Term
40.		Illustrative examples	Class problems	Tutorial	1322.5	Quiz & End Term
41.		Multiple correlation	understanding Correlation	Lecture	1322.5	Quiz & End Term
42.		Illustrative examples	Class problems	Tutorial	1322.5	Quiz & 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
MA 1322.1	To understand the concept of Basic Statistics.	1			1				1					2			
MA 1322.2	To understand the concept of Central tendency and Dispersion.		2						1								2

MA 1322.3	To understand the concept of Dispersion.		1		1									2			
MA 1322.4	To understand the application of Permutation and combination							1									
MA 1322.5	To understand the concept of Probability		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
MA 1322.1	To understand the concept of Basic Statistics.															
MA 1322.2	To understand the concept of Central tendency and Dispersion.															
MA 1322.3	To understand the concept of Dispersion.															
MA 1322.4	To understand the application of Permutation and combination															
MA 1322.5	To understand the concept of Probability															

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Science

Department of Computer Application

Course Hand-out

Database Management System| CA 1401 | 4 Credits | 3 | 0 | 4

Session: Jan 20 – May 20 | Faculty: Pradeep Kumar Tiwari | Class: BCA IV

A. Introduction: This course provides basic information about Database Management System. It provides the basic Conceptual background necessary to design and develop simple database system. The main Emphasize is to know the main features and functions of the DBMS and the features of Relational Database and ER models

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

[1401.1]. Describe main features and functions of the DBMS.

[1401.2]. Design data independence and data models for database systems.

[1401.3]. Classify features of Relational Database and ER Models.

[1401.4]. Recite relational algebra concepts and use it to translate queries to relational algebra.

[1401.5]. Outline and explain SQL queries.

[1401.6]. Explain the concept of transaction, concurrency and recovery.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Program Specific Outcomes

PSO1 Prepare professionally trained in the areas of programming, databases, software engineering, web-designing and networking and other completer application areas to acquire knowledge in various domain-based prospects

PSO2 Encourage to communicate effectively and to improve their competency skills to solve real time problems

PSO3 Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I	20
	Sessional Exam II	20
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	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 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 to Database management system, some examples, characteristics of the database approach, Relational Model. **ER Models:** Database modeling using the entity-relationship model, entity types, entity sets attributes and keys, relationships. **Database Design:** Functional dependencies and normalization for relational databases. **SQL the Relational Database Standard:** Data definition, constraints, Basic Queries in SQL, More complex SQL queries, Insert, Update and Delete Statements in SQL. **Transaction Processing:** Transaction processing concepts: Introduction to transaction processing, transaction and system concepts, desirable properties of transactions, schedules and recoverability.

F. TEXT BOOKS

1. Ehmasri & Navathe, *"Fundamentals of Database Systems"*, (3rd Edition), Addison-Wesley, 1999
2. Korth & S.Sudarshan, *"Database System Concepts"*, (5th edition), TATA McGraw Hill, 2002

G. REFERENCE BOOKS

1. C.J. Date, *"Introduction to Database Systems"*, Addison-Wesley, 1995.

Lecture Plan:

Lecture No.	Main Topics	Topic	Session outcome	Mode of delivery	Corresponding CO	Mode Of Assessing CO
1	Introduction to DBMS	Introduction to Database	Understanding of CO PO,PSO	Lecture	CA1401.1	Mid Term-I,Quiz & End Term
2		Database Vs File System	Introduction to Database	Lecture	CA1401.1	Mid Term-I,Quiz & End Term
3		Introduction to Database Management System & Database Management System-Examples	Knowledge of Database with examples	Lecture	CA1401.1	Mid Term-I,Quiz & End Term
4		TUTORIAL	Knowledge of Database with examples	Activity	CA1401.1	Mid Term-I,Quiz & End Term
5		Characteristics of the database approach	Applications of database	Lecture	CA1401.1	Mid Term-I,Quiz & End Term
6		Components of database system	Synthesis of DBMS structure	Lecture	CA1401.1	Mid Term-I,Quiz & End Term
7		actors on the scene, Workers behind the scene Database user and database application	Synthesis of DBMS structure	Lecture	CA1401.1	Mid Term-I,Quiz & End Term
8		TUTORIAL	Synthesis of DBMS structure	Lecture	CA1401.1	Mid Term-I,Quiz & End Term
9		Functions of DBMS	Knowledge of DBMS	Lecture	CA1401.1	Mid Term-I,Quiz & End Term
10		Advantages & Disadvantages of DBMS	Knowledge of DBMS	Flipped class	CA1401.1	Mid Term-I,Quiz & End Term
11		Database Architecture-Two Tire client/Server Architecture	Synthesis of DBMS structure	Lecture	CA1401.1	Mid Term-I,Quiz & End Term
12		Database Architecture-Three Tire client/Server Architecture	Synthesis of DBMS structure	Lecture	CA1401.1	Mid Term-I,Quiz & End Term
13		TUTORIAL	Synthesis of DBMS structure	Lecture	CA1401.1	Mid Term-I,Quiz & End Term

14	Database Modeling	Database Models- OverviewRelational Model with Examples	Knowledge of DBMS models	Lecture	CA1401.2 & CA1401.3	Mid Term-I, Quiz & End Term
15		Relational Model and Relational algebra	Analyse dbms models	Lecture	CA1401.2 & CA1401.3 & CA1401.4	Mid Term-II, Quiz & End Term
16		ER Models with examples Database modeling using the entity-relationship model	Analyse dbms models	Activity	CA1401.2 & CA1401.3	Mid Term-II, Quiz & End Term
17		TUTORIAL	Analyse dbms models	Lecture	CA1401.2 & CA1401.3	Mid Term-II, Quiz & End Term
18		Entity types, Entity sets	Knowledge of database models	Lecture	CA1401.2 & CA1401.3	Mid Term-II, Quiz & End Term
19		attributes, relationships	Knowledge of database models	Lecture	CA1401.2 & CA1401.3	Mid Term-II, Quiz & End Term
20		Concept of keys	Knowledge of keys	Lecture	CA1401.2 & CA1401.3	Mid Term-II, Quiz & End Term
21		TUTORIAL	Knowledge of keys	Lecture	CA1401.2 & CA1401.3	Mid Term-II, Quiz & End Term
22		Database Design-I & Database Design-II	Introduction to Database Design	Activity	CA1401.2 & CA1401.3	Mid Term-II, Quiz & End Term
23		Functional Dependencies	Introduction to functional dependencies	Lecture	CA1401.2 & CA1401.3	Mid Term-II, Quiz & End Term
24	Relation Model	Normalization for relational databases-Overview	Introduction to normalization	Lecture	CA1401.2 & CA1401.3	Mid Term-II, Quiz & End Term
25		Problem without Normalization	Introduction to normalization	Lecture	CA1401.2 & CA1401.3	Mid Term-II, Quiz & End Term
26		TUTORIAL	Introduction to normalization	Lecture	CA1401.2 & CA1401.3	Mid Term-II, Quiz & End Term
27		Normal forms-I & Normal forms-II	Introduction to normalization	Lecture	CA1401.2 & CA1401.3	Mid Term-II, Quiz & End Term
28		Example of Normal Form	Introduction to normalization	Activity	CA1401.2 & CA1401.3	Mid Term-II, Quiz & End Term

29	SQL	Database languages and interfaces	Comprehension on SQL	Lecture	CA1401.5	Mid Term-II, Quiz & End Term
30		TUTORIAL	Comprehension on SQL	Lecture	CA1401.5	Mid Term-II, Quiz &
31		Introduction to SQL & Introduction to SQL Commands-DDL,DML,DCL,TCL	Introduction to SQL	Flipped Class	CA1401.5	Mid Term-I & II, Quiz & End Term
32		DDL: Data Definition Language(Basic Queries)-I	Introduction to SQL	Lecture	CA1401.5	Mid Term-I & II, Quiz & End Term
33		DDL: Data Definition Language(Basic Queries)-II	Introduction to SQL	Lecture	CA1401.5	Mid Term-I & II, Quiz & End Term
34		TUTORIAL	Introduction to SQL	Lecture	CA1401.5	Mid Term-I & II, Quiz & End Term
35		DML: Data Manipulation Language(Basic Queries)-I & DML: Data Manipulation Language(Basic Queries)-II	Introduction to SQL-dml	Lecture	CA1401.5	Mid Term-I & II, Quiz & End Term
36		DCL: Data Control Language(Basic Queries)	Introduction to SQL-dcl	Lecture	CA1401.5	Mid Term-I & II, Quiz & End Term
37	Transaction Concept	TCL: Transaction Control Language(Basic Queries)	Introduction to SQL-tcl	Lecture	CA1401.5	Mid Term-I & II, Quiz & End Term
38		TUTORIAL	Introduction to SQL-tcl	Lecture	CA1401.5	Mid Term-I & II, Quiz & End Term
39		More complex SQL queries	Synthesis-sql queries	Activity	CA1401.5	Mid Term-I & II, Quiz & End Term
40		Specifying general constraints as assertion and Additional features of SQL-I	Synthesis-constraints	Lecture	CA1401.5	Quiz & End Term
41		Specifying general constraints as assertion and Additional features of SQL-II	Synthesis-integrity constraints	Lecture	CA1401.5	Quiz & End Term
42		TUTORIAL	Synthesis-integrity constraints	Lecture	CA1401.5	Quiz & End Term
43		Introduction to transaction & Introduction to transaction processing-concepts	Introduction to transaction	Lecture	CA1401.6	Quiz & End Term
44		Transaction and system concepts	Knowledge and	Flipped class	CA1401.6	Quiz & End Term

		Introduction to transaction			
45		Desirable properties of transactions	Application to SQL Transaction	Lecture	CA1401.6 Quiz & End Term
46		TUTORIAL	Application to SQL Transaction	Lecture	CA1401.6 Quiz & End Term
47		Techniques for concurrency-I	Introduction Techniques for concurrency	Lecture	CA1401.6 Quiz & End Term
48		Introduction to concurrency & Techniques for concurrency-II	Introduction Techniques for concurrency	Lecture	CA1401.6 Quiz & End Term
49		TUTORIAL	Introduction Techniques for concurrency	Lecture	CA1401.6 Quiz & End Term
50		Database Recovery Techniques-I	Introduction to recovery	Lecture	CA1401.6 Quiz & End Term
51		Database Recovery Techniques-II	Introduction to recovery techniques	Lecture	CA1401.6 Quiz & End Term
52		TUTORIAL	Introduction to recovery techniques	Lecture	CA1401.6 Quiz & End Term

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	PSO 3
CA 1401.1	Describe main features and functions of the DBMS.				2									1		
CA 1401.2	Design data independence and data models for database systems.			1											2	
CA 1401.3	Classify features of Relational Database and ER Models.				2									3		
CA 1401.4	Recite relational algebra concepts and use it to translate queries to relational algebra.	2														
CA 1401.5	Outline and explain SQL queries.					2								2		
CA 1401.6	Explain the concept of transaction, concurrency and recovery.				2	1										2

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Sciences

Bachelor of Computer Application

Course Hand-out

Visual Programming Using .Net | CA 1402 | 4 Credits | 3 1 0 4

Session: Jan May 2020 | Faculty: Dr. Vaibhav Bhatnagar | Class: BCA IV SEMESTER

- **Introduction:** This course will introduce students to the fundamental concepts programming languages using its implementation in .Net. The objective of course is to develop background knowledge as well as core expertise in C#. The subsequent objectives are to understand, analyze and explain .NET Framework, Write, debug, and document well-structured .NET applications

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

[1402.1]: Understand the basic concepts of C# and .NET framework.

[1402.2]: Write programs using the fundamental concepts of object-oriented programming.

[1402.3]: Apply the concepts of basic programming in C# such as data type, Identifier etc.

[1402.4]: Implement the concepts of Event handling and Type Conversion.

[1402.5]: Understand and implement basic concepts of Database connectivity.

PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Program Specific Outcomes

[PSO1]. Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other computer application areas to acquire knowledge in various domain-based prospects

[PSO2]. Encourage to communicate effectively and to improve their competency skills to solve real time problems

[PSO3]. Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

B. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	20
	Sessional Exam II (Closed Book)	20
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	10
End Term Exam (Summative)	End Term Exam (Closed 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.	

C. SYLLABUS

Introduction: The Origin of .Net Technology, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Just-In –Time Compilation; Classes and Objects: Framework Base Classes, Data Types, Identifiers, Variables, Constants, Literals, Array and Strings, Object and Classes, Inheritance and Polymorphism, Operator Overloading, Interfaces, Events. Type conversion, Error Handling; Database and Connectivity: ADO.Net. Distributed Application in C#, Visual programming interface with C#. Web controls, Web Forms.

D. TEXT BOOKS

1. Wiley, "Beginning Visual C# 2008", Wrox Publication, 2009
2. Fergal Grimes, "Microsoft .Net for Programmers", SPI, 2011

E. REFERENCE BOOKS

1. Balagurusamy, "Programming with C#", TMH, 2010
2. Mark Michaelis, "Essential C# 3.0: For .NET Framework 3.5", (2nd Edition), Pearson Education, 2010

Lecture Plan:

LEC NO	Major Topics	TOPICS	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Accessing CO
1	.Net Framework	Introduction to .Net Technology	Understanding .Net framework and IDE	Lecture	1402.1	Mid Term I, Quiz & End Term
2		.Net Evolution	Understanding .Net framework and IDE	Lecture	1402.1	Mid Term I, Quiz & End Term
3		IDE, Visual Studio	Understanding .Net framework and IDE	Lecture	1402.1	Mid Term I, Quiz & End Term

4		.Net Framework	Understanding .Net framework and IDE	Lecture	1402.1	Mid Term I, Quiz & End Term
5		Common Language Runtime	.Net Framework	Lecture	1402.1	Mid Term I, Quiz & End Term
6		Implementation of Common Language Runtime	.Net Framework	Lecture	1402.1	Mid Term I, Quiz & End Term
7		Tutorial	.Net Framework	Tutorial	1402.1	Mid Term I, Quiz & End Term
8		Common Type System	.Net Framework	Lecture	1402.1	Mid Term I, Quiz & End Term
9		Implementation of Common Type System	.Net Framework	Lecture	1402.1	Mid Term I, Quiz & End Term
10		Tutorial	.Net Framework	Tutorial	1402.1	Mid Term I, Quiz & End Term
11		Common Language Specification	.Net Framework	Lecture	1402.1	Mid Term I, Quiz & End Term
12		Implementation of Common Language Specification	.Net Framework	Lecture	1402.1	Mid Term I, Quiz & End Term
13		Tutorial	.Net Framework	Tutorial	1402.1	Mid Term I, Quiz & End Term
14		Microsoft Intermediate Language	.Net Framework	Lecture	1402.1	Mid Term I, Quiz & End Term
15		Implementation of Microsoft Intermediate Language	.Net Framework	Lecture	1402.1	Mid Term I, Quiz & End Term
16		Just-In-Time Compilation	.Net Framework	Lecture	1402.1	Mid Term I, Quiz & End Term
17		Compilation Process	.Net Framework	Lecture	1402.1	Mid Term I, Quiz & End Term
18		Tutorial	.Net Framework	Tutorial	1402.1	Mid Term I, Quiz & End Term
19	OOPs Concepts	Concepts of OOPs	fundamental concepts of object-oriented programming	Tutorial	1402.2	Mid Term I, Quiz & End Term

20		Classes and Objects	fundamental concepts of object-oriented programming	Lecture	1402.2	Mid Term I, Quiz & End Term
21		Implementation of Classes and Objects	fundamental concepts of object-oriented programming	Lecture	1402.2	Mid Term I, Quiz & End Term
22		Framework base Classes	fundamental concepts of object-oriented programming	Lecture	1402.2	Mid Term II, Quiz & End Term
23		Implementation on Visual Studio	fundamental concepts of object-oriented programming	Lecture	1402.2	Mid Term II, Quiz & End Term
24		Data Types and Identifiers	Basic Concepts of Programming	Lecture	1402.3	Mid Term II, Quiz & End Term
25		Implementation of Data Types and Identifiers	Basic Concepts of Programming	Lecture	1402.3	Mid Term II, Quiz & End Term
26		Array and Strings	Basic Concepts of Programming	Lecture	1402.3	Mid Term II, Quiz & End Term
27		Implantation of Array and String	Basic Concepts of Programming	Lecture	1402.3	Mid Term II, Quiz & End Term
28		Concepts of Inheritance	fundamental concepts of object-oriented programming	Lecture	1402.2	Mid Term II, Quiz & End Term
29		Implementation of inheritance	fundamental concepts of object-oriented programming	Lecture	1402.2	Mid Term II, Quiz & End Term
30		Polymorphism	fundamental concepts of object-oriented programming	Lecture	1402.2	Mid Term II, Quiz & End Term
31		Implementation of Polymorphism	fundamental concepts of object-oriented programming	Lecture	1402.2	Mid Term II, Quiz & End Term
32		Operator Overloading	fundamental concepts of object-oriented programming	Lecture	1402.2	Mid Term II, Quiz & End Term
33		Implementation of Operator Overloading	fundamental concepts of object-oriented programming	Lecture	1402.2	Mid Term II, Quiz & End Term
34		Interface and event handling and Type Conversion		Lecture	1402.3	Mid Term II, Quiz & End Term

