MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

DEPARTMENT OF INFORMATION TECHNOLOGY
PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES
Bachelor of Computer Application

PROGRAM OUTCOMES

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

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

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

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

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

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

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

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

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

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

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

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

PROGRAM SPECIFIC OUTCOME

[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

[PSO.2]. To develop and manage policies related to organizations' IT systems.

[PSO.3]. In-depthknowledge &sustained learning leading toinnovation& research tofulfilglobalinterest.

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Information Technology Course

Hand-out

FUNDAMENTALS OF COMPUTER | CA 1101 | 4 Credits | 3 1 0 4

Session: July'18 – Dec'18

Faculty: Virender

A. **Introduction:** The present era is evolving around computing devices. The one who is lacking the knowledge of computing devices is considered as illiterate. Therefor 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

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

[CA1101.2] To understand the main hardware component of computer and to understand the basic functional.

[CA1101.3] To describe the main s/w category and its utility.

[CA1101.4] Brief introduction to OS.

[CA1101.5] To discuss the various commands of DOS and other OS.

C. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

PROGRAM OUTCOMES

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

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

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

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

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

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PROGRAM SPECIFIC OUTCOMES

[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

[PSO.2]. To develop and manage policies related to organizations' IT systems.

[PSO.3]. In-depth knowledge &sustained learning leading to innovation& research to fulfil global interest.

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 (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.	

E.
F.   SYLLABUS

FUNDAMENTALS OF COMPUTER AND OPERATING SYSTEMS: 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. Video Standard-VGA, SVGA; **Printers:** Types of printer; **Storage Devices:** Storage Fundamentals, Primary Vs Secondary; **Data Storage and Retrieval Method:** Various Storage Devices. Computer Software: **Types of software:** System Software and Application Software. **Programming Languages:** Machine Language, Assembly language, High-level language, Assembler, Compilers and Interpreter; **Operating Systems:** Operating system? What is DOS?

G.   TEXT BOOKS

1.   E. Balagurusamy "*Fundamentals of Computers*" Published by Tata McGraw-Hill Education Pvt. Ltd.
2.   P.K.Sinha, *"Computers Fundamentals"*, BPB Publications.

H.   REFERENCE BOOKS

1.   W. S. Davis , *"Fundamental Computer Concepts"*, Addison-Wesley, 1986

I.   Lecture Plan:

Lecture#	Topics to be Covered
Module I : FUNDAMENTALS OF COMPUTER	
Lecture 1-4	• Basic Definitions, Data, information • Bits, byte, software, hardware, memory • Characteristics of a computer
Lecture 5-8	• Block diagram of a computer • Generation of Computers
Lecture 9-12	• Memory and its types, Input Devices
Module II : Input Devices	
Lecture 13-19	• Examples of Input Device

	• Keyboards • Pointing Devices • Graphic and Video Input Devices • Audio Input Devices
Module III : Output Devices	
Lecture 20 – 26	• Monitors • Digital and Analog. • Video Standard-VGA • SVGA • Printers and types
Module IV: Storage Devices	
Lecture 27-30	• Storage Fundamentals, Primary Vs Secondary • Various Storage Devices. Computer Software
Module V: Types of software	
Lecture 31-32	• System Software and Application Software
Module VI: Programming Languages	
Lecture 33- 38	• Machine Language • Assembly language • High-level language • Assembler • Compilers and Interpreter
Module VII: Operating Systems	
Lecture 39-45	• Operating system • What is DOS?

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

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CS 1101.1	To understand basic elements of the computer system and to bring awareness about their functionality.	1					1					1		1		
CS 1101.2	To understand the main hardware component of computer and to understand the basic functional.		1		1				1		1		1		1	
CS 1101.3	To describe the main s/w category and its utility.		1					1		1				1		
CS 1101.4	Brief introduction to OS.	1				1	1				1					1
CS 1101.5	To Discuss the various commands of DOS and other OS.			1											1	

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

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Information Technology
Course Hand-out

Fundamentals of Digital Electronics| CA1102 | 4 Credits | 3 1 0 4

Session: Jul 18 – Dec 18 | Faculty: Pradeep Kumar | Class: BCA I
SEMESTER

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

[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.

[CA1102.2] Apply the principles of Boolean algebra to manipulate and minimize logic expressions.

[CA1102.3] Design two-level logic functions with AND, OR, NAND, NOR and XOR gates with minimum Number of gate delays or literals.

[CA1102.4] Be able to design and Analyze small combinational circuits and use standard combinational functions / building blocks to build larger more complex circuits.

[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.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

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

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[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

[PSO.2]. To develop and manage policies related to organizations' IT systems.

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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	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: 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.

F.   TEXT BOOKS

1. *S. Salivahanan, S. Pravin Kumar, "Digital Circuits and Design", Vikas Publishing House Pvt. Ltd.*

2. *2012Morris Mano, "Digital Logic and Computer Design", PHI, 2015.*

G.   REFERENCE BOOKS

1. Bartee, "Digital Computer Fundamentals", Tata McGraw Hill, 2004.

2. Taub and Schilling, "Digital Integrated Electronics", McGraw Hill International Edition, 2005.

3. Thomos L. Floyd, "Digital Fundamentals", Universal Book Stall, 2003.

H.   Lecture Plan:

Lectures	Major Topics	Topics	Mode of Delivery	Corresponding CO	Mode Of Assessing CO
1.	Introduction	Number System: Binary Decimal, Octal ,Hexadecimal	Lecture	CA1102.1	Mid Term I, Assignment/Quiz & End Term
2.		1's and 2's Complements	Lecture	CA1102.1	Mid Term I, Assignment/Quiz & End Term
3.		Binary Coded Decimal (BCD),Gray Code	Lecture	CA1102.1	Mid Term I, Assignment/Quiz & End Term
4.		Tutorial	Practice	CA1102.1	Mid Term I, Assignment/Quiz & End Term
5.	Boolean Algebra	Introduction, Development of Boolean Algebra	Lecture	CA1102.2	Mid Term I, Assignment/Quiz & End Term
6.		Boolean Logic Operation: Logical AND, Logical OR and Logical Complementation(Inversion)	Lecture	CA1102.2	Mid Term I, Assignment/Quiz & End Term
7.		Boolean Addition, Boolean Multiplication, Properties of Boolean Algebra and Principle of Duality.	Lecture	CA1102.2	Mid Term I, Assignment/Quiz & End Term
8.		Tutorial	Activity	CA1102.2	Mid Term I, Assignment/Quiz & End Term
9.		Demorgan's Theorems, inimization of Boolean expression using algebraic method	Lecture	CA1102.2	Mid Term I, Assignment/Quiz & End Term
10		Sum of Products and Product of Sums : Minterm, Maxterm	Lecture	CA1102.2	Mid Term I, Assignment/Quiz & End Term