35	Error Handling	Implementation of Interface and Handling	Error Handling	Lecture	1402.3	Mid Term II, Quiz & End Term
36		Error Handling	Error Handling	Activity	1402.4	Mid Term II, Quiz & End Term
37		Implementation of Error Handling	Error Handling	Lecture	1402.4	Mid Term II, Quiz & End Term
38		Concepts of Data Handling	Error Handling	Lecture	1402.4	Mid Term II, Quiz & End Term
39	Database Connectivity	Types of Drivers	Implementation of ADO.net	Lecture	1402.5	Mid Term II, Quiz & End Term
40		Distributed Applications in C#	Implementation of ADO.net	Lecture	1402.5	Quiz & End Term
41		Implementation of Database Applications	Implementation of ADO.net	Lecture	1402.5	Quiz & End Term
42		Insert, delete and Updating in Ado.Net	Implementation of ADO.net	Lecture	1402.5	Quiz & End Term
43		Web Controls	Implementation of ADO.net	Lecture	1402.5	Quiz & End Term
44		Implementation of Different Web Controls	Implementation of ADO.net	Lecture	1402.5	Quiz & End Term
45		Form handling	Implementation of ADO.net	Lecture	1402.5	Quiz & End Term
46		Designing of Web Forms	Implementation of ADO.net	Lecture	1402.5	Quiz & End Term
47	Handout	Handouts	Handouts	Activity	1402.5	Quiz & End Term
48		Handouts	Handouts	Activity	1402.5	Quiz & End Term
49	Revision	Revision-1	Revision	Activity	1402.1,	Quiz & End Term
50		Revision-2	Revision	Activity	1402.2	Quiz & End Term
51		Revision-3	Revision	Activity	1402.4	Quiz & End Term
52		Revision-4	Revision	Activity	1402.5	Quiz & End Term

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
CA 1402.1	Understand the basic concepts of C# and .NET framework	3	1		1									1		
CA 1402.2	Write programs using the fundamental concepts of object-oriented programming		2	2											3	
CA 1402.3	Apply the concepts of basic programming in C# such as data type, Identifier etc.		1		2	3								3		
CA 1402.4	Implement the concepts of Event handling and Type Conversion				2		2									2
CA 1402.5	Understand and implement basic concepts of Database connectivity			1				1							2	

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Science

Department of Computer Application

Course Hand-out

E Commerce| CA 1403 | 4 Credits | 3 1 0 4

Session: Jan – May 2020 | Faculty: Pradeep Kumar | Class: BCA IV

- A. Introduction:** The objectives of the course are to introduce the concept of electronic commerce, and to understand how electronic commerce is affecting business enterprises, governments, consumers and people in general. In addition, we will study the development of websites using relevant software tools.
- B. Course Outcomes:** At the end of the course, students will be able to:

[1403.1]. Elaborate the components and roles of the Electronic Commerce environment.

[1403.2]. Explain how businesses sell products and services on the Web & Describe the qualities of an Effective Web business presence.

[1403.3]. Describe the working of E- payment systems.

[1403.4]. Depict the client/server infrastructure that supports electronic commerce and basic e-commerce Functions.

[1403.5]. Outline legal and ethical issues related to E-Commerce.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Program Specific Outcomes

PSO1 Prepare professionally trained in the areas of programming, databases, software engineering, web-designing and networking and other completer application areas to acquire knowledge in various domain-based prospects

PSO2 Encourage to communicate effectively and to improve their competency skills to solve real time problems

PSO3 Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

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: Motivation, Forces behind E-Commerce Industry Framework, Brief history of Ecommerce, Inter Organizational E-Commerce, Intra Organizational E-Commerce, and Consumer to Business Electronic Commerce, Architectural framework, Network Infrastructure for E-Commerce, Component of I way Access Equipment, Global Information Distribution Network, Broad band Telecommunication. **Mobile Commerce:** Introduction to Mobile Commerce, Mobile Computing Application, Wireless Application Protocols, WAP Technology, Mobile Information Devices, Web Security, Introduction to Web security, Firewalls & Transaction Security, Client Server Network, Emerging Client Server Security Threats, firewalls & Network Security. **Basic cryptography for enabling E-commerce:** World Wide Web & Security, Encryption, Transaction security, Secret Key Encryption, Public Key Encryption, Virtual Private Network (VPN). **Electronic Payments:** Overview of Electronics payments, Digital Token based Electronics payment System, Smart Cards; Credit Card, Debit Card based EPS, Emerging financial Instruments.

F. TEXT BOOKS

1. Ravi lalakota, Andrew Whinston “*Frontiers of Electronic Commerce*”, Addison Wesley.

G. REFERENCE BOOKS

2. V.K. Garg and N.K. Venkita Krishna, “*Enterprise Resource Planning-Concepts and Practice*”, PHI.

H. Lecture Plan:

Lecture No.	Main Topics	Topic	Session Outcome	Mode of delivery	Corresponding CO	Mode Of Assessing CO
1	Introduction to E Commerce	Introduction to E commerce	Understanding to CO ,PO and PSO	Lecture	CA1403.1	Mid Term-I,Quiz & End Term
2		Motivation and Forces behind E-Commerce	Knowledge of E commerce	Lecture	CA1403.1	Mid Term-I,Quiz & End Term
3		E-Commerce Industry Framework	Synthesis Industry Framework	Lecture	CA1403.1	Mid Term-I,Quiz & End Term
4		Tutorial-1	Knowledge of E commerce	Activity	CA1403.1	Mid Term-I,Quiz & End Term
5		Brief history of Ecommerce	Knowledge of E commerce	Lecture	CA1403.1	Mid Term-I,Quiz & End Term
6	Types of E Commerce	Inter Organizational E-Commerce	Knowledge Of Organizational E-Commerce	Lecture	CA1430.1 & CA1403.5	Mid Term-I,Quiz & End Term
7		Intra Organizational E-Commerce	Knowledge Of Organizational E-Commerce	Lecture	CA1430.1 & CA1403.5	Mid Term-I,Quiz & End Term
8		Tutorial-2	Knowledge Of Organizational E-Commerce	Activity	CA1430.1 & CA1403.5	Mid Term-I,Quiz & End Term
9		Consumer- to - Business and Business –to - consumer Electronic Commerce.	Knowledge Of Organizational E-Commerce	Lecture	CA1430.1 & CA1403.5	Mid Term-I,Quiz & End Term

10		Architectural framework of e commerce	Analysis framework of e commerce	Lecture	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term
11		Network Infrastructure for E-Commerce	Analysis framework of e commerce infrastructure	Lecture	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term
12		Tutorial-3	Analysis framework of e commerce	Activity	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term
13		Component of I way Access Equipment	Analysis of WAP	Lecture	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term
14		Global Information Distribution Network	Knowledge to GIDN	Lecture	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term
15		Broad band Telecommunica tion	Knowledge to GIDN	Lecture	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term
16		Tutorial-4	Knowledge to GIDN	Discussion	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term
17	M-Commerce	Introduction to Mobile Commerce	Introduction to Mcommerce	Lecture	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term
18		Mobile Computing Application	Introduction to mobile computing	Lecture	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term
19		Wireless Application Protocols	Application of WAP	Lecture	CA1403.2 & CA 1403.4	Mid Term-II,Quiz & End Term
20		Tutorial-5	Application of WAP	Lecture	CA1403.2 & CA 1403.4	Mid Term-II,Quiz & End Term
21		WAP Technology	Synthesis of WAP	Lecture	CA1403.2 & CA 1403.4	Mid Term-II,Quiz & End Term
22		Mobile Information Devices	Introduction to MIDs	Lecture	CA1403.4	Mid Term-II,Quiz & End Term
23		Web Security	Introduction to WEB security	Flipped Class	CA1403.4	Mid Term-II,Quiz & End Term
24		Tutorial-6	Introduction to WEB security	Lecture	CA1403.4	Mid Term-II,Quiz & End Term

25		Introduction to Web security, Firewalls & Transaction Security	Knowledge WEB security	Lecture	CA1403.4	Mid Term-II, Quiz & End Term
26		Client Server Network	Introduction to client server architecture	Lecture	CA1403.4	Mid Term-II, Quiz & End Term
27		Emerging Client Server Security Threats	Synthesis client server architecture	Lecture	CA1403.4	Mid Term-II, Quiz & End Term
28		firewalls & Network Security	Introduction to firewall	Lecture	CA1403.4	Mid Term-II, Quiz & End Term
29		Tutorial-7	Introduction to firewall	Lecture	CA1403.4	Mid Term-II, Quiz & End Term
30	Basic cryptography for enabling E-commerce	World Wide Web & Security	Introduction too WWW	Flipped Class	CA1403.4	Mid Term-II, Quiz & End Term
31		Encryption and encryption algorithm	knowledge of encryption	Lecture	CA1403.4	Mid Term-II, Quiz & End Term
32		Transaction security	Introduction to transaction security	Lecture	CA1430.3	Mid Term-II, Quiz & End Term
33		Tutorial-8	Introduction to transaction security	Lecture	CA1430.3	Mid Term-II, Quiz & End Term
34		Secret Key Encryption	knowledge of encryption	Lecture	CA1430.3	Mid Term-II, Quiz & End Term
35		Public Key Encryption	knowledge of encryption	Lecture	CA1430.3	Mid Term-II, Quiz & End Term
36		Virtual Private Network	Knowledge of VPN	Lecture	CA1430.3	Mid Term-II, Quiz & End Term
37		Tutorial-9	Knowledge of VPN	Lecture	CA1430.3	Mid Term-II, Quiz & End Term
38	Eletronic Payment	Overview of Electronics payments	Overview of Electronics payments	Flipped Class	CA1430.3	Quiz & End Term
39		Digital Token based Electronics	Overview of Electronics payments	Lecture	CA1430.3	Quiz & End Term

		payment System				
40		Smart Cards	Overview of Electronics payments	Lecture	CA1430.3	Quiz & End Term
41		Tutorial-10	Overview of Electronics payments	Lecture	CA1430.3	Quiz & End Term
42		Smart Cards; Credit Card, Debit Card based EPS	Overview of Electronics payments	Lecture	CA1430.3	Quiz & End Term
43		Emerging financial Instruments	Application of financial Instruments	Lecture	CA1430.3	Quiz & End Term
44		Reviews of E commerce	Evaluation of ecommerce	Lecture	CA1430.3	Quiz & End Term
45	Revision	Revision	Evaluation of ecommerce	Activity		Quiz & End Term
46		Revision	Evaluation of ecommerce	Activity		Quiz & End Term
47		Revision	Evaluation of ecommerce	Activity		Quiz & End Term
48		Revision	Evaluation of ecommerce	Activity		Quiz & End Term

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

[illegible]

CA 1403.3	Describe the working of E- payment systems.	2													2	
CA 1403.4	Depict the client/server infrastructure that supports electronic commerce and basic e-commerce functions.					1										2
CA 1403.5	Outline legal and ethical issues related to E-Commerce.					2			1						1	

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



MANIPAL UNIVERSITY JAIPUR

School of Basic sciences

DEPARTMENT OF COMPUTER APPLICATION

Course Hand-out

Data Communication| CA 1404| 4 Credits | 3 | 0 4

Session: JAN 20-MAY 20 | Faculty: Ms Kuntal Gaur| Class: BCA IV SEM

A. Introduction: This course is offered by Department of Computer application which 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:

[CA 1404.1] 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.

[CA 1404.2] 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.

[CA 1404.3] 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.

[CA 1404.4] Discuss and distinguish between different types of multiplexing techniques and spread spectrum techniques.

[CA 1404.5] Identify and compare various generations of wireless cellular networks.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Program Specific Outcomes

PSO1 Prepare professionally trained in the areas of programming, databases, software engineering, web-designing and networking and other completer application areas to acquire knowledge in various domain-based prospects

PSO2 Encourage to communicate effectively and to improve their competency skills to solve real time problems

PSO3 Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	20
	Sessional Exam II (Close Book)	20
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	10
End Term Exam (Summative)	End Term Exam (Close 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.	

E. SYLLABUS

Introduction to Data Communication: Networks-protocols, applications, Line Configuration, topology, Transmission mode, Classification of networks. Parallel & Serial Transmissions, Analog & Digital Signals, Periodic & Aperiodic Signals; **Modulation:** Amplitude Modulation, Frequency Modulation, Phase Modulation, Pulse Amplitude Modulation, Pulse Code Modulation, Sampling. Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying, Bit/ Baud Comparison, DTE-DCE Interface, 56 K Modem, Cable Modem; **OSI Model, Transmission Media:** Twisted Pair Cable, Coaxial Cable, Fiber-Optics Cable, Radio frequency Allocation, Terrestrial Microwave, Infrared rays, Satellite Communication, Cellular Telephony; **Introduction to ISDN:** Framing, Line Discipline, Types of Errors, Error Detection & Correction, Flow Control, Error Control. CSMA/CD, IEEE802.X Standards; **Introduction to Bridges:** Internal Organization of Network Layer, Routing Algorithms-----Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, General Principles of Congestion, Congestion Prevention Policies. Duties of Transport Layer, Connection Establishment & Connection Termination; **Introduction to TCP/IP:** Data Link Layer in Internet---SLIP & PPP, Network Layer in Internet---IP protocol, IP addressing, Subnetting & Internet Control Protocols, Transport Layer in Internet-TCP & UDP.

Text Books:

1. Bertsekas, Dimitri, Gallager, Robert, “Data Networks” (2nd Edition). Prentice Hall Indi, 2009.
2. Tanenbaum A. S., “Computer networks” (5th Edition). Pearson Education, 2009
3. Behrouz Forouzan, “Data communication & networking” (5th Edition). TMH, 2011

Reference Books:

1. Peterson and Davie “*Computer Networks: A Systems Approach*” (5th Edition), Morgan Kaufmann Publishers, 2009
2. William Stallings, “*Data and Computer Communications*” (9th Edition). Pearson Education, 2009
3. Stevens, “*TCP/IP Illustrated*”, Addison-Wesley Publication, 2010
4. Kleinrock, Leonard, “*Queueing Systems, Vol 1: Theory*”, Wiley Publication, 2011

F. Lecture Plan:

Lecture No.	Major Topics	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1.	Introduction to Data Communication	Data, Data Communication, Data Network, Internet	Fundamentals of communication	Lecture	NA	NA
2.		Need of Layered Protocol Architecture (OSI & TCP/IP)	Fundamentals of protocol architecture	Lecture	NA	NA
3.		TCP/IP - Layers and its Functioning	Fundamentals of protocol architecture	Lecture & Activity	NA	NA
4.	Data Transmission: Concepts and Terminology	Concepts and Terminology – Simplex, Half-Duplex, Full-Duplex, Frequency, Bandwidth	Concepts of transmissions Concepts of transmissions Concepts of transmissions	Lecture	[1404.1]	Class Quiz Mid Term - I End Term
5.		Time Domain and Frequency Domain Concepts, Data Rate	Introduction to data signals Introduction to data signals Introduction to data signals	Lecture & Problem Solving Practice	[1404.1]	Class Quiz Mid Term - I End Term
6.		Analog and Digital Data and Signals,	Introduction to digital signals Introduction to digital signals Introduction to digital signals	Lecture	[1404.1]	Class Quiz Mid Term - I End Term
7.	Analog and Digital Data Transmission	Analog and Digital Transmission	Introduction to digital signals Introduction to digital signals Introduction to digital signals	Lecture	[1404.1]	Class Quiz Mid Term - I End Term
8.	Transmission Impairments	Attenuation, Delay Distortion, Noise	Knowledge of data transmission Knowledge of data transmission Knowledge of data transmission	Lecture & Problem Solving Practice	[1404.1]	Class Quiz Mid Term - I End Term
9.	Channel Capacity	Data Rate and Nyquist Bandwidth	Fundamentals of channel capacity Fundamentals of channel capacity	Lecture	[1404.2]	Class Quiz Mid Term - I End Term

			Fundamentals of channel capacity			
10.		Shannon Capacity Formula	Fundamentals of channel capacity	Lecture & Problem Solving Practice	[1404.2]	Class Quiz Mid Term - I End Term
			Fundamentals of channel capacity			
			Fundamentals of channel capacity			
11.	Transmission Media: Guided Transmission Media	Twisted Pair & CAT Types	Introduction to transmission media	Lecture & Activity	[1404.2]	Class Quiz Mid Term - I End Term
			Introduction to transmission media			
			Introduction to transmission media			
12.		Coaxial Cable, Optical Fiber	Introduction to transmission media	Lecture	[1404.2]	Class Quiz Mid Term - I End Term
			Introduction to transmission media			
			Introduction to transmission media			
13.	Wireless Transmission	Antennas , Terrestrial Microwave	Description to wireless transmission	Lecture	[1404.2]	Class Quiz Mid Term - I End Term
			Description to wireless transmission			
			Description to wireless transmission			
14.		Satellite Microwave, Broadcast Radio, Infrared	Description to wireless transmission	Lecture & Problem Solving Practice	[1404.2]	Class Quiz Mid Term - I End Term
			Description to wireless transmission			
			Description to wireless transmission			
15.	Wireless Propagation	Ground Wave Propagation, Sky Wave Propagation	Introduction to wireless propogation	Lecture & Activity	[1404.2]	Class Quiz Mid Term - I End Term
			Introduction to wireless propogation			
			Introduction to wireless propogation			
16.		Line-of-Sight Propagation	Introduction to wireless propogation	Lecture & Problem Solving Practice	[1404.2]	Class Quiz Mid Term - I End Term
			Introduction to wireless propogation			
			Introduction to wireless propogation			
17.	Line-of-sight Propagation	Free Space Loss	Concepts of sight propogation	Lecture & Problem Solving Practice	[1404.2]	Class Quiz Mid Term - I End Term
			Concepts of sight propogation			
			Concepts of sight propogation			
18.		Atmospheric Absorption, Multipath, Refraction	Concepts of sight propogation	Lecture	[1404.2]	Class Quiz Mid Term - I End Term
			Concepts of sight propogation			
			Concepts of sight propogation			
19.	Signal Encoding Techniques: Digital-	Analog and Digital Signals, Line Coding	Introduction to signal encoding	Lecture &	[1404.2]	Class Quiz Mid Term

	To-Digital Conversion	Schemes: Unipolar, Polar	Introduction to signal encoding	Problem Solving Practice		- I End Term	
20.		NRZ & Bipolar – AMI	Introduction to signal encoding	Lecture & Problem Solving Practice	[1404.2]	Class Quiz Mid Term - I End Term	
			Introduction to signal encoding				
			Introduction to signal encoding				
21.		Biphase – Manchester & Differential Manchester	Introduction to signal encoding	Lecture & Problem Solving Practice	[1404.2]	Class Quiz Mid Term - I End Term	
			Introduction to signal encoding				
			Introduction to signal encoding				
22.		Modulation Rate and Scrambling Techniques	Introduction to signal encoding	Lecture & Problem Solving Practice	[1404.2]	Class Quiz Mid Term - I End Term	
			Introduction to signal encoding				
			Introduction to signal encoding				
23.		Digital Data – Analog Signal	ASK & FSK	Synthesis to digital /analog signals	Lecture	[1404.2]	Class Quiz Mid Term - I End Term
				Synthesis to digital /analog signals			
	Synthesis to digital /analog signals						
24.	PSK – BPSK		Synthesis to digital /analog signals	Lecture	[1404.2]	Class Quiz Mid Term - I End Term	
			Synthesis to digital /analog signals				
			Synthesis to digital /analog signals				
25.	MFSK		Synthesis to digital /analog signals	Lecture	[1404.2]	Class Quiz Mid Term - I End Term	
			Synthesis to digital /analog signals				
			Synthesis to digital /analog signals				
26.	QAM		Synthesis to digital /analog signals	Lecture	[1404.2]	Class Quiz Mid Term - I End Term	
			Synthesis to digital /analog signals				
			Synthesis to digital /analog signals				
27.	Analog-To-Digital Conversion	Pulse Code Modulation	Fundamentals of data conversion	Lecture & Problem Solving Practice	[1404.2]	Class Quiz Mid Term - I End Term	
			Fundamentals of data conversion				
			Fundamentals of data conversion				
28.		Delta Modulation	Fundamentals of data conversion	Lecture	[1404.2]	Class Quiz Mid Term - I End Term	
			Fundamentals of data conversion				
			Fundamentals of data conversion				
29.	Digital Data Communication Techniques	Asynchronous and	Introduction to communication techniques	Lecture	[1404.3]	Class Quiz Mid Term	

		Synchronous Transmission	Introduction to communication techniques			- I End Term
			Introduction to communication techniques			
30.		Type of Error, Redundancy, Detection Vs Correction	Introduction to communication techniques	Lecture	[1404.3]	Class Quiz Mid Term - II End Term
			Introduction to communication techniques			
			Introduction to communication techniques			
31.		Cyclic Redundancy Check	Introduction to communication techniques	Lecture	[1404.3]	Class Quiz Mid Term - II End Term
			Introduction to communication techniques			
			Introduction to communication techniques			
32.		Polynomials & CRC Architecture	Introduction to communication techniques	Lecture & Problem Solving Practice	[1404.3]	Class Quiz Mid Term - II End Term
			Introduction to communication techniques			
			Introduction to communication techniques			
33.		Error Correction and Block Code Principle	Introduction to communication techniques	Lecture & Problem Solving Practice	[1404.3]	Class Quiz Mid Term - II End Term
			Introduction to communication techniques			
			Introduction to communication techniques			
34.		Line Configurations	Introduction to communication techniques	Lecture	[1404.3]	Class Quiz Mid Term - II End Term
			Introduction to communication techniques			
			Introduction to communication techniques			
35.	Data Link Control Protocols	Framing	Fundamentals of data link protocols	Lecture	[1404.3]	Class Quiz Mid Term - II End Term
36.		Flow Control - Stop-and-Wait Protocol	Fundamentals of data link protocols	Lecture &	[1404.3]	Class Quiz Mid Term - II End Term

				Problem Solving Practice		
37.		Sliding Window	Fundamentals of data link protocols	Lecture & Problem Solving Practice	[1404.3]	Class Quiz Mid Term - II End Term
38.		Error Control: Stop-and-Wait ARQ	Fundamentals of data link protocols Fundamentals of data link protocols Fundamentals of data link protocols	Lecture & Problem Solving Practice	[1404.3]	Class Quiz Mid Term - II End Term
39.	Data Link Control Protocols	Go-Back-N ARQ	Fundamentals of data link protocols	Lecture & Problem Solving Practice	[1404.3]	Class Quiz Mid Term - II End Term
40.		Selective Repeat ARQ	Fundamentals of data link protocols	Lecture & Problem Solving Practice	[1404.3]	Class Quiz Mid Term - II End Term
41.		High-Level Data Link Control (HDLC)	Fundamentals of data link protocols Fundamentals of data link protocols Fundamentals of data link protocols	Lecture	[1404.3]	Class Quiz Mid Term - II End Term
42.	Multiplexing	Introduction to Multiplexing	Fundamentals of multiplexing Fundamentals of multiplexing Fundamentals of multiplexing	Lecture	[1404.4]	Class Quiz Mid Term - II End Term
43.		Frequency Division Multiplexing (FDM)	Fundamentals of multiplexing Fundamentals of multiplexing Fundamentals of multiplexing	Lecture	[1404.4]	Class Quiz Mid Term - II End Term
44.		Time-Division Multiplexing (TDM)	Fundamentals of multiplexing Fundamentals of multiplexing Fundamentals of multiplexing	Lecture & Activity	[1404.4]	Class Quiz Mid Term - II End Term
45.	Spread Spectrum	The Concept of Spread Spectrum	Fundamentals of spectrum Fundamentals of spectrum Fundamentals of spectrum	Lecture	[1404.4]	Class Quiz Mid Term - II End Term
46.		Frequency Hopping Spread Spectrum (FHSS)	Fundamentals of spectrum Fundamentals of spectrum Fundamentals of spectrum	Lecture	[1404.4]	Class Quiz Mid Term - II End Term

47.		Slow and Fast FHSS	Fundamentals of spectrum	Lecture & Problem Solving Practice	[1404.4]	Class Quiz Mid Term - II End Term
			Fundamentals of spectrum			
			Fundamentals of spectrum			
48.		Direct Sequence Spread Spectrum (DSSS)	Fundamentals of spectrum	Lecture & Problem Solving Practice	[1404.4]	Class Quiz Mid Term - II End Term
			Fundamentals of spectrum			
			Fundamentals of spectrum			
49.		Performance Consideration – FHSS and DSSS	Fundamentals of spectrum	Lecture	[1404.4]	End Term
50.		Code Division Multiple Access (CDMA)	Fundamentals of spectrum	Lecture & Problem Solving Practice	[1404.4]	End Term
51.	Cellular Wireless Communication Techniques	Introduction, Generations: 1G, 2G, 3G,	Introduction to wireless communication technique	Lecture	[1404.5]	End Term
52.		4G, and 5G	Introduction to wireless communication technique	Lecture	[1404.5]	End Term

G. Course Articulation Matrix: (Mapping of COs with POs & 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	
[CA 1404. 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.	1	1		1	2		1						2	1		
[CA 1404. 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								3	1		
[CA 1404. 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								2	2	1	
[CA 1404. 4]	Distinguish between different types of multiplexing techniques and spread spectrum techniques.	2			1	2								2	1		
[CA 1404. 5]	Identify and compare various generations of wireless cellular networks.	2						1						1	1		

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Science

Department of Computer Applications

Course Hand-out

Numerical Methods | MA 1422 | 4 Credits | 3 | 0 4

Session: Jan – May 2020 | Faculty: Garima Agarwal | Class: BCA IV SEMESTER

A. Introduction: This course aims to discuss basic concept of Numerical Methods. Course is intended to provide the students the experience in solution of Ordinary Differential equations using numerical methods concepts and to emphasize the practical aspects of numerical analysis.

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

[1422.1]. Understand the concept of Numerical Operators.

[1422.2]. Demonstrate the concepts of Interpolation with equal, unequal interval and central difference.

[1422.3]. Analyse the Numerical Integration.

[1422.4]. Solve the algebraic, transcendental and Ordinary differential equations

C Program Outcomes:

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Program Specific Outcomes

PSO1 Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other computer application areas to acquire knowledge in various domain-based prospects

PSO2 Encourage to communicate effectively and to improve their competency skills to solve real time problems

PSO3 Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

C. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	20
	Sessional Exam II (Closed Book)	20
	In class Quizzes	10
End Term Exam (Summative)	End Term Exam (Closed 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.	
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.	

D. SYLLABUS

Finite Differences: Definition of operators and derivation of inter-relations among them, Properties of Δ and E (without proof), Factorial notation for positive and negative exponent, Representation of polynomial in factorial notations.

Interpolation with equal intervals: Newton's forward difference formula, Newton's backward difference formula.

Interpolation with unequal intervals. **Central Difference Interpolation formula:** Gauss Forward, Gauss Backward,

Stirling's formula. **Numerical Integration:** Trapezoidal rule and its geometrical significance, Simpson's one-third

rule, Simpson's three-eighth rule. **Solution of algebraic and transcendental equations:** Secant, Regula-Falsi method,

Newton-Raphson Method, Iterative method. **Solution of Ordinary differential equations:** Picard method, Taylor series method, Euler methods, Euler's modified method, Runge-Kutta methods.

E. TEXT BOOKS

1. Numerical Methods: R. K. Jain, S.R.K. Iyengar and M.K. Jain

F. REFERENCE BOOKS

1. Numerical Methods using MATLAB: Mathews and Finle
2. Applied Numerical Analysis: Gerald and Whealtes

G. Lecture Plan:

Lectures	Major Topics	Topics	Session outcome	Delivery Mode	Corresponding CO	Mode Of Assessing CO
1.		Introduction to CO, PO, PSO	Understand PO,CO,PSO	Lecture	NA	NA
2.	Finite Differences	Definition of operators	understanding numerical operators	Lecture	1422.1	Mid Term I, Quiz & End Term
3.		Properties of operators	Concept of Operators	Lecture	1422.1	Mid Term I, Quiz & End Term
4.		Factorial notation	concept of factorial	Lecture	1422.1	Mid Term I, Quiz & End Term
5.		Properties of Factorial notation	understanding of Factorial	Lecture	1422.1	Mid Term I, Quiz & End Term
6.		Illustrative examples	class problems	Activity	1422.1	Mid Term I, Quiz & End Term
7.		Quiz-1	evaluation	Activity	1422.1	Mid Term I, Quiz & End Term
8.	Interpolation Formulas	Newton's forward difference formula	understanding of interpolation	Lecture	1422.2	Mid Term II, Quiz & End Term
9.		Illustrative examples	class problems	Activity	1422.2	Mid Term II, Quiz & End Term
10.		Newton's backward difference formula	Understanding basic formulas	Lecture	1422.2	Mid Term II, Quiz & End Term
11.		Illustrative examples		Lecture	1422.2	Mid Term II, Quiz & End Term
12.		Interpolation with unequal intervals	Application of inline and	Lecture	1422.2	Mid Term II, Quiz & End Term
13.		Illustrative examples	class problems	Activity	1422.2	Mid Term II, Quiz & End Term
14.		Quiz-2	evaluation	Activity	1422.2	Mid Term II, Quiz & End Term
15.		Templates	Templates implementatio	Tutorial	1422.2	Mid Term II, Quiz & End Term
16.	Central Difference Interpolation formula	Gauss Forward Formula	understanding Numerical	Lecture	1422.2	Mid Term II, Quiz & End Term
17.		Illustrative examples	class problems	Activity	1422.2	Mid Term II, Quiz & End Term
18.		Gauss Backward	Introduction to c++Operator	Lecture	1422.2	Mid Term II, Quiz & End Term
19.		Illustrative examples	class problems	Activity	1422.2	Mid Term II, Quiz & End Term
20.		Stirling's formula	understanding Numerical problems	Lecture	1422.2	Mid Term II, Quiz & End Term
21.		Illustrative examples	class problems	Activity	1422.2	Mid Term II, Quiz & End Term
22.		Quiz-3	evaluation	Activity	1422.2	Mid Term II, Quiz & End Term
23.	Numerical Integration	Trapezoidal rule	concept of Numerical	Lecture	1422.3	Mid Term III, Quiz & End Term
24.		Illustrative examples	class problems	Activity	1422.3	Mid Term III, Quiz & End Term
25.		Simpson's one-third rule	understanding of Numerical Integration	Lecture	1422.3	Mid Term III, Quiz & End Term
26.		Illustrative examples	class problems	Activity	1422.3	Mid Term III, Quiz & End Term
27.		Simpson's three-eighth rule	method of Numerical Integration	Lecture	1422.3	Mid Term III, Quiz & End Term
28.		Illustrative examples	class problems	Activity	1422.3	Mid Term III, Quiz & End Term