11	**Simplification Methods**	Deriving Sum of Products (SOP) Expressions from a Truth Table, Deriving Product of Sum (POS) Expressions from a Truth Table	Lecture	CA1102.2	Mid Term I, Assignment/Quiz & End Term
12		Tutorial	Activity	CA1102.2	Mid Term I, Assignment/Quiz & End Term
13		Karnaugh Map :Two-variable map, Three-variable map	Lecture	CA1102.2	Mid Term I, Assignment/Quiz & End Term
14		Four-variable map	Lecture	CA1102.2	Mid Term I, Assignment/Quiz & End Term
15	**Logic Gates**	Logic Gates: OR, AND, NOT, NAND, NOR	Lecture	CA1102.3	Mid Term I, Assignment/Quiz & End Term
16		Tutorial	Activity	CA1102.3	Mid Term I, Assignment/Quiz & End Term
17		Universal Gates: Realisation of logic function using NAND gates	Lecture	CA1102.3	Mid Term I, Assignment/Quiz & End Term
18		Realisation of logic function using NOR gates	Lecture	CA1102.3	Mid Term I, Assignment/Quiz & End Term
19		Exclusive-OR (Ex-OR) Gate, Exclusive-NOR (Ex-NOR) Gate	Lecture	CA1102.3	Mid Term I, Assignment/Quiz & End Term
20		Tutorial	Practice	CA1102.3	Mid Term I, Assignment/Quiz & End Term
21	**Combination circuit**	Arithmetic Circuits: Half Adder, Full Adder , K-Map Simplification	Lecture	CA1102.4	Mid Term II, Assignment/Quiz & End Term
22		Half Subtractor , Full Subtractor	Lecture	CA1102.4	Mid Term II, Assignment/Quiz & End Term
23		4-bit Parallel Adder/Subtractor	Lecture	CA1102.4	Mid Term II, Assignment/Quiz & End Term
24		Tutorial	Activity	CA1102.4	Mid Term II, Assignment/Quiz & End Term
25		Fast Adder	Lecture	CA1102.4	Mid Term II, Assignment/Quiz & End Term

26		BCD Adder	Lecture	CA1102.4	Mid Term II, Assignment/Quiz & End Term
27		Combinational Circuits Multiplexers – Basic Four input Multiplexer	Lecture	CA1102.4	Mid Term II, Assignment/Quiz & End Term
28		Tutorial	Flipped class	CA1102.4	Mid Term II, Assignment/Quiz & End Term
29		Implementation of Boolean Expression using Multiplexers	Lecture	CA1102.4	Mid Term II, Assignment/Quiz & End Term
30		Demultiplexers : 1-to-4 Demultiplexer, 1-to-8 Demultiplexer,	Lecture	CA1102.4	Mid Term II, Assignment/Quiz & End Term
31		Decoders: Basic Binary Decoder, 3-to-8 Decoder	Lecture	CA1102.4	Mid Term II, Assignment/Quiz & End Term
32		Tutorial	Activity	CA1102.4	Mid Term II, Assignment/Quiz & End Term
33		4-to-16 Decoder	Lecture	CA1102.4	Mid Term II, Assignment/Quiz & End Term
34		Encoders: Octal-to-Binary,Encoder, Decimal-to-BCD Encoder	Lecture	CA1102.4	Mid Term II, Assignment/Quiz & End Term
35		Code Converters: BCD-to-Binary Converters	Lecture	CA1102.4	Mid Term II, Assignment/Quiz & End Term
36		Tutorial	Flipped class	CA1102.4	Mid Term II, Assignment/Quiz & End Term
37		Binary-to-Gray Code Converters, Gray Code-to-Binary Converters	Lecture	CA1102.4	Mid Term II, Assignment/Quiz & End Term
38		parity bit generator and checker	Lecture	CA1102.4	Mid Term II, Assignment/Quiz & End Term
39		Flip-Flops: Latches	Lecture	CA1102.5	Assignment/Quiz & End Term
40		Tutorial	Activity	CA1102.5	Assignment/Quiz & End Term
41	Sequential circuit	S-R Flip-Flop, D Flip-Flop	Lecture	CA1102.5	Assignment/Quiz & End Term

		J-K Flip-Flop, T Flip-Flop	Lecture	CA1102.5	Assignment/Quiz & End Term
42					
43		Triggering of Flip-Flop: Level Triggering,Edge triggering	Lecture	CA1102.5	Assignment/Quiz & End Term
44		Tutorial	Flipped class	CA1102.5	Assignment/Quiz & End Term
45		Master Slave Flip-Flop	Lecture	CA1102.5	Assignment/Quiz & End Term
46		Realisation of One Flip-Flop using other Flip-Flops.	Lecture	CA1102.5	Assignment/Quiz & End Term
47	**Counter and shift registers**	Design of Synchronous Counters	Lecture	CA1102.5	Assignment/Quiz & End Term
48		Tutorial	Practice	CA1102.5	Assignment/Quiz & End Term
49		Design of Synchronous Counters	Lecture	CA1102.5	Assignment/Quiz & End Term
50		Ring Counter	Lecture	CA1102.5	Assignment/Quiz & End Term
51		Serial-in-parallel out shift registers	Lecture	CA1102.5	Assignment/Quiz & End Term
52		parallel-in-serial out shift registers	Lecture	CA1102.5	Assignment/Quiz & End Term
53		bidirectional shift registers.	Lecture	CA1102.5	Assignment/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
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					2				1			
CA1102.2	Apply the principles of Boolean algebra to manipulate and minimize logic expressions.	2	1						2		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		1	2	1		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		2			1	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		2			1	3	2	2

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

MANIPAL UNIVERSITY JAIPUR

School of Computing & Information Technology

Department of Information Technology

Course Hand-out

C Programming| CA 1103 | 4 Credits | 3 1 0 4

Session: July'18 – December'18

Faculty: Ms. Kuntal Gaur

Class: B.C.A

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

[CA1103.1]. Design flow chart, write algorithm and pseudo code parallel with Control Statements to

understand flow of program execution.

[CA1103.2]. Use branching control statements and iterative control statements.

[CA1103.3]. Demonstrate the concepts of Reusability through the use of functions.

[CA1103.4]. Understand various categorization of operators into arithmetic, logical, relational, bitwise etc.

[CA1103.5]. Debug the programs of any logical or syntactical errors.

[CA1103.6]. 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

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

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[PSO.2]. To develop and manage policies related to organizations' IT systems.

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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	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.	