29.		Quiz-4	evaluation	Activity	1422.3	Mid Term III, Quiz & End Term
30.		Templates	Templates implemantation	Tutorial	1422.3	Mid Term III, Quiz & End Term
31.	Solution of algebraic and transcendental equations	Secant Method	understanding of application of Numerical	Lecture	1422.4	Mid Term IV, Quiz & End Term
32.		Illustrative examples	class problems	Activity	1422.4	Mid Term IV, Quiz & End Term
33.		Regula-Falsi method	method for solving algebraic method	Lecture	1422.4	Mid Term IV, Quiz & End Term
34.		Illustrative examples	class problems	Activity	1422.4	Mid Term IV, Quiz & End Term
35.		Newton-Raphson Method	method for solving algebraic method	Lecture	1422.4	Mid Term IV, Quiz & End Term
36.		Illustrative examples	class problems	Activity	1422.4	Mid Term IV, Quiz & End Term
37.		Iterative method	understanding methods	Lecture	1422.4	Mid Term IV, Quiz & End Term
38.		Illustrative examples	class problems	Activity	1422.4	Mid Term IV, Quiz & End Term
39.		Quiz-5	evaluation	Activity	1422.4	Mid Term IV, Quiz & End Term
40.	Solution of Ordinary differential equations	Picard method	understanding Numerical solution of ODE	Lecture	1422.4	Mid Term IV, Quiz & End Term
41.		Illustrative examples	class problems	Activity	1422.4	Mid Term IV, Quiz & End Term
42.		Taylor series method	understanding Numerical	Lecture	1422.4	Mid Term IV, Quiz & End Term
43.		Illustrative examples	class problems	Activity	1422.4	Mid Term IV, Quiz & End Term
44.		Euler methods	understanding Numerical	Lecture	1422.4	Quiz & End Term
45.		Illustrative examples	class problems	Activity	1422.4	Quiz & End Term
46.		Euler's modified method	understanding Numerical	Lecture	1422.4	Quiz & End Term
47.		Illustrative examples	class problems	Activity	1422.4	Quiz & End Term
48.		Runge-Kutta methods.	understanding Numerical solution of	Tutorial	1422.4	Quiz & End Term
49.		Quiz-6	evaluation	Activity	1422.4	Quiz & End Term
50.		Templates	Templates implemantation	Tutorial	1422.4	Quiz & 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

MA 1422.1	Understand the concept of Numerical Operators.		1		1			1								2
MA 1422.2	Demonstrate the concepts of Interpolation with equal and unequal interval.						1							2		
MA 1422.3	Analyse the Numerical Integration.	2			1						2					1
MA 1422.4	Solve the algebraic, transcendental and Ordinary differential equations								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
MA 1422.1	Understand the concept of Numerical Operators.															
MA 1422.2	Demonstrate the concepts of Interpolation with equal and unequal interval.															
MA 1422.3	Analyse the Numerical Integration.															
MA 1422.4	Solve the algebraic, transcendental and Ordinary differential equations															

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



SCHOOL OF BASIC SCIENCE

DEPARTMENT OF COMPUTER APPLICATIONS

COURSE HAND-OUT

Software Engineering | CA 1501 | 4 Credits | 3 | 0 | 4

Session: Jul 19 – Dec 19 | Faculty: Dr. Shilpa Kulkarni Sharma | Class: BCA V

A. Introduction: This course provides a general introduction to software engineering. It introduces concepts such as software system, characteristics and its types, and software development life cycle, from initial specification through to system maintenance. Various software development models will be covered such as Waterfall model, Prototype model and evolutionary development models. Formalisms and tools to assist in software development are also presented, including Data Flow Diagrams, E-R notation and structured design tools. There is a focus on software testing, from unit testing to the testing of software releases.. Case studies provide practical examples for many of these concepts.

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

[1501.1]. To improve the software process; assist in planning, tracking and control of software project; and assess the quality of product that is produced

[1501.2]. To integrate process, methods and tools for the development of computer software

[1501.3]. To follow the design principles and concepts as the design process proceed

[1502.4]. To conduct strategic test plans to meet test objectives: to find and remove errors in an orderly and effective manner.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

PROGRAM SPECIFIC OUTCOMES

PSO1 Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other completer application areas to acquire knowledge in various domain-based prospects

PSO2 Encourage to communicate effectively and to improve their competency skills to solve real time problems

PSO3 Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	20
	Sessional Exam II (Close Book)	20
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	10
End Term Exam (Summative)	End Term Exam (Close 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.	

D. SYLLABUS

Introduction to System Concepts: Definition, Elements of System, Characteristics of System, Types of System, System Concepts. **Introduction to Software Engineering:** Definition, Need for software Engineering, Software Characteristics, Software Qualities (McCall's Quality Factors) **Requirement Analysis:** Definition of System Analysis, Requirement Anticipation, Knowledge and Qualities of System Analyst, Role of a System Analyst, Feasibility Study And It's Types, User Transaction Requirement, User design Requirements, SRS(System Requirement Specification) **Software Development Methodologies:** SDLC (System Development Life Cycle), Waterfall Model, Spiral Model, Prototyping Model. **Analysis and Design Tools:** Entity-Relationship Diagrams, Data Flow Diagrams (DFD), Data Dictionary & Elements of Data Dictionary, Pseudo code, Input And Output Design. **Structured System Design:** Modules Concepts and Types of Modules, Structured Chart, Qualities of Good Design, Coupling, Types of Coupling, Cohesion, Types of Cohesion. **Software Testing:** Definition, Test characteristics, Types of testing - Black-Box Testing, White-Box Testing, Stress Testing, Performance Testing

E. TEXT BOOKS

- Roger S. Pressman, "*Software Engineering*", Tata McGraw Hills, 5th Edition, 2009.
- Ian Sommerville, "*Software Engineering*", Pearson Education Asia, 6th Edition, 2005.

F. REFERENCE BOOKS

- Pankaj Jalote, "*An Integrated Approach to Software Engineering*", Springer Publications, 2010.

G. Lecture Plan:

Lecture s	Major Topics	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode Of Assessing CO
1-2	Introduction to System Concepts	Definition, Elements of System, Characteristics of System, System	Understanding Cos, Pos and PSOs	Lecture	CA 1501 .1	Mid Term I, Assignment/Quiz
3-4		Types of System	Defining System and types	Practice	CA 1501 .1	Mid Term I, Assignment/Quiz
5-6.	Introduction to Software Engineering	Definition, Need for software Engineering, Software Characteristics,	Recognizing need of Software Engineering	Lecture	CA 1501 .2	Mid Term I, Assignment/Quiz
7-8.		Software Qualities (McCall's Quality Factors)	Identifying quality attributes	Lecture	CA 1501 .2	Mid Term I, Assignment/Quiz
9-11		Definition of System Analysis, Requirement Anticipation, Knowledge and Qualities of System	Understanding Requirements and analysis	Lecture	CA 1501 .2	Mid Term I, Assignment/Quiz
12-14		Feasibility Study And It's Types	Comprehend feasibility	Lecture	CA 1501 .2	Mid Term I, Assignment/Quiz
15		User Transaction Requirement, User design Requirements	Introducing requirements	Lecture	CA 1501 .2	Mid Term I, Assignment/Quiz
16-17		SRS(System Requirement Specification)	Creating SRS	Activity	CA 1501 .2	Mid Term I, Assignment/Quiz
18	Software Development Methodologi es	SDLC (System Development Life Cycle)	Defining SDLC	Lecture	CA 1501 .3	Mid Term II, Assignment/Quiz
19		Waterfall Model	Understanding Waterfall model	Lecture and Activity	CA 1501 .3	Mid Term II, Assignment/Quiz
20		Prototyping Model	Identify with prototyping	Lecture and Activity	CA 1501 .3	Mid Term II, Assignment/Quiz

21		Spiral Model	Recognize Spiral model need	Lecture and Activity	CA 1501 .3	Mid Term II, Assignment/Quiz
22-24	Analysis and Design Tools,	Entity-Relationship Diagrams,	Creating ER model	Lecture	CA 1501 .3	Mid Term II, Assignment/Quiz
25-27		Data Flow Diagrams (DFD)	Creating DFD	Lecture	CA 1501 .3	Mid Term I, Assignment/Quiz
28		Data Dictionary & Elements of Data Dictionary, Pseudo code	Understanding data dictionary	Lecture	CA 1501 .3	Mid Term II, Assignment/Quiz
29-30		Input And Output Design	Understanding I/O designs	Activity	CA 1501 .3	Mid Term II, Assignment/Quiz
31-32	Structured System Design	Modules Concepts and Types of Modules	Applying module concepts	Lecture	CA 1501 .3	Mid Term II, Assignment/Quiz
33		Structured Chart	Implementing SC	Lecture	CA 1501 .3	Mid Term II, Assignment/Quiz
34		Qualities of Good Design	Understanding quality design	Lecture	CA 1501 .3	Assignment/Quiz & End Term
35-38.		Coupling, Types of Coupling, Cohesion, Types of Cohesion	Identifying cohesion and coupling	Practice	CA 1501 .3	Assignment/Quiz & End Term
39.	Software Testing	Definition, Test characteristics	Understanding testing	Lecture	CA 1501 .4	Assignment/Quiz & End Term
40-41		Types of testing - Black-Box Testing, White-Box Testing, Stress Testing, Performance Testing	Identify types of testing	Lecture	CA 1501 .4	Assignment/Quiz & End Term
42-43.		Black-Box Testing	Understanding black	Activity	CA 1501 .4	Assignment/Quiz & End Term
44-45.		White-Box Testing	Understanding white box testing	Activity	CA 1501 .4	Assignment/Quiz & End Term

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	PS O 1	PS O 2	PS O 3	PS O 4
CA 150 1.1	To improve the software process; assist in planning, tracking and control of software project; and asses the quality of product that is produced	1		1	3	1	2	1	2	3	2	1	1	1	3	1	
CA 150 1.2	To integrate process, methods and tools for the development of computer software	2		1	2	1	1			1	2	2	1	2	3	2	1
CA 150 1.3	To follow the design principles and concepts as the design process proceed	2	1		3	1			1			2		2	3		1
CA 150 1.4	To conduct strategic test plans to meet test objectives: to find and remove errors in an orderly and effective manner	2	2	3	2	1	2			2		1		1		2	1

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

I. 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
CA 1501.1	To improve the software process; assist in planning, tracking and control of software project; and asses the quality of product that is produced															
CA 1501.2	To integrate process, methods and tools for the development of computer software															
CA 1501.3	To follow the design principles and concepts as the design process proceed															
CA 1501.4	To conduct strategic test plans to meet test objectives: to find and remove errors in an orderly and effective manner															

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Science

Department of Computer Applications

Course Hand-out

Computer Graphics| CA 1502 | 4 Credits | 3 | 0 4

Session: Jul 19 – Dec 19 | Faculty: Dr. Vaibhav Bhatnagar | Class: BCA V SEMESTER

A. Introduction: This course is offered by Department of Computer Application as a compulsory subject, targeting the students of BCA who wish to pursue job in Industries or higher studies in the field of computer Graphics. After learning through this course, students will be able to understand how a visual device displays components over display unit such as monitor, TV etc. Students are expected to have background knowledge of Coordinate Geometry, Programming concepts, and visual devices.

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

[1502.1]. Describe How a visual device displays, component work over display unit such as monitor, TV etc.

[1502.2]. Analysis the underline algorithm of graphics primitives, mathematical concepts, supporting computer graphics, These include but are not limited to: composite homogenous matrices for translation, rotation, and scaling transformation.

[1502.3]. Design and implement among models and viewing transformation

[1502.4]. Recognize and implement among model for light shading: color, ambient light, distant light with source; phong reflection model; and shading (Flat, smooth, Gourand, Phong)

[1502.5]. Analyse future trends in computer graphics and also able to design 3D graphics system and to visualize them.

C. Program Outcomes:

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Program Specific Outcomes

[PSO1]. Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other completer application areas to acquire knowledge in various domain-based prospects

[PSO2]. Encourage to communicate effectively and to improve their competency skills to solve real time problems

[PSO3]. Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	20
	Sessional Exam II (Closed Book)	20
	In class Quizzes	10
End Term Exam (Summative)	End Term Exam (Closed 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.	
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.	

E. SYLLABUS

Basics of Computer Graphics: Introduction, What is computer Graphics? Area of Computer Graphics, Design and Drawing, Simulation, How are picture actually stored and displayed, difficulties for displaying pictures: Graphics Devices: Cathode Ray Tube, CRTs for Color Display, Beam Penetration CRT, The shadow, Mask CRT, Direct View Storage Tube, Tablets, The Light Pen, Three Dimensional Devices,; C Graphics Basics: Graphics Programming, initializing the graphics, C Graphical functions, simple programs;; Simple Line Drawing Methods: Point Plotting Technique, Qualities of good line drawing algorithms, The Digital Differential Analyzer (DDA), Brenham's Algorithm, Generation of Circles:

Two Dimensional Transformation: what is Transformation?, Matrix representation of Points, Basic transformation, Need for Clipping and Windowing, Line Clipping Algorithms, The midpoint subdivision Method, Other Clipping Methods, Sutherland-Hodgeman Algorithm, viewing. Transformation; Curves and Surfaces: shape description requirement, parametric functions, Bezier curve, Bezier surfaces, B-Spline methods: Solid Area Conversion: Solid Area scan Conversion, Scan Conversion of polygon, Algorithm Singularity,

Three-Dimensional Transformation: translation, Scaling, Rotation, Viewing Transformation, The Perspective algorithm, Three Dimension Clipping, Perspective view of Tube.

F. TEXT BOOKS

1. "Computer Graphics C Version/OpenGL version", Donald Hearn and M. Pauline baker, Pearson Education.
2. "Computer Graphics Principles and Practice", second edition in C, Foley, VenDam, Feiner and Hughes, Pearson Education.

G. REFERENCE BOOKS

1. "Computer Graphics second Edition" Zhigandxiang, RoyPlaystock, Schaum'Soutlines, TataMc Graw Hill Edition.

H. Lecture Plan:

Lectur es	Major Topics	Topics	Session outcome	Delivery Mode	Correspond ing CO	Mode Of Assessing CO
1.	Overview of Computer Graphics	Introduction, what is Computer Graphics	Understand PO,CO,PSO	Lecture	1502.1	Mid Term I, Quiz & End Term
2.		Area of Computer Graphics, Design and Drawing, Simulation.	Visual Display System	Lecture	1502.1	Mid Term I, Quiz & End Term
3.	Display Devices & Display Techniques	How are pictures actually stored and displayed	Visual Display System	Lecture	1502.1	Mid Term I, Quiz & End Term
4.		Difficulties for Display picture	Visual Display System	Lecture	1502.1,	Mid Term I, Quiz & End Term

5.		Introduction of Input and Output	Component Work	Lecture	1502.1	Mid Term I, Quiz & End Term
6.		Cathode Ray Tube	Display Units	Lecture	1502.1	Mid Term I, Quiz & End Term
7.		Random Scan and Raster Scan	Display Units	Lecture	1502.1	Mid Term I, Quiz & End Term
8.		CRTs for Color Display	Display Units fu	Flipped Classroom	1502.1	Mid Term I, Quiz & End Term
9.		Beam Penetration CRT, The shadow mask method CRT	Display units	Activity	1502.1,	
10.		Direct View Storage Tube, The light Pen	Display Unit	Lecture	1502.1	Mid Term I, Quiz & End Term
11.		Tablets	Display Devices	Lecture	1502.1	Mid Term I, Quiz & End Term
12.		Three Dimensional Devices	Display Devices	Lecture	1502.1	Mid Term I, Quiz & End Term
13.		Input Devices	Display Devices	Lecture	1502.1	Mid Term I, Quiz & End Term
14.		Tutorial	Graphics Primitives	Tutorial	1502.2	Mid Term I, Quiz & End Term
15.	C Implementation With Line Drawing	Graphics Programming, initializing the graphics	Mathematical Concepts	Lecture	1502.2	Mid Term I, Quiz & End Term
16.		C Graphical function	Mathematical Concepts	Lecture	1502.2	Mid Term I, Quiz & End Term
17.		Simple programs	Mathematical Concepts	Flipped Classroom	1502.2	Mid Term I, Quiz & End Term
18.		Tutorial	Mathematical Concepts	Tutorial	1502.2	
19.		Simple Line Drawing methods, Point Plotting techniques	Algorithm	Lecture	1502.2	Mid Term I, Quiz & End Term
20.		Qualities of good Line drawing algorithms	Algorithm	Lecture	1502.2	Mid Term I, Quiz & End Term
21.		The Digital Differential Analyser (DDA)	Algorithm	Lecture	1502.2	Mid Term I, Quiz & End Term
22.		Brenham's Algorithm	Algorithm	Lecture	1502.2	Mid Term II, Quiz & End Term
23.		Generation of Circle	Algorithm	Lecture	1502.2	Mid Term II, Quiz & End Term
24.		Generation of Ellipse	Algorithm	Lecture	1502.2	Mid Term II, Quiz & End Term
25.	Spherical Shapes	Polygon fill Algorithm	Algorithm	Lecture	1502.2	Mid Term II, Quiz & End Term
26.		Tutorial	Homogenous matrices	Tutorial	1502.2	Mid Term II, Quiz & End Term
27.		Tutorial	Homogenous matrices	Tutorial	1502. 2	Mid Term II, Quiz & End Term
28.		What is Transformation	Transformation	Activity	1502.2	
29.		Matrix representation of points	Transformation	Lecture	1502.3	Mid Term II, Quiz & End Term