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	Mode of Delivery	Corresponding CO	Mode Of Assessing CO
1.		Introduction and Course Hand-out briefing	Presentation	NA	
2.		Block diagram of a computer, Introduction to operating system	Presentation	1103.1	MidTermI, Quiz&EndTerm
3.	**Introduction to Computers (1-7 Lecture)**	Number System	Lecture	1103.1	MidTermI, Quiz&EndTerm
4.		Algorithms and Flowcharts	Presentation	1103.1	MidTermI, Quiz&EndTerm
5.		Algorithmic notations	Lecture	1103.1	MidTermI, Quiz&EndTerm
6.		Space and Time complexity	Lecture	1103.1	MidTermI, Quiz&EndTerm
7.		Tutorial	Activity	1103.1	MidTermI, Quiz&EndTerm
8.		C program structure	Lecture	1103.1	MidTermI, Quiz&EndTerm
9.	**C Fundamentals (8-12 Lecture)**	Simple I/O operations	Lecture	1103.1	MidTermI, Quiz&EndTerm
10.		I/O examples	Lecture	1103.1	MidTermI, Quiz&EndTerm
11.		Various data types in C	Lecture	1103.1	MidTermI, Quiz&EndTerm
12.		Tutorial	Flipped Class	1103.1	MidTermI, Quiz&EndTerm
13.		Types of operators	Presentation	1103.4	MidTermI, Quiz&EndTerm
14.		Types of operators	Presentation	1103.4	MidTermI, Quiz&EndTerm
15.	**Operators and Expressions(13-19 Lecture)**	Examples of operators	Lecture	1103.4	MidTermI, Quiz&EndTerm
16.		Tutorial	Activity	1103.4	MidTermI, Quiz&EndTerm
17.		precedence and associativity expressions	Lecture	1103.4	MidTermI, Quiz&EndTerm
18.		evaluation of expressions	Lecture	1103.4	MidTermI, Quiz&EndTerm
19.		Tutorial	Lecture	1103.4	MidTermI, Quiz&EndTerm
20.		Statements and blocks,	Lecture	1103.2&1103.5	MidTermI, Quiz&EndTerm
21.		switch–case statement	Lecture	1103.2&1103.5	MidTermI, Quiz&EndTerm
22.		Tutorial	Activity	1103.2&1103.5	MidTermI, Quiz&EndTerm
23.	**Flow of Control (20-29 lecture)**	While- loop	Lecture	1103.2&1103.5	MidTermI, Quiz&EndTerm
24.		Examples of While -loop	Lecture	1103.2&1103.5	MidTermI, Quiz&EndTerm
25.		For -loop	Lecture	1103.2&1103.5	MidTermI, Quiz&EndTerm
26.		Examples of For-Loop	Lecture	1103.2&1103.5	MidTermI, Quiz&EndTerm
27.		Do-while loop	Lecture	1103.2&1103.5	MidTermI, Quiz&EndTerm
28.		Examples of Do-while loop	Lecture	1103.2&1103.5	MidTermI, Quiz&EndTerm
29.		Tutorial	Activity	1103.2&1103.5	MidTermI, Quiz&EndTerm

30.		Introduction of arrays, Declaring Arrays	Lecture	1103.5 & 1103.6	MidTermII,Quiz&EndTerm
31.		Reading and Displaying arrays	Lecture	1103.5 & 1103.6	MidTermII,Quiz&EndTerm
32.		Examples	Lecture	1103.5 & 1103.6	MidTermII,Quiz&EndTerm
33.		Bubble Sorting	Lecture	1103.5 & 1103.6	MidTermII,Quiz&EndTerm
34.	**Arrays (30-39**	Insertion Sorting	Lecture	1103.5 & 1103.6	MidTermII,Quiz&EndTerm
35.	**lecture)**	Selection Sorting	Lecture	1103.5 & 1103.6	MidTermII,Quiz&EndTerm
36.		Matrix declaration	Lecture	1103.5 & 1103.6	MidTermII,Quiz&EndTerm
37.		Matrix reading and displaying	Lecture	1103.5 & 1103.6	MidTermII,Quiz&EndTerm
38.		Examples	Lecture	1103.5 & 1103.6	MidTermII,Quiz&EndTerm
39.		Tutorial	Flipped Class	1103.5 & 1103.6	MidTermII,Quiz&EndTerm
40.		operations on strings	Lecture	1103.5 & 1103.6	MidTermII,Quiz&EndTerm
41.	**Strings (40-43**	built-in string handling functions	Lecture	1103.5 & 1103.6	MidTermII,Quiz&EndTerm
42.	**Lecture)**	Programs based on string operations	Lecture	1103.5 & 1103.6	MidTermII,Quiz&EndTerm
43.		Tutorial	Activity	1103.5 & 1103.6	MidTermII,Quiz&EndTerm
44.		Introduction of Modular Programming and functions	Lecture	1103.3 & 1103.6	MidTermII,Quiz&EndTerm
45.		Function declaration, Definition and function call	Lecture	1103.3 & 1103.6	MidTermII,Quiz&EndTerm
46.		Types of Functions	Lecture	1103.3 & 1103.6	MidTermII,Quiz&EndTerm
47.	**Functions (44-52**	Function returning value	Lecture	1103.3 & 1103.6	Quiz & End Term
48.	**lecture)**	Function with operators	Lecture	1103.3 & 1103.6	Quiz & End Term
49.		Function and Decision Statements	Lecture	1103.3 & 1103.6	Quiz & End Term
50.		Function and loop operators	Lecture	1103.3 & 1103.6	Quiz & End Term
51.		Function with Arrays	Lecture	1103.3 & 1103.6	Quiz & End Term
52.		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	-	-	-	-	1	1	1	1	2	-	-
CA 1103.2	Use branching control statements and iterative control statements	2	2	2	2	-	-	-	-	1	-	-	1	2	-	-
CA 1103.3	Demonstrate the concepts of Reusability through the use of functions	3	2	2	1	-	-	-	-	1	-	-	1	3	-	-
CA 1103.4	Understand various categorization of operators into arithmetic, logical, relational, bitwise etc.	3	2	2	1	-	-	-	-	1	-	-	1	2	-	-
CA 1103.5	Debug the programs of any logical or syntactical errors.	3	2	2	2	-	-	-	-	1	-	-	1	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 Computing & IT

DEPARTMENT OF IT

Course Hand-out

Technical Communication| EN1113| 2 Credits **[2 0 0 2]**

Session: July 18 – Dec. 18 | Faculty: Dr Priyanka Chaudhary | Class: BCA I Sem

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

(EN1113.1) Understand the fundamental principles of effective communication skills and presentation skills.

(EN1113.2) Develop critical and creative thinking abilities for communicative competence

(EN1113.3) Display enhanced competence in oral and written communication

(EN1113.4) Improve ideas with precision and coherence in writing

(EN1113.5) Recognize the importance of communication skills like listening, speaking, reading and writing with advancement of competitive world.

C.   PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

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

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

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

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

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

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

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

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

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

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

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

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

[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.
[PSO.2]. To develop and manage policies related to organizations' IT systems.
[PSO.3]. In-depth knowledge &sustained learning leading to innovation& research to fulfil global interest.

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 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 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

Introduction to communication: Types of communication, Process of communication, Principles of communication, Channels of communication, Verbal and non-verbal communication, Formal and informal 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; **Techniques of effective sentence constructions, Précis writing**; **Structure and format of letter writing**: Letter of Enquiry, Quotations, Orders, Tenders, Complaint/adjustment letters, Job application letter, Resume, **Group discussion; Art of Public Speaking**: Tips for effective presentations.