30.	Basic of Transformations	Basic Transformation	Transformation	Lecture	1502.3	Mid Term II, Quiz & End Term
31.		Basic Transformation	Transformation	Lecture	1502.3	Mid Term II, Quiz & End Term
32.		Homogenous Matrix Reoperation	Transformation	Lecture	1502.3	Mid Term II, Quiz & End Term
33.		Homogenous Matrix Reoperation	Implementation Model	Flipped Classroom	1502.3	Mid Term II, Quiz & End Term
34.	Types of Transformations and Viewing	Reflection, Shearing	Scaling Transformation	Lecture	1502.3	Mid Term II, Quiz & End Term
35.		Tutorial	Scaling Transformation	Tutorial	1502.3	Mid Term II, Quiz & End Term
36.		Need of Clipping and Window	Viewing Transformation	Activity	1502.3	Mid Term II, Quiz & End Term
37.		Line Clipping Algorithm	Viewing Transformation	Lecture	1502.3	Mid Term II, Quiz & End Term
38.		The midpoint subdivision Methods	Viewing Transformation	Lecture	1502.3	Mid Term II, Quiz & End Term
39.		Other Clipping Methods	Viewing Transformation	Lecture	1502.3	Mid Term II, Quiz & End Term
40.		Sutherland Algorithm	Viewing Transformation	Tutorial	1502.3	Mid Term II, Quiz & End Term
41.		Solid Area Conversion, Scan Area conversion	Clipping	Lecture	1502.3	Mid Term II, Quiz & End Term
42.	Area Conversion	Tutorial	Clipping	Tutorial	1502.3	Quiz & End Term
43.		Tutorial	Clipping	Lecture	1502.3	Quiz & End Term
44.		Introduction to 3 Dimensional Object	3-Dimensional Object	Tutorial	1502.5	Quiz & End Term
45.		3-D Transformation	3 Dimensional Object	Activity	1502.5	
46.	3-D Transformations	Scaling and Rotation	3 Dimensional Object	Lecture	1502.5	Quiz & End Term
47.		Viewing Transformation	3 Dimensional Object	Lecture	1502.5	Quiz & End Term
48.		The perspective algorithm, Algorithm	3 Dimensional Object	Lecture	1502.5	Quiz & End Term
49.		Three Dimensional Clipping	3 Dimensional Object	Lecture	1502.5	Quiz & End Term
50.		Perspective view of Cube	3 Dimensional Object	Lecture	1502.5	Quiz & End Term
51.		Tutorial	3 Dimensional Object	Tutorial	1502.5	Quiz & End Term
52.		Tutorial	3 Dimensional Object	Tutorial	1502.5	Quiz & 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
CA 1502.1	Describe How a visual device displays, component work over display unit such as monitor, TV etc	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
CA 1502.2	Analysis the underline algorithm of graphics primitives, mathematical concepts, supporting computer graphics, These include but are not limited to: composite homogenous matrices for translation, rotation, and scaling transformation.	3	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
CA 1502.3	Design and implement among models and viewing transformation	0	1	2	0	0	0	0	0	0	0	0	0	0	0	2	0
CA 1502.4	Recognize and implement among model for light shading: color, ambient light, distant light with source; phomg reflection model; and shading (Flat, smooth, Gourand, Phong)	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0
CA 1502.5	Analyse future trends in computer graphics and also able to design 3D graphics system and to visualize them	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Sciences

Department of Computer Application

Course Hand-out

Java Programming | CA 1503 | 3 Credits | 3 1 0 4

Session: July 19 – Dec 19 | Faculty: Linesh Raja | Class: BCA (V Sem)

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. 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 is 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

[1503.1]. Understand object oriented programming and learn how to compile and execute a simple as well as complex Java Application using Command Based Interface.

[1503.2]. Learn and apply the concepts of encapsulation and abstraction using class, objects and interfaces.

[1503.3]. Describe and Implement various inheritance and polymorphism forms using Java Classes and Interfaces.

[1503.4]. Learn and Implement various collection data structure such as linked lists, queues, stacks using Java's collection framework

[1503.5]. 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 for improving employability.

[1503.6]. Visualize a real world problem in the form of various collaborating classes and objects or skill development.

C. Program Outcomes and Program Specific Outcomes

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

[PSO.1]. Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other completer application areas to acquire knowledge in various domain-based prospects.

[PSO.2]. Encourage to communicate effectively and to improve their competency skills to solve real time problems.

[PSO.3]. Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	20
	Sessional Exam II (Close Book)	20
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	10
End Term Exam (Summative)	End Term Exam (Close 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

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; Collections & Generics; **INTRODUCTION TO SWINGS:** Classes, component, Container, Panel, Window, frame, Canvas, working with frame, working with Graphics, using Swing Controls.

F. Text Books

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

G. Reference Books

R1. Core Java Volume I - Fundamentals (10th Edition), By Cay Horstmann, Prentice Hall, ISBN-10:0134177304, ISBN-13: 978-0134177304, Year (2006)

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), By Cay horstmann, Wiley India, ISBN-10:0471697044, ISBN-13:978-0471697046, Year (2005)

H. Lecture Plan:

Lec No	Major Topics	Topics	Session outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	Introduction to Java	Introduction and Course Hand-out briefing	Course objective	Lecture	NA	NA
2		The Creation of Java	About Java	Lecture	I503.1	In Class Quiz (Not Accounted)
3		How java changed the internet	Java and Internet	Lecture	I503.1	In Class Quiz End Term
4		Java's Magic, The java Buzzwords	About Java	Guided Self-Study	I503.1	Home Assignment End Term
5		An Overview of Java	About Java	Lecture	I503.2	In Class Quiz End Term
6		Arrays	Array and their initialization	Activity	I503.2	Class Quiz Mid Term I End Term
7- 8	Class & Objects	Class fundamentals, Class fundamentals, Declaring objects	Class & Object	Lecture	I503.2	Class Quiz Mid Term I End term
9		Assigning Object reference variable	Object referencing	Lecture	I503.2	Home Assignment Class Quiz Mid Term I End Term
10		Introduction to methods	Member methods	Activity	I503.2	Class Quiz Mid Term I End Term
11		Constructors	Initialization and their use	Lecture	I503.2	Class Quiz Mid Term I End Term
12		this keyword	Various aspects of this keyword	Lecture	I503.2	Class Quiz End Term
13		Garbage collection	De-allocation of memory	Lecture	I503.4	Class Quiz Mid Term II End Term
14		finalize() method	Uses of method	Lecture	I503.4	Class Quiz Mid Term II End Term
15		Overloading	Concept of overloading	Lecture	I503.4	Class Quiz Mid Term II End Term
16-17		Objects as parameters, Argument passing, Returning objects	Object passing	Lecture	I503.4	Class Quiz Mid Term II End Term

18		Recursion	Use of recursion in class & object	Lecture	1503.4	Class Quiz End Term
19	Java Concepts and their applications	Access control, Final	Use of various access and final keyword	Lecture	1503.4	Class Quiz End Term
20		Nested and inner classes	Uses and their applications	Lecture	1503.4	Class Quiz End Term
21		String class	Uses and their applications	Lecture	1503.4	Class Quiz End Term
22		Reading Console Input, Writing Console Output, Files	Uses and their applications	Lecture	1503.5	Class Quiz End Term
23-24		Applet fundamentals	Introduction	Lecture	1503.5	Class Quiz End term
25-26		Inheritance Basic, super, multilevel hierarchy	Uses and their applications	Lecture	1503.5	Class Quiz
27-28		Overriding, abstract classes, final with inheritance	Uses and their applications	Lecture	1503.5	Class Quiz Mid Term II End Term
29		Exception Handling	Uses and their applications	Lecture	1503.3 1503.5	Class Quiz Mid Term II End Term
30-31		Multithreaded programming; String Handling, Applet Class, Event Handling	Uses and their applications	Lecture	1503.3 1503.5	Class Quiz Mid Term II End Term
32		Collections & Generics	Uses and their applications	Lecture	1503.3 1503.5	Class Quiz End Term
33-34		Swing classes, component, Container	Uses and their applications	Lecture	1503.4 1503.6	Class Quiz End Term
35-36		Panel, Window, frame, Canvas, working with frame	AWT based application development	Lecture	1503.6	Class Quiz End Term
37-38		Working with Graphics	Application development	Lecture	1503.6	Class Quiz End Term
39-41		Swing Controls	Application development	Lecture	1503.6	Class Quiz End Term
42		Revision	Discussion of course outcome	Lecture	NA	NA
LAB SESSIONS	Java & their applications	Lab sessions based on object oriented programming concepts. Applets, AWT and Swing based application development		Lab Sessions	1503.1 - 1503.6	Experimental results 14 lab sessions End Term Practical End Term Theory

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	PSO 1	PSO 2	PSO 3
CA 1503.1	Understand object oriented programming and learn how to compile and execute a simple as well as complex Java Application using Command Based Interface.	3						1			2
CA 1503.2	Learn and apply the concepts of encapsulation and abstraction using class, objects and interfaces.		2	2							2
CA 1503.3	Describe and Implement various inheritance and polymorphism forms using Java Classes and Interfaces.				2	2			3		
CA 1503.4	Learn and Implement various collection data structure such as linked lists, queues, stacks using Java's collection framework.						2		3		
CA 1503.5	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 for improving employability.			1					3	2	
CA 1503.6	Visualize a real world problem in the form of various collaborating classes and objects or skill development.	3	2	2	2				3	2	

I- 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	PSO 1	PSO 2	PSO 3
CA 1503.1	Understand object oriented programming and learn how to compile and execute a simple as well as complex Java Application using Command Based Interface.										
CA 1503.2	Learn and apply the concepts of encapsulation and abstraction using class, objects and interfaces.										
CA 1503.3	Describe and Implement various inheritance and polymorphism forms using Java Classes and Interfaces.										
CA 1503.4	Learn and Implement various collection data structure such as linked lists, queues, stacks using Java's collection framework.										
CA 1503.5	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 for improving employability.										
CA 1503.6	Visualize a real world problem in the form of various collaborating classes and objects or skill development.										

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Science

Department of Computer Applications

Course Hand-out

Introduction to Unix Programming | CA 1504 | 4 Credits | 3 | 0 | 4

Session: Jul 19 – Dec 19 | Faculty: Dr. Vaibhav Bhatnagar | Class: BCA V SEMESTER

A. Introduction: The objective of this course is to provide a comprehensive introduction to Unix operating system Shell programming. To understand the fundamental design of Unix operating system and its structure. To gain an understanding of important aspects related to the shell and the process. Be familiar with basic Unix concept such as process, program, groups and signals, running programs, process control, user and kernel modes, system calls.

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

[1504.1]. Describe the architecture and features of Unix operating system and distinguish it from other Operating Systems.

[1504.2]. Understand, Identify and use Unix commands and utilities to create and manage simple processing operations, organize directory structure with appropriate security and develop shell scripts to perform more complex tasks.

[1504.3]. Analyses a given problem and apply requisite facets of shell programming in order to devise a SHELL SCRIPT to solve problem

[1504.4]. Apply fundamental concepts of Unix programming to automate the jobs and Process in Unix Environment

C. Program Outcomes:

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Program Specific Outcomes

[PSO1]. Prepare professionally trained in the areas of programming, databases, software engineering, web-designing and networking and other completer application areas to acquire knowledge in various domain-based prospects

[PSO2]. Encourage to communicate effectively and to improve their competency skills to solve real time problems

[PSO3]. Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	20
	Sessional Exam II (Closed Book)	20
	In class Quizzes	10
End Term Exam (Summative)	End Term Exam (Closed 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.	
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.	

E. SYLLABUS

Unix Operating System, Multiuser, multitasking, Kernel and Shell, System calls and System program, command usage, General purpose utilities, Introduction to Vi-editor, Unix file system, File types, File attributes, Inode, File descriptor, Navigating the file system, Handling ordinary files, Hard link and Symbolic links, System call for process control-fork, wait, exec, and exit, signals, orphan and Zombie, Shell Wild card, Escaping.

Quoting, Redirection, Pipe, command substitution, System calls for redirection and pipe, Shell programming: Shell variables, echo and read commands, Command line arguments, Arithmetic in Script-expr and bc, Exit Status, test command-Numeric test and String test, Taking Decisions-If-then-else and case, The loop control structure-while, for and repeat until.

F. TEXT BOOKS

1. Sumitabha Das, "Unix Concepts and Applications", TMH
2. Richard Stevens, "Advanced Programming in the Unix Environment", Pearson.

G. REFERENCE BOOKS

1. Maurice J. Bach, "Design of Unix Operating System", Prentice Hall..

H. Lecture Plan:

Lectur es	Major Topics	Topics	Session outcome	Delivery Mode	Correspond ing CO	Mode Of Assessing CO
1.	Introduction to Unix	Introduction and course handout brief	Introduction of CO	Lecture	1504.1	Mid Term I, Quiz & End Term
2.		Unix Operating System-Overview and History	Unix Operating System	Lecture	1504.1	Mid Term I, Quiz & End Term
3.	Architecture of Unix and File concepts	Features of Unix	Architecture of Unix	Lecture	1504.1	Mid Term I, Quiz & End Term
4.		Tutorial	Architecture of Unix	Tutorial	1504.1,	Mid Term I, Quiz & End Term
5.		Structure of Unix System	Architecture of Unix	Lecture	1504.1	Mid Term I, Quiz & End Term
6.		Difference between Unix and Linux	Features of Unix	Lecture	1504.1	Mid Term I, Quiz & End Term
7.		Unix Environment, Introduction to Files	Features of Unix	Lecture	1504.1	Mid Term I, Quiz & End Term
8.		Tutorial	Features of Unix	Tutorial	1504.1	Mid Term I, Quiz & End Term
9.		File descriptor, File Attributes	File processing operating	Activity	1504.2	
10.		Types of File, Hard Links, Symbolic Link	File processing operating	Lecture	1504.2	Mid Term I, Quiz & End Term

11.		Revision and Briefing	File processing operating	Lecture	1504.2	Mid Term I, Quiz & End Term
12.		Tutorial	File processing operating	Tutorial	1504.2	Mid Term I, Quiz & End Term
13.		Basic Unix Command: Internal and External Commands	Unix Command	Lecture	1504.2	Mid Term I, Quiz & End Term
14.	Unix Basic Commands	Structure of Commands	Unix Command	Lecture	1504.2	Mid Term I, Quiz & End Term
15.		Basic Commands, understanding of Command Usage	Unix Command	Lecture	1504.2	Mid Term I, Quiz & End Term
16.		Tutorial	Unix Command	Tutorial	1504.2	Mid Term I, Quiz & End Term
17.		General Purpose Utilities	Utilities	Flipped Classroom	1504.2	Mid Term I, Quiz & End Term
18.		Advanced General Purpose Utilities	Utilities	Activity	1504.2	
19.		Directory and File base commands	File Handling	Lecture	1504.2	Mid Term I, Quiz & End Term
20.		Tutorial	File Handling	Tutorial	1504.2	Mid Term I, Quiz & End Term
21.		More file Handling Commands	File Handling	Lecture	1504.2	Mid Term I, Quiz & End Term
22.		File and Directory Permission	File Handling	Lecture	1504.2	Mid Term II, Quiz & End Term
23.		Changing File ownership, File access permission” unmask, chmod, group	File Handling	Tutorial	1504.2	Mid Term II, Quiz & End Term
24.	Basic of Shell Script	Tutorial	File Handling	Tutorial	1504.2	Mid Term II, Quiz & End Term
25.		Introduction to Vi Editor	Shell Programming	Lecture	1504.3	Mid Term II, Quiz & End Term
26.		Introduction to shell programming: Types of Shell	Shell Programming	Lecture	1504.3	Mid Term II, Quiz & End Term
27.		Revision and Briefing	Shell Programming	Lecture	1504. 2	Mid Term II, Quiz & End Term
28.		Tutorial	Shell Programming	Tutorial	1504.2	
29.	Shell Script	Unix Wild Card, Escaping, Quoting, Redirection, pipe, command substitution	Shell Programming	Lecture	1504.3	Mid Term II, Quiz & End Term
30.		Command Substitution, Shell variable, script example	Shell Programming	Lecture	1504.3	Mid Term II, Quiz & End Term
31.		Interactive Shell Script	Shell Programming	Lecture	1504.3	Mid Term II, Quiz & End Term
32.		Tutorial	Shell Programming	Tutorial	1504.3	Mid Term II, Quiz & End Term
33.		Simple Shell Script	Shell Programming	Flipped Classroom	1504.3	Mid Term II, Quiz & End Term
34.	Basic Shell Scripts	Logical Operators, Control Structures	Shell Programming	Lecture	1504.3	Mid Term II, Quiz & End Term
35.		Case Structurer	Shell Programming	Lecture	1504.3	Mid Term II, Quiz & End Term
36.		Tutorial	Shell Programming	Tutorial	1504.3	Mid Term II, Quiz & End Term