Text Book

1. A Koneru, *"Professional Communication"*, New Delhi: Tata McGraw Hill,1998.
2. L. C. Bovee, J. V. Thill and B. E. Schatzman, *"Business CommunicationToday"*, 7thEdition, New Delhi: Pearson Education, 2004.
3. L Sen, "*Communication Skills*", New Delhi: Prentice Hall, 2006.
4. M Raman and S Sharma, *"Technical Communication: Principles and Practice 2/e"*, New Delhi: Oxford University Press, 2013.

Reference Book

1. N Krishnaswamy, *"Modern English: A Book of Grammar Usage and Composition, New Delhi"*: Macmillan India, 2000.
2. R V Lesikar and M E Flatley, *"Basic Business Communication: Skills for Empowering the Internet Generation"*, New Delhi: Tata McGraw-Hill, 2002.
3. V K Jain and O P Biyani, *"Business Communication"*, New Delhi: S. Chand,2007

Lecture Plan:

LEC NO	TOPICS
1	Introduction to Communication Skills, Definition and process of Communication,
2	Principles of communication / 7 Cs
3	Types and barriers to Communication
4	Non-verbal communication like kinesics, Proxemics & paralanguage
5	Vocabulary Building: Word formation, Affixes, Compound words
6	Synonyms & Antonyms
7	Homophones and Homonyms
8	Misspelt words
9	Punctuation rules with examples & Exercise
10	Introduction to Parts of Speech and practice exercise
11	Syntactic errors , Concord
12	Active and passive voice
13	Practice class on Active and passive voice exercise
14	Direct and indirect speech rules with sample examples
15	Practice class on Direct and indirect speech
16	Comprehension Reading for Précis writing

17	Précis writing – Practice
18	Structure and format of formal letter writing
19	Inquiry and complaint Letters
20	Job Application Letter
21	Resume Writing, Tips for effective presentations
22	Different types of paragraph writing
23	Paragraph writing practice
24	Précis writing- rules
25	Précis writing- practice
26	Formal letter writing- Basics
27	Impromptu for Public Speaking
28	Revision and Problem solving

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

CO	STATEMENT	Correlation with Program Outcomes (POs							Correlation with Program Specific Outcomes (PSOs)		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO 2	PSO 3
EN 1113.1	To understand the fundamental principles of effective communication skills and presentation	1		3			3			2	**2**
EN 1113.2	To develop critical and creative thinking abilities for communicative competence	3				2				1	
EN 1113.3	To display enhanced competence in oral and written communication	2			3				2		2
EN 1113.4	To develop ideas with precision and coherence in writing		3						1		3
EN1113.5	To recognize the importance of communication skills like listening, speaking, reading and writing with	2		1				3			

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

MANIPAL UNIVERSITY JAIPUR

School of Computing & IT

Department of IT

Course Hand-out

MATHEMATICS-I | MA1122 | 4 Credits | 3 1 0 4

Session: July'18 – Dec'18

Faculty: Dr. Garima Agarwal

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
[1121.1]. To understand the concept of mathematical functions, Limit, Continuity and its properties.
[1121.2]. To understand the concept of special functions .
[1121.3]. To understand the differentiability and its application using very case study for skill
Development.
[1121.4]. To understand the concept of maxima and minima of the function and its applications.
[1121.5]. To understand the concept of integration and its applications for better skill development and
Increasing employability. .

C. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

PROGRAM OUTCOMES

[PO.1]. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering
specialization to the solution of complex engineering problems.
[PO.2]. Identify, formulate, research literature, and analyse complex engineering problems reaching
substantiated conclusions using first principles of mathematics, natural sciences, and engineering
sciences.
[PO.3]. Design solutions for complex engineering problems and design system components or processes
that meet the specified needs with appropriate consideration for the public health and safety, and
the cultural, societal, and environmental considerations.
[PO.4]. Use research-based knowledge and research methods including design of experiments, analysis and
interpretation of data, and synthesis of the information to provide valid conclusions.
[PO.5]. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools
including prediction and modelling to complex engineering activities with an understanding of the
limitations.
[PO.6]. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and
cultural issues and the consequent responsibilities relevant to the professional engineering practice.
[PO.7]. Understand the impact of the professional engineering solutions in societal and environmental
contexts, and demonstrate the knowledge of, and need for sustainable development.
[PO.8]. Apply ethical principles and commit to professional ethics and responsibilities and norms of the
engineering practices.

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

- **[PO.10].** Communicate effectively on complex engineering activities with the engineering community and withsocietyat large,suchas, being abletocomprehendandwriteeffectivereports anddesign documentation, make effective presentations, andgive and receive clear instructions.
- **[PO.11].** Demonstrateknowledgeandunderstandingoftheengineering andmanagementprinciplesand applythese to one'sown work, as amember and leader in ateam, tomanageprojects and in multidisciplinary environments.
- **[PO.12].** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

- **[PSO.1].** Clarity on both conceptual and application-oriented skills of IT Applications in Business context.
- **[PSO.2].** To develop and manage policies related to organizations' IT systems.
- **[PSO.3].** In-depth knowledge &sustained learning leading to innovation& research to fulfil global interest.

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 (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.	

E. 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.

F. 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.

G. REFERENCE BOOKS

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

H. Lecture Plan:

Lecture#	Topics to be Covered
Module I : FUNCTION, LIMIT, CONTINUITY	
Lecture 1-6	• Definition of Function • Type of functions

	• Illustrative examples
Lecture 7-11	• Definition of Limit • Properties of limit • Illustrative examples
Lecture 12-16	• Definition of Continuity • Properties of Continuity • Illustrative examples
Module II : SPECIAL FUNCTIONS	
Lecture 17-27	• Trigonometric functions and their properties • exponential functions • logarithmic functions • hyperbolic functions • inverse circular functions • Rational functions • partial fraction
Module III : DIFFERENTIATION	
Lecture 28- 38	• Definition • Differentiation of different functions • First principal of Differentiation • Methods of Differentiation
Module IV: MAXIMA AND MINIMA	
Lecture 39-44	• Definition and basic concept • Application of maxima and minima
Module V: INTEGRATION	
Lecture 44-50	• Definition • Methods of integration • Integration of various functions • Reduction formula

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
MA 1121.1	To understand the concept of mathematical functions, Limit, Continuity and its properties.	1					1					1		1		
MA 1121.2	To understand the concept of special functions.		1		1				1		1		1		1	
MA 1121.3	To understand the differentiability and its application.		1					1		1				1		
MA 1121.4	To understand the concept of maxima and minima of the function and its applications.	1				1	1				1					1
MA 11215	To understand the concept of integration and its applications.			1											1	

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

MANIPAL UNIVERSITY JAIPUR

School of Computing & Information Technology

Department of Information Technology

Course Hand-out

Linear Data Structures | CA 1202 | 4 Credits | 3 1 0 4

Session: Jan'19 – July'19

Faculty: Mrs.Kuntal Gaur

Class: B.C.A

A. **Introduction:** Linear Data Structures form the base of computer science and hence this course is introduced at this level so that the students can gain the understanding of how the data gets stored into computer memory and how efficiently by making use of different storage structures, they can save space and time.

The main objective of the course are as follows:
- Get knowledge about the basic of data structure.
- Role of Time and space complexity in programming.
- Understanding concept of Array (1D, and 2D) and pointers dealing with memory management.
- Implementing Linked list using arrays as well pointers (dynamic memory allocation).
- Implementing Stack and queues using array and linked list.
- Implementing stack and queues to solve problems like tower of Hanoi, post fix evaluation etc.
- Analyse problem and use appropriate data structure

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

[CA1202.1]. Write algorithms and perform asymptotic analysis of them.

[CA1202.2]. Describe how arrays, linked lists, stacks and queues are represented in memory and used by algorithms.

[CA1202.3]. Apply knowledge of data structures for development of skills to solve the problem.

[CA1202.4]. Choose appropriate data structures to solve problems and assess the trade-offs involved in the design choices.

[CA1202.5]. Choose appropriate sorting algorithms such as merge sort, quick sort etc. based on the problem given.

[CA1202.6]. Concept Building and understanding the Storage of Data in Computers using real time experiments in C to increase Employability.

PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PROGRAM OUTCOMES

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

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

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

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

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

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

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

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

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

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

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

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

PROGRAM SPECIFIC OUTCOMES

[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

[PSO.2]. To develop and manage policies related to organizations' IT systems.

[PSO.3]. In-depth knowledge & sustained learning leading to innovation & research to fulfil global interest.

B.   Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	20
	Sessional Exam II (Open 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.	

C. SYLLABUS

Introduction: Algorithm specification; **Performance Analysis**: Time and Space Complexity, Asymptotic notation; pointer declaration and definition, memory allocation functions, array of pointers; The type definition, enumerated types, accessing structures, complex structures, arrays of structures, structures and functions; Recursive definition & processes, Recursion in C, writing recursive programs efficiency of recursion, Examples: Tower of Hanoi, GCD, Fibonacci Definition and examples, Representing **Stacks** in C, Evaluation of expressions, multiple stacks and queues; Applications: infix, postfix and prefix and their conversions. **Linked lists** representations, Singly, doubly, header node, circular, Applications: linked stacks and queuesBinary and linear search, insertion, quick, merge, heap, radix sort Static Hashing.

D. TEXT BOOKS

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

2. Horowitz, Sahani and Anderson "Fundamentals of Data Structures in C", Universities Press, 2016.

E. REFERENCE BOOKS

1. Seymour Lipschutz, "*Data Structures with C* (Schaum's Outline Series)", Tata McGraw Hill Education Private Limited, 2011.
2. Reema Thareja, "*Data Structures using C*", Oxford University Press, 2011.
3. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to algorithms", PHI, Third Edition, 2009
4. A. Forouzan, R. F. Gilberg, "A Structured Programming Approach Using C", Thomson, 2003.
5. A. Tenenbaum, J. Augenstein, "Data Structures using C", Pearson Education, 2006.

6. Lecture Plan:

Lectures	Major Topics	Topics	Mode of Delivery	Corresponding CO	Mode Of Assessing CO
1.		Introduction to data structure	Presentation	1202.1	
2.	Introduction (1-5 Lecture)	Algorithm Specification	Presentation	1202.1	MidTerm I, Quiz& EndTerm
3.		Performance Analysis- Time and Space Complexity	Lecture	1202.1	MidTerm I, Quiz& EndTerm
4.		Asymptotic notation, Array	Presentation	1202.1	MidTerm I, Quiz& EndTerm
5.		Tutorial	Activity	1202.1	MidTerm I, Quiz& EndTerm
6.	Arrays (6-12 Lecture)	Operation on array like insertion, deletion	Lecture	1202.2	MidTerm I, Quiz& EndTerm
7.		Searching - Linear and binary searching	Lecture	1202.2	MidTerm I, Quiz& EndTerm
8.		Multidimensional Arrays like 2-D and 3-D arrays	Lecture	1202.2	MidTerm I, Quiz& EndTerm
9.		Sparse Matrix and diagonal Matrices	Lecture	1202.2	MidTerm I, Quiz& EndTerm
10.		Addition, subtraction and multiplication operation with	Lecture	1202.2	MidTerm I, Quiz& EndTerm
11.		Solving problems based on Arrays	Activity	1202.2	MidTerm I, Quiz& EndTerm
12.		Tutorial	Activity	1202.2	MidTerm I, Quiz& EndTerm
13.	Linked List (13-21 Lecture)	Linked List and its advantage over array	Presentation	1202.2	MidTerm I, Quiz& EndTerm
14.		insertion, deletion operations on simple linked list	Lecture	1202.2	MidTerm I, Quiz& EndTerm
15.		insertion, deletion operations on simple linked list	Lecture	1202.2	MidTerm I, Quiz&EndTerm
16.		insertion, deletion operations on circular linked list	Lecture	1202.2	MidTerm I, Quiz& EndTerm
17.		insertion, deletion operations on doubly linked list	Lecture	1202.2	MidTerm I, Quiz& EndTerm
18.		insertion, deletion operations on doubly circular linked list	Lecture	1202.2	MidTerm I, Quiz& EndTerm
19.		Solving problems based on linked list	Activity	1202.2& 1202.3	MidTerm I, Quiz& EndTerm
20.		Solving problems based on linked list	Activity	1202.2& 1202.3	MidTerm I, Quiz& EndTerm
21.		Tutorial	Activity	1202.2& 1202.3	MidTerm I, Quiz& EndTerm
22.	Stack (22-30 lecture)	Stacks and its application in computer science	Lecture	1202.2	MidTermII, Quiz&EndTerm
23.		Stack implementation by the help of Array and linkedlist	Lecture	1202.2	MidTermII, Quiz&EndTerm
24.		Push and pop operation on Stack	Lecture	1202.2	MidTermII, Quiz&EndTerm
25.		Solving problems based on Stack	Activity	1202.2	MidTermII, Quiz&EndTerm
26.		Tutorial based on Stack	Activity	1202.3& 1202.4	MidTermII, Quiz&EndTerm
27.		Polish notation, Evaluation of expressions bythe stack	Lecture	1202.3& 1202.4	MidTermII, Quiz&EndTerm
28.		Application: infix,postfixandprefixandtheirconversions	Lecture	1202.3& 1202.4	MidTermII, Quiz&EndTerm
29.		infix, postfix andprefixandtheir conversions(continued)	Lecture	1202.3& 1202.4	MidTermII, Quiz&EndTerm
30.		Tutorial based on stack application and conversion	Activity	1202.3& 1202.4	MidTermII, Quiz&EndTerm