37.		For Loop, Nesting of Loop	Shell Programming	Lecture	1504.3	Mid Term II, Quiz & End Term
38.		While Loop, Do While	Shell Programming	Lecture	1504.3	Mid Term II, Quiz & End Term
39.		Loop Nesting of While and Do While	Shell Programming	Lecture	1504.3	Mid Term II, Quiz & End Term
40.		Tutorial	Shell Programming	Tutorial	1504.3	Mid Term II, Quiz & End Term
41.	Advance Shell Script	Repeat Until Loop, Exit Loop	Shell Script	Lecture	1504.3	Mid Term II, Quiz & End Term
42.		Process Concepts	Shell Script	Lecture	1504.3	Quiz & End Term
43.		Revision and Briefing	Shell Script	Lecture	1504.3	Quiz & End Term
44.		Tutorial	Shell Script	Tutorial	1504.3	Quiz & End Term
45.		System Process, Orphan and Zombie Process	Shell Script	Activity	1504.3	
46.	System cal;	Tutorial	Shell Script	Tutorial	1504.3	Quiz & End Term
47.		Process related System calls	System Call	Lecture	1504.4	Quiz & End Term
48.		System call for Redirection	System Call	Lecture	1504.4	Quiz & End Term
49.		System call for Pipe	System Call	Lecture	1504.4	Quiz & End Term
50.		System call for Low level input	System Call	Lecture	1504.4	Quiz & End Term
51.		Signals, classes of Signals	System Call	Lecture	1504.4	Quiz & End Term
52.		Tutorial	System Call	Tutorial	1504.4	Quiz & 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
CA 1504.1	Describe the architecture and features of Unix operating system and distinguish it from other Operating Systems.	1	2	2	0	0	0	1	0	0	0	0	0	2	0	1	0
CA 1504.2	Understand, Identify and use Unix commands and utilities to create and manage simple processing operations, organize directory structure with appropriate security and develop shell scripts to perform more complex tasks.	2	2	2	0	1	0	0	0	0	0	0	0	2	0	1	0
CA	Analyses a given	0	2	2	0	0	0	0	0	0	0	0	0	2	0	1	0

1504.3	problem and apply requisite facets of shell programming in order to devise a SHELL SCRIPT to solve problem																
CA 1504.4	Apply fundamental concepts of Unix programming to automate the jobs and Process in Unix Environment	2	0	2	0	0	0	0	0	0	0	0	0	2	0	1	0

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Science

Department of Computer Applications

Course Hand-out

Non Linear Data Structure | CA 1505 | 4 Credits | 3 1 0 4

Session: Jul 19 – Dec 19 | Faculty: Kuntal Gaur | Class: BCA V SEMESTER

- A. Introduction:** The objective of this course is to make students acquainted with working and implementation of nonlinear data structures like trees and graphs. Second objective is to increase knowledge of student so that one can write efficient program using knowledge of data structure. The course will be taught with the help of GCC compiler.

The main objective of the course are as follows:

- Apply knowledge of data structures to solve problems.
- Describe how trees, graphs and heaps are represented in memory and used by algorithms.
- Choose appropriate data structures to solve problems and assess the trade-offs involved in the design choices.
- Programming using GCC compiler in Linux.

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

[CA1505.1]. Elucidate basic concepts of Non- Linear Data Structure.

[CA1505.2]. Describe how trees, graphs, heap and other data structures are represented in memory and how they can be implemented using Linked list and arrays in memory.

[CA1505.3]. Perform various operations on Non-Linear Data Structures for improving programming skills.

[CA1505.4]. Understand complexity notations and analyse complexity of various algorithms.

[CA1505.5]. Describe and analyse various searching and sorting algorithms.

[CA1505.6]. Analyse the problem statement and decide appropriate data structure to solve the problem efficiently for enhancing employability.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

- [PO.1].** Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
- [PO.2].** Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
- [PO.3].** Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings 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.4].** Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

- [PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.
- [PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
- [PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

PROGRAM SPECIFIC OUTCOMES

- [PSO.1]. Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other completer application areas to acquire knowledge in various domain-based prospects.
- [PSO.2]. Encourage to communicate effectively and to improve their competency skills to solve real time problems.
- [PSO.3]. Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	20
	Sessional Exam II (Close Book)	20
	In class Quizzes	10
End Term Exam (Summative)	End Term Exam (Close 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.	

E. SYLLABUS

NONLINEAR DATA STRUCTURE: Tree-Definitions and Concepts, Representation of binary tree, Binary tree traversal (Inorder, postorder, preorder), Threaded binary tree, insertion and deletion, Binary search trees, Applications Of Trees- Some balanced tree mechanism, eg. AVL trees, 2-3 trees, Height Balanced, Weight Balance , B Tree, B+ Tree, Graph-Matrix Representation Of Graphs, Elementary Graph operations,(Breadth First Search, Depth First Search, Spanning Trees, Shortest path, Minimal spanning tree).**ALGORITHMS:** Algorithm Definition, Complexity of Algorithms: Time & space complexity, Bestcase, worst-case, average-case, Asymptotic notations, Searching Algorithm: Linear or sequential search, Binary search, Interpolation search using array, Complexity of Linear search, Binary search, Interpolation Search Sorting Algorithm: Bubble sort, Selection sort, Insertion sort, Merge sort Complexity of sorting algorithms.

F. TEXT BOOKS

1. O.G. Kakde & U.A. Deshpandey, "*Data Structures and Algorithms*", ISTE/EXCEL BOOKS, 2003
2. Aho Alfred V., Hopcroft John E., Ullman Jeffrey D., "*Data Structures and Algorithms*", Addison Wesley, 2002
3. Drozdek, "*Data Structures and Algorithms*", Vikas Publications, 2003

G. REFERENCE BOOKS:

1. H. Cormen, Charles E. Leiserson, Ronald L. Rivest, "*Introduction to Algorithms*", 2002
2. Heileman, "*Data Structure Algorithms & OOP*", Tata McGraw Hill., 2003
3. M. Radhakrishnan and V. Srinivasan, "*Data Structures Using C*" ISTE/EXCEL BOOKS, 1983
4. Horowitz Ellis & Sartaj Sahni, "*Fundamentals of Data Structures*", Galgotria Publication, 2004.
5. Tanenbaum A. S., "*Data Structures using C*" Pearson Publication, 2004.
6. Ajay Agarwal "*Data structure Through C*", Cybertech Publication, 2005. Balaguruswamy, "Computing Fundamentals & C Programming", Tata McGraw Hill, 2008.

H. Lecture Plan:

Lectures	Major Topics	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode Of Assessing CO
1.	Introduction to Computers (1-2 Lecture)	Introduction and Course Hand-out briefing	Understand CO, PO and PSO	Power Point Presentation	NA	
2.		Introduction to non-linear data structure	Learn about nonlinear data structure	Lecture	1505.1	Mid Term I, Quiz & End Term
3.	Algorithms (1-2 Lecture)	Introduction to algorithm and its complexity	Revise algo notation	Lecture	1505.1 &1505.4	Mid Term I, Quiz & End
4.		Trade off time and space complexity	Revisit complexity	Lecture	1505.1 &1505.4	Mid Term I, Quiz & End
5.		Asymptotic notations	Notations	Lecture	1505.1 &1505.4	Mid Term I, Quiz & End
6.		Tutorial	Tutorial	Activity	1505.1 &1505.4	Mid Term I, Quiz & End
7.	Trees (8-12 Lecture)	Basic terminologies, binary tree representation	Learn about trees	Lecture	1505.2	Mid Term I, Quiz & End
8.		In order and preorder tree traversal	Traversing tree	Lecture	1505.2	Mid Term I, Quiz & End Term
9.		Post order tree traversal	Traversing Tree	Lecture	1505.2	Mid Term I, Quiz & End Term
10.		Binary Search Tree and its implementation	Learn about BST	Lecture	1505.2	Mid Term I, Quiz & End
11.		Threaded Binary tree	Threaded Binary tree	Lecture	1505.2	Mid Term I, Quiz & End
12.		Tutorial based on Binary tree	Tutorial	Tutorial	1505.2 &1505.3	Mid Term I, Quiz & End
13.		tutorial based on Binary Search Tree	Tutorial	Tutorial	1505.2 &1505.3	Mid Term I, Quiz & End
14.		Height balanced tree and AVL Tree	Learn AVL tree	Lecture	1505.2 &1505.3	Mid Term I, Quiz & End
15.		AVL Insertion	AVL insertion	Lecture	1505.2 &1505.3	Mid Term I, Quiz & End
16.		AVL deletion	AVL deletion	Lecture	1505.2 &1505.3	Mid Term I, Quiz & End
17.		Tutorial based on AVL tree	Tutorial	Lecture	1505.2 &1505.3	Mid Term I, Quiz & End
18.		Advantage of M-way tree over AVL tree,	M way trees	Lecture	1505.2 &1505.3	Mid Term I, Quiz & End
19.		M-way tree , B-tree Insertion & Deletion	M way trees	Lecture	1505.2 &1505.3	Mid Term I, Quiz & End
20.		B+ tree insertion & Deletion	B+ tree	Lecture	1505.2 &1505.3	Mid Term I, Quiz & End
21.		Tutorial based on B+ tree	Tutorial	Tutorial	1505.2 &1505.3	Mid Term I, Quiz & End
22.		Introduction to heap	Heap basics	Lecture	1505.2 &1505.3	Mid Term II, Quiz & End
23.		Min and Max Heap	Types of Heap	Lecture	1505.2 &1505.3	Mid Term II, Quiz & End
24.		Insertion and Deletion in a Heap	Heap Construction	Lecture	1505.2 &1505.3	Mid Term II, Quiz & End
25.		Heap sort	Sorting	Lecture	1505.2 &1505.3	Mid Term II, Quiz & End
26.		Tutorial based on Heap	Tutorial	Tutorial	1505.2 &1505.3	Mid Term II, Quiz & End
27.		Tutorial based on tree	Tutorial	Tutorial	1505.2 &1505.3	Mid Term II, Quiz & End
28.	Graphs (13-19 Lecture)	Terminology and definition of graph, Graph	Learn about Graphs	Lecture	1505.2 &1505.6	Mid Term II, Quiz & End
29.		Linked list and array representation of graph	Memory Representation	Lecture	1505.2 &1505.6	Mid Term II, Quiz & End Term
30.		Breadth first traversal	Graph Traversal	Lecture	1505.2 &1505.6	Mid Term II, Quiz & End

31.		depth first and level order traversal	Graph Traversal	Lecture	1505.2 &1505.6	Mid Term II, Quiz & End
32.		Tutorial based on Graph and Tree	Tutorial	Flipped Class	1505.2 &1505.6	Mid Term II, Quiz & End
33.		Spanning trees, minimum cost spanning tree	Spanning tree	Lecture	1505.2 &1505.6	Mid Term II, Quiz & End
34.		Shortest path	MST	Lecture	1505.2 &1505.6	Mid Term II, Quiz & End
35.		Prim's algorithm	MST algorithm	Lecture	1505.2 &1505.6	Mid Term II, Quiz & End
36.		Kruskal's algorithm	MST algorithm	Lecture	1505.2 &1505.6	Mid Term II, Quiz & End
37.		Tutorial based on Spanning trees	Tutorial	Flipped Class	1505.2 &1505.6	Mid Term II, Quiz & End
38.		Examples based on Prim's algorithm	Tutorial	Activity	1505.2 &1505.6	Mid Term II, Quiz & End
39.		Examples based on Kruskal's algorithm	Tutorial	Activity	1505.2 &1505.6	Mid Term II, Quiz & End
40.		Tutorial	Tutorial	Activity	1505.2 &1505.6	Mid Term II, Quiz & End
41.	Searching and Sorting (20-29 lecture)	Linear search and Binary search	Searching	Lecture	1505.5	Quiz & End Term
42.		Interpolation of search using array	Interpolation	Lecture	1505.5	Quiz & End Term
43.		Tutorial based on searching	Tutorial	Lecture	1505.5	Quiz & End Term
44.		Insertion Sort, Selection	Sorting	Lecture	1505.5	Quiz & End Term
45.		Bubble sort	Sorting	Lecture	1505.5	Quiz & End Term
46.		Quick Sort	Sorting	Lecture	1505.5	Quiz & End Term
47.		Merge sort	Sorting	Lecture	1505.5	Quiz & End Term
48.		Radix sort	Sorting	Lecture	1505.5	Quiz & End Term
49.		Hashing, its advantage	Learn about Hash	Lecture	1505.5	Quiz & End Term
50.		Collision resolution	Collision resolution	Lecture	1505.5	Quiz & End Term
51.		Tutorial based on hashing.	Tutorial	Flipped Class	1505.5	Quiz & End Term
52.		Tutorial based on sorting	Tutorial	Activity	1505.5	Quiz & End Term
53.		Tutorial	Tutorial	Activity	1505.5	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
CA 1505.1	Elucidate basic concepts of Non-Linear Data Structure	1	2	2	2	-	-	-	-	1	1	1	1	2	-	-
CA 1505.2	Describe how trees, graphs, heap and other data structures are represented in memory and how they can be implemented using Linked list and arrays in memory.	2	2	2	2	-	-	-	-	1	-	-	1	2	-	-
CA 1505.3	Perform various operations on Non-Linear Data Structures for improving programming skills.	3	2	2	1	-	-	-	-	1	-	-	1	3	-	-
CA 1505.4	Understand complexity notations and analyse complexity of various algorithms.	3	2	2	1	-	-	-	-	1	-	-	1	2	-	-
CA 1505.5	Describe and analyse various searching and sorting algorithms.	3	2	2	2	-	-	-	-	1	-	-	1	2	-	-
CA1505.6	Analyse the problem statement and decide appropriate data structure to solve the problem efficiently for enhancing employability.	1	2	1	1	-	-	-	-	1	-	-	2	2	-	-

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



MANIPAL UNIVERSITY JAIPUR

School of Basic sciences

Department of CA

Course Hand-out

Operating Systems | CA 1601 | 4 Credits | 3 1 0 4

Session: Jan – May 2020 | Faculty: Dr Pradeep Kumar Tiwari | Class: BCA VI

A. Introduction: This course provides a comprehensive introduction to understand the underlying principles, techniques and approaches which constitute a coherent body of knowledge in operating systems. In particular, the course will consider inherent functionality and processing of program execution. The emphasis of the course will be placed on understanding how the various elements that underlie operating system interact and provides services for execution of application software.

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

[1601.1]. Understand and apply the concepts of Operating System.

[1601.2]. Illustrate various system calls to development skills for design functionality.

[1601.3]. In depth knowledge of process and threads and their scheduling.

[1601.4]. Better understanding of process synchronization and management

[1601.5]. Understand resource allocation process and deadlocks.

[1601.6]. Understanding of disk scheduling and various storage strategies.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Program Specific Outcomes

PSO1 Prepare professionally trained in the areas of programming, databases, software engineering, web-designing and networking and other completer application areas to acquire knowledge in various domain-based prospects

PSO2 Encourage to communicate effectively and to improve their competency skills to solve real time problems

PSO3 Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	20
	Sessional Exam II (Close Book)	20
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	10
End Term Exam (Summative)	End Term Exam (Close 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: Basic concepts, Simple Batch Systems, Multi-programmed Batched Systems, Time-Sharing Systems, Protection; **Processes and CPU scheduling:** Process Concept, Process scheduling, Operation on Processes, Cooperating Processes, Inter-process Communication. Scheduling Criteria, Scheduling algorithms; **Process Synchronization:** The Critical-Section problem, Synchronization Hardware, Basics of Semaphores; **Deadlocks:** Deadlock characterization, Methods of Handling Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection & Recovery from Deadlock; **Memory Management:** Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging. Virtual Memory: Demand paging, Page replacement, Page-replacement algorithms.