31.		Implementing Linear Queue by array and linked list	Lecture	1202.2	MidTermII,Quiz&EndTerm
32.		Insertion and deletion in queue	Lecture	1202.2	MidTermII,Quiz&EndTerm
33.		Implementing Circular Queue by array and linked list	Lecture	1202.2	MidTermII,Quiz&EndTerm
34.		Insertion and deletion in circular queue	Lecture	1202.2	MidTermII,Quiz&EndTerm
35.	**Queues (31-39 lecture)**	Implementing Priority Queue by array and linked list	Lecture	1202.2	MidTermII,Quiz&EndTerm
36.		Insertion and deletion in Priority queue	Lecture	1202.2	MidTermII,Quiz&EndTerm
37.		Implementing Deques insertion and deletion	Lecture	1202.2	MidTermII,Quiz&EndTerm
38.		Solving problems based on Queues	Activity	1202.3& 1202.4	MidTermII,Quiz&EndTerm
39.		Solving problems based on Queues	Activity	1202.3& 1202.4	MidTermII,Quiz&EndTerm
40.		Tutorial	Activity	1202.3& 1202.4	MidTermII,Quiz&EndTerm
41.		Bubble Sort, Insertion Sort, Selection Sort	Lecture	1202.5	Quiz & End Term
42.		Quick Sort	Lecture	1202.5	Quiz & End Term
43.	**Searching & Sorting(41-48 Lecture)**	Merge Sort	Lecture	1202.5	Quiz & End Term
44.		Radix	Lecture	1202.5	Quiz & End Term
45.		Hashing, its advantage	Lecture	1202.5	Quiz & End Term
46.		Solving problems based on hashing.	Activity	1202.5	Quiz & End Term
47.		Solving problems based on searching and sorting	Activity	1202.5	Quiz & End Term
48.		Tutorial	Activity	1202.5	Quiz & End Term
49.	**Revisiting Concepts (44-52 lecture)**	Complexity and Arrays	Lecture	1202.4& 1202.6	Quiz & End Term
50.		Linked List	Lecture	1202.4& 1202.6	Quiz & End Term
51.		Stacks	Lecture	1202.4& 1202.6	Quiz & End Term
52.		Queues	Lecture	1202.4& 1202.6	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 1202.1	Write algorithms and perform asymptotic analysis of them.	1	2	2	2	-	-	-	-	1	1	1	1	2	1	1
CA 1202.2	Describe how arrays, linked lists, stacks and queues are represented in memory and used by algorithms.	2	2	2	2	1	-	-	-	1	-	-	1	2	1	1
CA 1202.3	Apply knowledge of data structures to solve problems.	2	2	2	1	1	-	-	-	1	-	1	1	3	1	2
CA 1202.4	Choose appropriate data structures to solve problems and assess the trade-offs involved in the design choices.	3	2	2	1	2	-	1	-	1	-	-	1	2	1	2
CA 1202.5	Choose appropriate sorting algorithms such as merge sort, quick sort etc. based on the problem given.	3	2	2	2	1	-	-	-	1	-	-	1	2	1	1
CA1202.6	Compare between different data structures.	2	2	1	1	2	-	1	-	1	-	1	2	2	2	1

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

Internet & HTML| CA 1203 | 4 Credits | 3 1 0 4

Session: Jan 19 – May 19 | Faculty: Lokesh Sharma | Class: B.C.A II

A. **Introduction:** This course introduces students to Internet Technologies and basic web design using HTML (Hypertext Markup Language) and CSS (Cascading Style Sheets). The course does not require any prior knowledge of HTML or web design. Throughout the course students are introduced to planning and designing effective web pages; implementing web pages by writing HTML and CSS code; enhancing web pages with the use of page layout techniques, text formatting, graphics, images, and multimedia; and producing a functional, multi-page website and web development tools.

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

[1203.1]. Understand the concepts of Internet and its protocols.
[1203.2]. Recognize and understand HTML web page elements
[1203.3]. Know how to write HTML code
[1203.4]. Understand and apply effective web design principles
[1203.5]. Enhance web pages using text formatting, color, graphics, images, multimedia and forms
[1203.6]. Understand and apply CSS to format web page elements
[1203.7]. Plan, design, and publish a multi-page website for enhancing employability.

C. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

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

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

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

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

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

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

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

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

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

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

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

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

[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

[PSO.2]. To develop and manage policies related to organizations' IT systems.

[PSO.3]. In-depth knowledge & sustained learning leading to innovation & research to fulfil global interest.

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

Internet: Evolution, Concepts, Internet Vs Intranet, Growth of Internet, ISP, ISP in India, Types of connectivity-Dial-up, leased line, DSL, Broadband, RF, VSAT etc., Methods of sharing of Internet connection, Use of Proxy server. **Internet Services** – USENET, GOPHER, WAIS, ARCHIE and VERONICA, IRC; **World Wide Web (WWW):** History, Working, Web Browsers, Its functions, URLs, web sites Domain names, Portals. Concept of Search Engines, Search engines types, searching the Web, Web Servers, TCP/IP and others main protocols used on the Web. E-Mail: Concepts, POP and WEB Based E-mail, merits, address, Basics of Sending & Receiving, E-mail Protocols, Mailing List, Free E- mail services, e-mail servers and e-mail clients programs; **HTML**: introduction, features, uses & versions Using various HTML tags, Elements of HTML syntax, Head & Body Sections, , Inserting texts, Text alignment, Using images in pages, Hyperlinks – text and images, bookmarks, Backgrounds and Color controls, creating and using Tables in HTML, and presentation, Use of font size & Attributes, List types and its tags. **Cascading Style Sheets** – defining and using simple CSS. Design tools for HTML, Overview of MS FrontPage, Macromedia Dream weaver, and other popular HTML editors, designing web sites using MS FrontPage (using at least FrontPage 2000) Use of Frames and Forms in web pages, Image editors, Issues in Web site creations & Maintenance.

F.   TEXT BOOKS

    ☐ *Deitel & Nieto, "Internet & World Wide Web How to Program, 5/e, Prentice-Hall*

    ☐ *Marty Hall, Larry Brown, "Core Web Programming (2nd edition)", Prentice-Hall*

G.   REFERENCE BOOKS

    ☐ *Robert W. Sebesta "Programming the World Wide Web (2nd Ed) ",, Addison-Wesley Publishing*

    ☐ *Puntambekar, "Web Application Development", Technical Publication*

    ☐ *Shelly Powers, "Dynamic Web Publishing", Techmedia, 1998*

    • *www.w3schools.com*

    • *www.tutorialpoints.com*

H.   Lecture Plan:

Lecture/Tutorial No.	Topic to be covered	No. of Lecture Required
01	Evolution of Internet, Internet Vs Intranet, Internet Service providers.	03
02	Internet Connectivity and its types. Methods of sharing of Internet connection, Proxy server. Internet Services	04
03	WWW- History, Working, Web Browsers, Its functions, URLs, web sites Domain names, Portals	04
04	Concept of Search Engines, Search engines types, searching the Web, Web Servers	03
05	TCP/IP protocols and layers	03
06	E-Mail: Concepts and protocols	03
07	Introduction to HTML and its basic elements	02
08	Text and table formatting tags	03
09	HTML properties and attributes, Frames	04
10	Cascading Style sheets- Introduction, Why CSS, How to use it.	03
11	CSS Properties and its values.	03
12	HTML and web designing tools	03
13	Website creations and designing. Procedure to develop a website.	03
Total		**43**

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
AU 1492.1	Understand the concepts of Internet and its protocols.	2					1		1					1	1	
AU 1492.2	Recognize and understand HTML web page elements		2	2												
AU 1492.3	Know how to write HTML code													2		
AU 1492.4	Understand and apply effective web design principles		1	1		1						2				
AU 1492.5	Enhance web pages using text formatting, color, graphics, images, multimedia and Forms			1										2		
AU 1492.6	Understand and apply CSS toformat web page elements			2										2		
AU 1492.7	Plan, design, and publish a multi-page website		2		1	2				2	1	2		3	1	1

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

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

Session: Jan 19 – May 19 | Class: BCA

- **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] Elaborate the features of attribute grammars and draw parse trees.

[1204.5] Tabulate different parameter passing techniques of different programming languages.

[1204.6] Implement logic programming concepts by using PROLOG.

PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

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

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

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

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

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

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

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

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

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

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

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

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

[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

[PSO.2]. To develop and manage policies related to organization's IT systems.

[PSO.3]. In-depth knowledge & sustained learning leading to innovation & research to fulfil global interest

B. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	20
	Sessional Exam II (Closed Book)	20
	Inclass Quizzes and Assignments , Activityfeedbacks (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: 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: S**tack 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	Mode of Delivery	Corresponding CO	Mode of Accessing CO
1		Programming language – design	Lecture	1301.1	Mid Term I, Quiz & End Term
2		Programming Spectrum	Lecture	1301.1	Mid Term I, Quiz & End Term
3		Motivation study	Lecture	1301.1	Mid Term I, Quiz & End Term
4		Compilation and interpretation	Lecture	1301.1	Mid Term I, Quiz & End Term
5	**Introduction**	Programming environments	Lecture	1301.1	Mid Term I, Quiz & End Term
6		Concept of binding time	Lecture	1301.1	Mid Term I, Quiz & End Term
7		Object lifetime	Lecture	1301.1, 1301.2	Mid Term I, Quiz & End Term
8		storage management	Lecture	1301.1, 1301.3	Mid Term I, Quiz & End Term
9	**Names, Scope, and Bindings**	Scope rules and implementing scope	Lecture	1301.1, 1301.2	Mid Term I, Quiz & End Term
10		The binding of reference environments	Flipped Class	1301.1, 1301.3	Mid Term I, Quiz & End Term
11		Binding within a scope	Lecture	1301.1, 1301.3	Mid Term I, Quiz & End Term
12		Separate compilation	Lecture	1301.1, 1301.3	Mid Term I, Quiz & End Term
13		Expression evaluation	Lecture	1301.1, 1301.3	Mid Term I, Quiz & End Term
14	**Control Flow**	Structured and unstructured flow	Lecture	1301.3	Mid Term I, Quiz & End Term
15		Sequencing	Lecture	1301.3	Mid Term I, Quiz & End Term

16		Selection	Lecture	1301.3	Mid Term I, Quiz & End Term
17		Iteration	Lecture	1301.3	Mid Term I, Quiz & End Term
18		Recursion	Lecture	1301.2, 1301.3	Mid Term I, Quiz & End Term
19		Non-determinacy	Flipped Class	1301.3	Mid Term I, Quiz & End Term
20	**Data Types**	Type systems	Lecture	1301.3	Mid Term I, Quiz & End Term
21		Type Checking	Activity	1301.2, 1301.3	Mid Term I, Quiz & End Term
22		Records and variants	Lecture	1301.2	Mid Term II, Quiz & End Term
23		Arrays	Lecture	1301.3	Mid Term II, Quiz & End Term
24		Strings	Lecture	1301.3	Mid Term II, Quiz & End Term
25		Sets	Lecture	1301.2, 1301.3	Mid Term II, Quiz & End Term
26		Pointers	Lecture	1301.3	Mid Term II, Quiz & End Term
27		recursive types	Lecture	1301.1	Mid Term II, Quiz & End Term
28		Lists	Lecture	1301.2	Mid Term II, Quiz & End Term
29		Files and Input/Output	Lecture	1301.3	Mid Term II, Quiz & End Term
30		Equality testing and assignment	Lecture	1301.3	Mid Term II, Quiz & End Term
31	**Subroutines and Control Abstraction**	Stack layout	Lecture	1301.4	Mid Term II, Quiz & End Term
32		Calling sequences, Parameter passing	Lecture	1301.4, 1301.5	Mid Term II, Quiz & End Term
33		Generic subroutines and modules	Lecture	1301.4, 1301.5	Mid Term II, Quiz & End Term
34		Exception handling	Flipped Class	1301.4, 1301.5	Mid Term II, Quiz & End Term
35		Co-routines	Lecture	1301.4	Mid Term II, Quiz & End Term
36	**Data Abstraction, Object Orientation**	Object oriented programming	Activity	1301.4	Mid Term II, Quiz & End Term
37		Encapsulation and Inheritance	Lecture	1301.4	Mid Term II, Quiz & End Term
38		Dynamic method binding	Lecture	1301.2, 1301.4	Mid Term II, Quiz & End Term

		Origins, Concepts	Lecture	1301.4	Mid Term II, Quiz & End Term
39	**Functional Languages**				
40		Functional programming Scheme	Lecture	1301.4	Quiz & End Term
41		Evaluation order	Lecture	1301.4	Quiz & End Term
42		Higher-order functions	Lecture	1301.4	Quiz & End Term
43		Functional programming in perspective	Lecture	1301.4	Quiz & End Term
44	**Logic Languages**	Concepts	Lecture	1301.2	Quiz & End Term
45		Prolog	Lecture	1301.2	Quiz & End Term
46		Logic programming in perspective	Lecture	1301.2	Quiz & End Term
47	**Scripting Languages**	Common characteristics	Lecture	1301.3	Quiz & End Term
48		Common characteristics	Lecture	1301.1, 1301.3	Quiz & End Term
49		Revision-1	Activity	1301.1, 1301.2	Quiz & End Term
50		Revision-2	Activity	1301.3, 1301.4	Quiz & End Term
51		Revision-3	Activity	1301.5, 1301.6	Quiz & End Term
52		Revision-4	Activity	1301.7	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 1204.1	Analyze the concepts of programming languages and programming paradigms.	3							1					1		
CA 1204.2	List out various Data bindings and Scope rules in programming languages.		2	2							3	3			3	
CA 1204.3	Recall the Concepts of Structured and unstructured flow, Function, Recursion, Pointers, Lists, Expression evaluation, Files and Input/Output.				2	3								3		
CA 1204.4	Elaborate the features of attribute grammars and draw parse trees.				2		3									2
CA 1204.5	Tabulate different parameter passing techniques of different programming languages.							3				3			2	
CA 1204.6	Implement logic programming concepts by using PROLOG.									3				2		

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

MANIPAL UNIVERSITY JAIPUR

School of Business & Commerce

Department of Commerce

Course Hand-out

Financial and Accounting Management | CM 1221 | 4 Credits | 3 1 0 4

Session: Jan. 2019 – May 2019 | Faculty: Mohammed Zeeshan Qadri |

A. **Introduction:** The subject is developed to acquaint the students of computer application for understanding the system of financial management and cost accounting. As all the accounting processes are now operated online.