F. TEXT BOOKSE

Silberschatz and Galvin, “*Operating system concepts*”, Addison- Wesley 1999

G. REFERENCE BOOKS

H.M. Diatel, ”An Introduction to Operating Systems”, Addison- Wesley 1980.

Lecture Plan:

Lec No	Main Topic	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
2-5	Introduction:	Operating system structure, Operating system operations, Process management, Memory management Storage management, Protection and security, Special purpose systems.	Describe the objectives, functionality and different types of operating systems	Lecture	1601.1	Quiz MTE-1 End Term
6-9	System structure:	Operating system services, User operating system interfaces System calls, Types of system calls, System programs Operating system structure, Virtual machines, System boot.	Explain dual mode CPU operation, execution of system calls, interrupts, various operating system structures and booting process	Lecture	1601.1	Quiz MTE-1 End Term
10-15	Process:	Process Concept, Process scheduling Operations on processes Inter-process Communication, Unix Pipes	Describe process state transitions, process control block, and context switching and write system programs for process creation, execution, inter-process communication.	Lecture	1601.2	Quiz MTE-1 End Term Programming Assignment
16-20	Multithreaded Programming:	Overview, multithreaded models Thread libraries Programs using Pthreads	Describe significance of threads, multithreaded models and write system programs using PThreads	Lecture	1601.2	Quiz MTE-1 End Term Programming Assignment
21-26	Process scheduling:	Basic concepts, scheduling criteria, Scheduling Algorithms.	Compare various algorithms used for process scheduling	Lecture Tutorial	1601.3	Quiz Mid Term I End Term

			based on various scheduling criteria			
26-32	Process Synchronization:	Background, Critical section problem Peterson's solution Synchronization Hardware, Semaphores Classical problems of synchronization. Programs using PThreads	Apply concepts related to concurrency to achieve the same for cooperating processes	Lecture Tutorial	1601.4	Quiz MTE-2 End Term Tutorial
33-37		Synchronization Programs using PThreads	Write programs for synchronization problems	Lecture	1601.4	Quiz MTE-2 End Term Project
37-40	Deadlocks:	System model, Deadlock Characterization, Methods for handling deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from deadlock.	Apply various deadlock handling strategies to solve resource allocation problems	Lecture Tutorial	1601.4	Quiz MTE-2 End Term Tutorial
41-44	Memory Management:	Background, Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation,	Evaluate the performance of different memory management techniques	Lecture Tutorial	1601.5	Quiz MTE-2 End Term Tutorial
45-48		Demand Paging, Page Replacement Policies, Allocation of Frames, Thrashing.	Describe the concept of virtual memory, and compare various page replacement algorithms	Lecture Tutorial	1601.5	Quiz End Term Tutorial

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	PSO 1	PSO 2	PSO 3
CA1601.1	Understand and apply the concepts of Operating System.	1					1	1	1		1
CA1601.2	Illustrate various system calls to design functionality.		1			1				1	
CA1601.3	In depth knowledge of process and threads and their scheduling.							1			1
CA1601.4	Better understanding of process synchronization and management.				1	1		1	1	1	
CA1601.5	Understand resource allocation process and deadlocks.		1	1			1				
CA1601.6	Understanding of disk scheduling and various storage strategies.				1						1

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Sciences

Department of Computer Applications

Course Hand-out

Computer Networks & Protocols | CA 1602 | 4 Credits | 3104

Session: Jan- June 2020 | Faculty: Ms Kuntal Gaur| Class: BCA- Sem VI

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

[CA 1602.1]: Understand and learn basic concept of TCP/IP model, IPV4, class full addressing, sub netting and classless addressing.

[CA 1602.2]: Analysis and Implement the Routing and its types.

[CA 1602.3]: Demonstrate the Internet control protocols, IPV6 transitions.

[CA 1602.4]: Analyse the Transport Layer and Its protocols, congestion control.

[CA 1602.5]: Describe the Application Layer, its protocols and Network Security.

B. Program Outcomes and Program Specific Outcomes

PROGRAM OUTCOMES

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings.

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centred national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

PROGRAM SPECIFIC OUTCOMES

[PSO.1.] To work productively as IT professional both at supportive and leadership roles

[PSO.2.] To advance successfully in their chosen career path utilizing technical abilities, leadership qualities, communication and interpersonal skills with high regard to legal and ethical responsibilities.

[PSO.3.] To build their profession adaptable to the changes in the technology with lifelong learning

C. 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)	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 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: IPv4 Addresses Classfull addressing, other issues, Sub-netting Classless, addressing, variable length blocks, S options, checksum, Types of messages, message format, error reporting, Query, Checksum, fragmentation, IP Package, **IC**
Unicasting Protocols: Unicasting routing, RIP: RIP Message Format ,Requests and Responses, Timers in RIP , Introduction to
IGMP : Group Management, IGMP Messages, IGMP Protocol Applied to Host ,IGMP Protocol Applied to Router, Role of IGMP
Introduction, packet format, Encapsulation, RARP: Introduction, datagram, **UDP Protocol:** Process to process communication
TCP Protocol :Introduction, TCP services, TCP features, segment, TCP connection, State transition diagram, Flow control, Error
options, TCP package **SCTP Protocol:** SCTP features, packet format, association, state transition diagram, flow control, error

Text Books:

1. A. S. Tanenbaum, “Computer Networks”, Pearson Education Asia, 4th Ed., 2003.

Reference Books:

1. Behrouz A. Forouzan, “Data Communication and Networking”, 3rd edition, Tata McGraw Hill, 2004.

E. Lecture Plan:

Lecture No	Major Topics	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	Network introduction	Introduction to the subject	Understand POs, PSOs and COs	Lecture	1602.1	Mid Term I, Quiz & End Term
2		Introduction to network Layer: Network Layer Design Issues: Store-and-Forward Packet Switching, Services Provided to the Transport Layer, Implementation of Connectionless Service, Implementation of Connection-Oriented Service	Understand Network Layer and its functions	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	Understand Characteristics of Network Layer	Lecture	1602.1	Mid Term I, Quiz & End Term
4	Routing Algorithms	Routing Algorithms; Characteristics and Types, The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing,	Define Routing Algorithm	Lecture	1602.2	Mid Term I, Quiz & End Term
5		Routing Algorithms; Characteristics and Types, The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing,	Define Routing Algorithm	Lecture	1602.2	Mid Term I, Quiz & End Term

		Hierarchical Routing,				
6		Routing Algorithms; Characteristics and Types, The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing,	Discuss routing algorithms	Lecture	1602.2	Mid Term I, Quiz & End Term
7		Routing Algorithms; Characteristics and Types, The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing,	Discuss routing algorithms	Lecture	1602.2	Mid Term I, Quiz & End Term
8		Internetworking; IP Addresses, Subnets, CIDR— Classless InterDomain Routing, NAT— Network Address Translation	Explain Internetworking	Lecture	1602.2	Mid Term I, Quiz & End Term
9	Internetworking	Internetworking; IP Addresses, Subnets, CIDR— Classless InterDomain Routing, NAT— Network Address Translation	Explain Internetworking and Routing	Lecture	1602.2	Mid Term I, Quiz & End Term
10		Internetworking; IP Addresses, Subnets, CIDR— Classless InterDomain Routing, NAT— Network Address Translation	Find Route through CIDR	Lecture	1602.2	Mid Term I, Quiz & End Term
11		Internetworking; IP Addresses, Subnets, CIDR— Classless	Find Route through Classless routing	Lecture	1602.3	Mid Term I, Quiz & End Term

		InterDomain Routing, NAT— Network Address Translation				
12		Internetworking; IP Addresses, Subnets, CIDR— Classless InterDomain Routing, NAT— Network Address Translation	Analyse NAT	Lecture	1602.3	Mid Term I, Quiz & End Term
13	Network Layer Protocols	DHCP, ARP, RARP, ICMP, IPV4 and IPV6 header format	Classify various routing protocols	Lecture	1602.3	Mid Term I, Quiz & End Term
14		DHCP, ARP, RARP, ICMP, IPV4 and IPV6 header format	Classify various routing protocols	Lecture	1602.3	Mid Term I, Quiz & End Term
15		Fragmentation	Explain Fragmentation	Lecture	1602.2	Mid Term I, Quiz & End Term
16		RIP, OSPF, BGP	Classify various routing protocols	Lecture	1602.2	Mid Term I, Quiz & End Term
17		RIP, OSPF, BGP	Classify various routing protocols	Tutorial	1602.2	Mid Term I, Quiz & End Term
18	Congestion Control	Congestion Control Algorithms; General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnets	Understand Congestion Control Algorithms	Tutorial	1602.1	Mid Term I, Quiz & End Term
19		Congestion Control Algorithms; General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets,	Understand General Principles of Congestion Control	Tutorial	1602.1	Mid Term I, Quiz & End Term

		Congestion Control in Datagram Subnets				
20		Congestion Control Algorithms; General Principles of Congestion Control, Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnets	Illustrate the Congestion Prevention Policies, Congestion Control in Virtual-Circuit Subnets, Congestion Control in Datagram Subnets	Tutorial	1602.1	Mid Term I, Quiz & End Term
21		Quality of Service; Requirements, Techniques for Achieving Good Quality of Service (till Packet Scheduling as per Tannenbaum)	Explain Quality of Service	Tutorial	1602.1	Mid Term I, Quiz & End Term
22	Quality of Service	Quality of Service; Requirements, Techniques for Achieving Good Quality of Service (till Packet Scheduling as per Tannenbaum)	Explain techniques for Achieving Good Quality of Service	Tutorial	1602.1	Mid Term I, Quiz & End Term
23		Quality of Service; Requirements, Techniques for Achieving Good Quality of Service (till Packet Scheduling as per Tannenbaum)	Explain techniques for Achieving Good Quality of Service	Tutorial	1602.2	Mid Term I, Quiz & End Term
		First Sessional Examination		Tutorial		
24		Transport Layer; Introduction to Transport Layer, Transport Service Primitives	Understand Transport Layer	Tutorial	1602.4	Mid Term II, Quiz & End Term
25	Transport Layer	Elements of Transport Protocols; Addressing, Connection Establishment,	Understand Transport Layer Protocols	Tutorial	1602.4	Mid Term II, Quiz & End Term

		Connection Release, Flow Control and Buffering, Multiplexing				
r26		Elements of Transport Protocols; Addressing, Connection Establishment, Connection Release, Flow Control and Buffering, Multiplexing	Discuss the process of connection	Tutorial	1602.4	Mid Term II, Quiz & End Term
27		Elements of Transport Protocols; Addressing, Connection Establishment, Connection Release, Flow Control and Buffering, Multiplexing	Understand flow control and buffering	Tutorial	1602.4	Mid Term II, Quiz & End Term
28		Elements of Transport Protocols; Addressing, Connection Establishment, Connection Release, Flow Control and Buffering, Multiplexing	Articulate buffering and Multiplexing	Tutorial	1602.4	Mid Term II, Quiz & End Term
29	Transport Layer Protocols	UDP; UDP Header; Introduction to TCP	Understand UDP	Tutorial	1602.4	Mid Term II, Quiz & End Term
30		The TCP Service Model, The TCP Protocol, The TCP Segment Header,	Understand TCP Service Model	Tutorial	1602.4	Mid Term II, Quiz & End Term
31		The TCP Service Model, The TCP Protocol, The TCP Segment Header,	Understand TCP Segment header and its each field	Tutorial	1602.4	Mid Term II, Quiz & End Term
32		TCP Connection Establishment, TCP Connection Release	Understand TCP Connection	Flip Class	1602.4	Mid Term II, Quiz & End Term
33		TCP Transmission Policy; Window Management,	Identify TCP window and Timer Management	Lecture	1602.4	Mid Term II, Quiz & End Term

		Connection Control, Timer Management				
34		TCP Transmission Policy; Window Management, Connection Control, Timer Management	Describe the Connection Control, Timer Management	Lecture	1602.4	Mid Term II, Quiz & End Term
35		TCP Transmission Policy; Window Management, Connection Control, Timer Management	Describe the Connection Control, Timer Management		1602.4	Mid Term II, Quiz & End Term
36	Application Layer	Introduction to Application Layer; DNS—The Domain Name System	Explain Application Layer	Flip Class	1602.5	Mid Term II, Quiz & End Term
37		Introduction to Application Layer; DNS—The Domain Name System	Recognize DNS	Lecture	1602.5	Mid Term II, Quiz & End Term
38	Application Layer Protocols	Electronic Email; SMTP, POP, IMAP, MIME	Illustrate Email	Tutorials	1602.5	Mid Term II, Quiz & End Term
39		Electronic Email; SMTP, POP, IMAP, MIME	Illustrate Email and its protocols	Flip Class	1602.5	Mid Term II, Quiz & End Term
40		HTTP, HTTPS	Understand Hypertext protocols	Lecture	1602.5	Mid Term II, Quiz & End Term
41		HTTP, HTTPS	Compare HTTP and HTTPs	Lecture	1602.5	Mid Term II, Quiz & End Term
42		SNMP	Discuss Network Management Protocol	Lecture	1602.5	Mid Term II, Quiz & End Term
		Second Sessional Examination				
43	Introduction to VLAN concept	Wireless Network protocols	Explain Wireless Protocols	Tutorial	1602.5	Quiz & End Term
44		WAP Architecture introduction.	Understand WAP architecture	Flip Class	1602.5	Quiz & End Term
45		Introduction to MANET & VANET	Understand MANET and VANET	Flip Class	1602.5	Quiz & End Term

F. 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	PSO 1	PSO 2	PSO 3
CA1602.1	Understand and learn basic concept of TCP/IP model, IPV4, class full addressing, sub netting and classless addressing.	3		1				3	3	2	2
CA1602.2	Implement the Routing and its types	1		1				2	3	1	3
CA1602.3	Demonstrate the Internet control protocols, IPV6 transitions.	1						1	2	2	1
CA1602.4	Analyse the Transport Layer and Its protocols, congestion control.	1						3	2	2	1
CA1602.5	Describe the Application Layer, its protocols and Network Security.	2	1	1			3	2	3	1	2



MANIPAL UNIVERSITY JAIPUR

School of Basic Sciences

Department of Computer Application

Course Hand-out

DATA WAREHOUSING USING OLAP | CA 1603 | 4 Credits | 3 1 0 4

Session: Jan 20 – June 20 | Faculty: Linesh Raja | Class: BCA (VI Sem)

A. Introduction: We live in an age when technology is fast outpacing our thinking. We now think of newer tools and technologies to take care of our future needs. The data industry has come a long way since the earlier days of Data Warehousing. Today, data comes to us in various forms, and from multiple sources, unlike earlier days. The sources are not often disclosed, and the data needs to be sifted for meaningful information. The data engineer has taken the place of ETL developers, and DevOps has made its way into the data strategy. Data engineers work on platforms like Spark Architecture and Python. Algorithms have already forayed into Business Intelligence and decision making. Now, we can also extract data from multiple sources, before finding a pattern out of it. This course gives an introduction to methods and theory for development of data warehouses and data analysis using data mining. Data quality and methods and techniques for pre-processing of data. Modeling and design of data warehouses. Algorithms for classification, clustering and association rule analysis. Practical use of software for data analysis.

The main objective of the course is as follows:

- To teach students about the basics of Data Warehousing
- To enable the students to understand Data Warehousing types and architecture
- To enable the students to understand the basic differences and inter-relation between Data mining and Data Warehousing
- To teach students about the implementation Data Warehousing and Business Intelligence
- To teach students about Data Warehouse Appliances and future of Data Warehouse

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

[I603.1]. Understand data ware housing and data mining.

[I603.2]. Learn and apply the concepts of data building and mapping.

[I603.3]. Describe and Implement data pre-processing and data quality.

[I603.4]. Learn and implement modeling and design of data warehouse.

[I603.5]. Understand, Learn and finally Implement the use of data warehouse cost-benefit analysis, data visualization.

[I603.6]. Visualize a real world problem in the form of various applications.

C. Program Outcomes and Program Specific Outcomes

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes.

[PSO.1]. To work productively as IT professional both at supportive and leadership roles.

[PSO.2]. To advance successfully in their chosen career path utilizing technical abilities, leadership qualities, communication and interpersonal skills with high regard to legal and ethical responsibilities.

[PSO.3]. To build their profession adaptable to the changes in the technology with lifelong learning.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Close Book)	20
	Sessional Exam II (Close Book)	20
	In class Quizzes and Assignments , Activity feedbacks (Accumulated and Averaged)	10
End Term Exam (Summative)	End Term Exam (Close 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)	A student 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

Data Warehousing Introduction: Data Warehouse, Data Warehouse Architecture, Implementation, Data Warehousing to Data Mining, Data warehousing components, building a data warehouse, mapping the data warehouse to an architecture, data extraction, cleanup transformation tools, metadata, Data Warehouse characteristics and definition; The purpose of Data Warehouse;

Data Marts: Data Warehouse Cost-Benefit Analysis / Return on Investment;

OLAP: Patterns and models – Data visualization principles, Data Mining functionalities, Major issues in Data Mining..

F. Text Books

T1. Han, M. Kamber, “Data Mining Concepts and Techniques”, Elsevier, 2007.

T2. M. Berry, G. Linoff, “Data Mining Techniques”, Wiley Publishing, 2004.

G. Reference Books

R1. Core Java Volume I - Fundamentals (10th Edition), By Cay Horstmann, Prentice Hall, ISBN-10:0134177304, ISBN-13: 978-0134177304, Year (2006)

R2. T. Davenport, “Competing on Analytics”, Harvard Business Review (Decision Making), January 2006

R3 R. N Prasad, S. Acharya, “Fundamentals of Business Analytics”, John Wiley & Sons, 2011

H. Lecture Plan:

Lec No	Major Topics	Topics	Session outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	Data Warehousing	Introduction and Course Hand-out briefing	Course objective	Lecture	NA	NA
2		Data Warehouse	Introduction to DW	Lecture	1603.1	In Class Quiz (Not Accounted)
3-4		Data Warehouse Architecture	DW Architecture	Lecture	1603.1	In Class Quiz End Term
5-6		Implementation	DW Implementation	Guided Self-Study	1603.1	Home Assignment End Term
7-8		Data Warehousing to Data Mining	DW and DM	Lecture	1603.2	In Class Quiz End Term
9-10		Data warehousing components	DW Components	Activity	1603.2	Class Quiz Mid Term I End Term
11-12		Building a data warehouse	Basics of DW & M	Lecture	1603.2	Class Quiz Mid Term I End term
13-14		Mapping the data warehouse to an architecture	Basics of DW & M	Lecture	1603.2	Home Assignment Class Quiz Mid Term I End Term
15-16		Data extraction	Basics of DW & M	Activity	1603.2	Class Quiz Mid Term I End Term
17-18		Cleanup transformation tools	Basics of DW & M & implementation	Lecture	1603.2	Class Quiz Mid Term I End Term
19		Metadata	Basics of DW & M & implementation	Lecture	1603.2	Class Quiz End Term
20-21		Data Warehouse characteristics and definition	Basics of DW & M & implementation	Lecture	1603.3 1603.4	Class Quiz Mid Term II End Term
22-24		The purpose of Data Warehouse	Basics of DW & M & implementation	Lecture	1603.3 1603.4	Class Quiz Mid Term II End Term
25-27	Data Marts	Data Warehouse Cost-Benefit Analysis	DM and their Applications	Lecture	1603.3 1603.4	Class Quiz Mid Term II End Term
28-29		Data	DM and their Applications	Lecture	1603.4	Class Quiz

		Warehouse Return on Investment				Mid Term II End Term
30		Data Warehouse Cost-Benefit Analysis / Return on Investment	DM and their Applications	Lecture	I603.4	Class Quiz End Term
31-32	OLAP	Patterns and models	DM Models			End Term
33-34		Data visualization principles	DM visualization	Lecture	I603.4 I6035 I603.6	Class Quiz End Term
34-36		Data Mining functionalities	DM Functions	Lecture	I603.4 I6035 I603.6	Class Quiz End Term
37-38		Major issues in Data Mining	DM Issues	Lecture	I603.4 I6035 I603.6	Class Quiz End Term
39-42		Revision	Course Outcome	Lecture		

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	PSO 1	PSO 2	PSO 3
CA 1603.1	Understand data ware housing and data mining.	3						1			2
CA 1603.2	Learn and apply the concepts of data building and mapping.		2	2							2
CA 1603.3	Describe and Implement data pre-processing and data quality.				2	2			3		
CA 1603.4	Learn and implement modeling and design of data warehouse.						2		3		
CA 1603.5	Understand, Learn and finally Implement the use of data warehouse cost-benefit analysis, data visualization.			1					3	2	
CA 1603.6	Visualize a real world problem in the form of various applications.	3	2	2	2				3	2	

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



MANIPAL UNIVERSITY JAIPUR

School of Basic Sciences

Department of Computer Applications

Course Hand-out

Python Programming | CA1604 | 3 Credits | 3 | 0 | 4

Session: Jan '20 – May '20 | Faculty: Dr. Vanita Jaitly | Class: BCA VI Semester

Introduction: This course is offered by department of Computer Applications, targeting students who wish to pursue research & development in industries or higher studies, including Python programming, numpy, pandas, matplotlib, scipy libraries and gives an introductory level to advanced level knowledge on implementation of data structures as well as data analytics. Students are expected to have background knowledge on problem solving techniques and object oriented concepts for a better learning.

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

[1604.1]. Acquire basic programming skills of Python programming.

[1604.2]. Illustrate the concept of file handling and exception handling.

[1604.3]. Implement the concept of re-usability in python.

[1604.4]. Understand and Implement the concept of analytics using python libraries like numpy, Pandas, scipy.

[1604.5]. Enhance skills required for employability or entrepreneurship.

[1604.6]. Explain the concepts of Python Programming.

B. Program Outcomes and Program Specific Outcomes

[PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

[PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology

[PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings

[PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.

[PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them

[PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

Program Specific Outcomes for BCA program

PSO1 Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other completer application areas to acquire knowledge in various domain-based prospects

PSO2 Encourage to communicate effectively and to improve their competency skills to solve real time problems

PSO3 Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

C. 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.	
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

Python Concepts: Introduction to Python, Variables, Keywords, Identifiers, Literals, Operators, Comments; **Control Statement:** if, if else, else if, nested if, for loop, while loop, break, continue, pass; **Data structures:** List, Tuple, Set, Dictionary; **Functions:** Functions overview, lambda function, Recursive functions, map, filter and reduce; File and Exception handling: Create a file, read and write operation with file, Introduction to Exceptions & Errors, Handling exceptions using try-except-else-finally. **Python OOPs:** OOPs Concepts, Object, Class, Constructors, Inheritance.

E. Text Books

- T.1 W. McKinney, “*Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Ipython*”, Second Edition, O’Reilly, 2017.
- T.2 A. Martelli, “*Python in a Nutshell*”, Second Edition, O’ Reilly, 2012.
- T.3 J. Georzen, T. Bower, B. Rhodes, “*Foundations of Python Network Programming: The comprehensive guide to building network applications with Python*”, Second Edition, Academic Press, 2010.

F. Reference Books

- R.1 A. Geron, “*Hands-On Machine Learning with Scikit-Learn and Tensor Flow: Concepts, Tools, and Techniques to Build Intelligent Systems*”, First Edition, O’Reilly, 2017.
- R.2 D. M. Beazley, “*Python Essential Reference*”, Second Edition, Amazon Books, 2010.

G. Lecture Plan:

Lec No	Major Topics	Topics	Mode of Delivery	Session Outcome	Corresponding CO	Mode of Assessing the Outcome
1-5	Python Concepts	Introduction to Python: Identifiers ,Variables, Keywords, Data types	Lecture	Able to know Identifiers	1604.I	Mid term I
			Lecture		1604.I	In Class Quiz (Not Accounted)

		Literals, Operators, Comments	Lecture	, Variables, Keywords, Data types Literals, Operators, Comments	I604.1	In Class Quiz End Term
6-10	Control Statement	Control Statements: if, if else, else if, nested if, Reading and Writing on Console	Lecture	How to make Control Statements, read and display on screen	I604.1	Home Assignment End Term Mid Term I
11-14		Control Statements: for loop, while loop, break, continue, pass	Lecture	How iterators work	I604.1	In Class Quiz End Term Mid Term I
15-18	Python Data Structures	Strings	Lecture	Know about strings and their operations	I604.1	In Class Quiz Mid Term I End Term
19-22		List, Tuple	Lecture	Know about list, tuple and their operations	I604.3	Class Quiz Mid Term I End Term
23-25		Set, Dictionary(Mapping)	Lecture	Know about set, dictionary and their operations	I604.3	Class Quiz Mid Term I End term
26-29		Functions overview, lambda function, Recursive functions	Lecture	How to create functions and their usage	I604.1, I604.3	Class Quiz End Term
30-32		Map, filter and reduce functions	Lecture	How to apply these functions	I604.1, I604.3	Class Quiz Mid Term I End Term
33-36	File Handling	File Handling: Create a file, read and write operation with file	Lecture	Able to create a file and its operations	I604.4	Class Quiz Mid Term II End Term
37-40		Exception Handling: Introduction to Exceptions & Errors, Handling exceptions using try-except-else-finally	Lecture	Able to create exceptions and handle exceptions	I604.4	Class Quiz Mid Term II End Term
41-43	Python OOPs	OOPs Concepts	Lecture	Learn concepts of OOP	I604.2, I604.5	Class Quiz End Term
44-45		Object, Class	Lecture	Learn concepts of OOP	I604.2, I604.5	Class Quiz End Term
46		Constructors	Lecture	Learn concepts of OOP	I604.2, I604.5	Class Quiz End Term
47		Inheritance	Lecture	Learn concepts of OOP	I604.2, I604.5	Class Quiz End Term

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

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CA1604.1	Acquire basic programming skills of Python programming.	1	3	1										1			1
CA1604.2	Illustrate the concept of file handling and exception handling.		1	3													
CA1604.3	Implement the concept of re-usability in python.		1	2	1										1		
CA1604.4	Understand and Implement the concept of analytics using python libraries like numpy, Pandas, scipy.			1											1		
CA1604.5	Enhance skills required for employability or entrepreneurship.			3	2										2		
CA1604.6	Explain the concepts of Python Programming	2	2	2	2	1								2	3		2

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

MANIPAL UNIVERSITY JAIPUR

School of Basic Sciences

Department of Computer Applications

Course Hand-out

Soft Computing | CA I605 | 4 Credits | 3 | 0 4

Session: Jan -May 2020| Faculty: Dr. Shilpa Kulkarni Sharma | Class: BCA VI SEMESTER

A. Introduction: This course aims at introducing the fundamental mathematical theory and concepts of computational intelligence methods, classification, probability, clustering, feature selection and their extraction together with the recent advances in PR.

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

- I605.1 Learn about soft computing techniques and mathematical preliminaries.
- I605.2 Analyze various classification techniques.
- I605.3 Understand clustering methods and application.
- I605.4 Define the feature selection and extraction algorithms
- I605.5 Analyze the recent advances in PR related to soft computing and Neuro fuzzy

C. Program Outcomes and Program Specific Outcomes

- [PO.1]. Critical Thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, checking out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.
- [PO.2]. Effective Communication: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology
- [PO.3]. Social Interaction: Elicit views of others, mediate disagreements and help reach conclusions in group settings
- [PO.4]. Effective Citizenship: Demonstrate empathetic social concern and equity centered national development, and the ability to act with an informed awareness of issues and participate in civic life through volunteering.
- [PO.5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them
- [PO.6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.
- [PO.7]. Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context socio-technological changes

[PSO1 Prepare professionally trained in the areas of programming, databases, software engineering, web- designing and networking and other completer application areas to acquire knowledge in various domain-based prospects

PSO2 Encourage to communicate effectively and to improve their competency skills to solve real time problems

PSO3 Understand to employ modern computer languages and applications for their successful career, to create platforms to become an entrepreneur and a relish for higher studies

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	20
	Sessional Exam II (Closed Book)	20
	In class Quizzes	10
End Term Exam (Summative)	End Term Exam (Closed 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.	
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.	

E. Syllabus:

Introduction and mathematical preliminaries: What is pattern recognition?, Clustering vs. Classification; Applications; Linear Algebra, vector spaces, probability theory, estimation techniques. **Classification:** Bayes decision rule, Error probability, Error rate, Minimum distance classifier, Mahalanobis distance; K-NN Classifier, Linear discriminant functions and Non-linear decision boundaries. Fisher's LDA, Single and Multilayer perceptron, training set and test sets, standardization and normalization. **Clustering:** Different distance functions and similarity measures, Minimum within cluster distance criterion, K-means clustering, single linkage and complete linkage clustering, MST, medoids, DBSCAN, Visualization of datasets, existence of unique clusters or no clusters. **Feature selection:** Problem statement and Uses, Probabilistic separability based criterion functions, interclass distance based criterion functions, Branch and bound algorithm, sequential forward/backward selection algorithms, (l,r) algorithm. **Feature Extraction:** PCA, Kernel PCA. **Recent advances in PR:** Structural PR, SVMs, FCM, Soft-computing and Neuro-fuzzy.

F. Text Book(s):

1. S.N. Deepa, "Principles Of Soft Computing, 2nd Ed", Wiley-India 2011
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. 4. K. Knight, E. Rich, B. Nair, "Artificial Intelligence", 3rd Edition, McGraw Hill, 2008.

H. Lecture Plan:

Lecture	Major Topic	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1.	Introduction and mathematical preliminaries	What is pattern recognition?	To familiarize with soft computing concepts.	Lecture	I605.1	Class Quiz Mid Term I End Term
2.		Clustering vs. Classification;		Lecture	I605.1	
3.		Its applications		Lecture	I605.1	
4-7		Linear Algebra		Lecture	I605.1	
8-9		vector spaces		Lecture	I605.1	
10-13		probability theory		Lecture	I605.1	
14-16		estimation techniques		Lecture	I605.1	
17	Classification	Bayes decision rule	To learn Basics of classification techniques in soft computing.	Lecture	I605.2	
18-19		Error probability, Error rate, Minimum distance classifier,		Lecture	I605.2	
20-21		Mahalanobis distance; K-NN Classifier		Lecture	I605.2	
22-23		Linear discriminant functions and Non-linear decision boundaries		Lecture	I605.2	
24		Fisher's LDA		Handouts	I605.2	
25		Single and Multilayer perceptron,			I605.2	
26		training set and test sets,			I605.2	
27		Types of neural network:		Lecture	I605.2	
28		standardization and normalization		Lecture	I605.2	
29	Clustering	Different distance functions and similarity measures	Understand clustering methods and application	Lecture	I605.3	
30		Minimum within cluster distance criterion		Lecture	I605.3	
31		K-means clustering		Lecture	I605.3	
32		single linkage and complete linkage clustering		Lecture	I605.3	
33		MST, medoids		Lecture	I605.3	
34		DBSCAN		Lecture	I605.3	
35		Visualization of datasets		Lecture	I605.3	

36		existence of unique clusters or no clusters		Lecture	1605.3	
37	Feature selection	Problem statement and Uses	Illustrate the feature selection algorithms	Lecture	1605.4	Class Quiz Mid Term II End Term
38		Probabilistic separability based criterion functions		Lecture	1605.4	
39		interclass distance based criterion functions		Lecture	1605.4	
40		Branch and bound algorithm		Lecture	1605.4	
41		sequential forward/backward selection algorithms, (l,r) algorithm		Lecture	1605.4	
42-45	Feature Extraction	PCA, Kernel PCA	Identify extraction methods	Lecture	1605.4	
46-48	Recent advances in PR	Structural PR, SVMs, FCM, Soft-computing and Neuro-fuzzy	Introduce the recent advances in PR related to soft computing and Neuro fuzzy	Lecture	1605.5	

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

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES						CORRELATION WITH PROGRAM SPECIFIC OUTCOMES			
		PO 1	PSO 3	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3
CC 1605.1	Learn about soft computing techniques and mathematical preliminaries.	2			2	3			1		
CC 1605.2	Analyze various classification techniques.		2		3	2				1	1
CC 1605.3	Understand clustering methods and application.	2	3	2		1	1		1	1	

CC 1605.4	Define the feature selection and extraction algorithms				2		1			1	
CC 1605.5	Analyze the recent advances in PR related to soft computing and Neuro fuzzy	3		3			2	1	2	1	1