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

[1221.1]: Explain the system of Cost Accounting concepts, standards, principles and the application of it in the preparation of Cost Sheet.

[1221.2]: Describe the object of Financial Management with the functions of it and explaining the sources of finance available and role of finance manager also the role of SEBI.

[1221.3]: Explain the use of present value and future value, tools of financial management in the form of cash flow statement, fund flow statement and ratio analysis.

[1221.4]: Explain Working Capital, Working Capital Management, Working Capital Cycle, Working Capital Financing and Inventory Management.

[12215.]: Explain the Determinants of Credit Policy, Cash Management, Leverages and Indifference Point with reference to the employability of employee in credit management.

[1221.6]: Describe the uses of Cost of Capital, Capital Structure and Dividend Decisions.

C. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

[PO1].**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.

[PO2].**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.

[PO3]. **Social Interaction:** Elicit views of others, mediate disagreements and help reach conclusions in group settings.

[PO4]. 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.

[PO5]. Ethics: Recognize different value systems including your own, understand the moral dimensions of your decisions, and accept responsibility for them.

[PO6]. Environment and Sustainability: Understand the issues of environmental contexts and sustainable development.

[PO7]. 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]: To understand concept, theories and operation of business using appropriate supportive technologies.

[PSO2]: To Prepare, analyse and interpret business problems and draw appropriate conclusions.

[PSO3]: To develop the capabilities required to apply cross-functional business knowledge and technologies in solving real-world business problems

[PSO4]: Making Student capable of recognizing and resolving ethical issues that arise in business set ups.

C.   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 (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.

D.   SYLLABUS

General Purpose Cost Statement: Evolution of Cost Accounting, Cost Accounting Concepts, Generally Accepted Cost Accounting Principles & Cost Accounting Standards, Cost Accounting Standards, Business Process Analysis: Materials, Employee Costs, Direct Expenses, Overheads, Treatment of Special Items, Cost Sheet,

Overview of Financial Management: Objective of Financial Management, Key Decisions of Financial Management, Planning Environment, Functions of Financial Management, Sources of Finance, International Sources, Emerging Role of Finance Manager, Securities and Exchange Board of India Act. 1992, Future Value, Present Value,

Tools for Financial Analysis and Planning: Funds Flow Statement Cash Flow Statement, Ratio Analysis, Identification of Information Required to Assess Financial Performance, Working Capital Management and Leverage Analysis: Working Capital - Meaning & Definition, Kinds of Working Capital, Adequacies and Inadequacies of Working Capital, Danger of too high amount of Working Capital, Danger of inadequacies or low amount of Working Capital, Working Capital Cycle, Working Capital Financing, Inventory Management, Management of Receivable, Determinants of Credit Policy, Cash Management, Leverages, EBIT-EPS Indifference Point Level, Calculation of Indifference Point, Cost of Capital: Cost of Capital, Capital Structure, Dividend Decisions.

E.   TEXT BOOKS

T1: Financial Accounting in an Economic Context, Pratt, J., , John Wiley & Sons, Inc.

T2: Financial Management, Khan and Jain

F.   REFERENCE BOOKS

R1: Financial Management- I M Pandey

G. Lesson Plan

LEC NO	TOPICS	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1	Cost Accounting Introduction and Evolution	Understanding of Cost Accounting Introduction and Evolution	Lecture	1221.1	1st Mid-term and End-Term
2	Cost Accounting Principles, Standards and Concepts	Understanding of Cost Accounting Principles, Standards and Concepts	Lecture and presentation	1221.1	1st MidTerm and End Term
3	Elements of Cost: Material, Labour, Expenses and Overheads	Understanding of Elements of Cost: Material, Labour, Expenses and Overheads	Lecture and presentation	1221.1	1st MidTerm and End Term
4	Accounting treatment of forfeiture and reissue of shares	Understanding of Accounting treatment of forfeiture and reissue of shares	Lecture, presentation and discussion	1221.1	1st MidTerm and End Term
5	Business Process Analysis and Treatment of Special Items	Understanding of Business Process Analysis and Treatment of Special Items	Lecture and presentation	1221.1	1st MidTerm and End Term
6	Cost Sheet Introduction and Formation	Cost Sheet Introduction and Formation understanding	Lecture and presentation	1221.1	1st MidTerm and End Term
7	Numericals of Cost Sheet	Hands on practice	Discussion	1221.1	1st Mid Term and End Term
8	Numericals of Cost Sheet	Hands on practice	Lecture and presentation	1221.1	1st Mid Term and End Term
9	Overview of Financial Management: Objectives,	Overview of Financial Management: Objectives,	Lecture, presentation and discussion	1221.2	1st Mid Term and End Term

	Functions and Key decisions of Financial Management	Functions and Key decisions of Financial Management			
10	Emerging Role of Financial Manager, Planning Environement and SEBIAct 1992	Emerging Role of Financial Manager, Planning Environement and SEBIAct 1992	Lecture and presentation	1221.2	1st MidTermand End Term
11	Future Value, Present Value,ToolsforFinancial Planning and Analysis	Future Value, Present Value,ToolsforFinancial Planning and Analysis	Lecture and Discussion	1221.3	1st MidTermand End Term
12	Fund Flow Statement Introduction	Fund Flow Statement Introduction	Lecture and presentation	1221.3	1st Mid Term and End Term
13	Numericals of Fund Flow Statement	Hands on practice	Lecture and presentation	1221.3	1st Mid Term and End Term
14	Numericals of Fund Flow Statement	Hands on practice	Lecture, presentation and discussion	1221.3	2nd Mid Term and End Term
15	Numericals of Fund Flow Statement	Hands on practice	Discussion	1221.3	NA
16	Cash Flow Statement Introduction	Cash Flow Statement Introduction	Lecture and presentation	1221.3	2nd Mid Term and End Term
17	Numericals of Cash Flow Statement	Hands on practice	Lecture and presentation	1221.3	2nd Mid Term and End Term
18	Numericals of Cash Flow Statement	Hands on practice	Lecture and presentation	1221.3	2nd Mid Term and End Term
19	Numericals of Cash Flow Statement	Hands on practice	Lecture and presentation	1221.3	2nd Mid Term and End Term
20	Ratio Analysis Introduction	Ratio Analysis Introduction	Written Test	1221.3	2nd Mid Term and End Term
21	Numericals of Ratio Analysis	Hands on practice	Lecture and presentation	1221.3	2nd Mid Term and End Term
22	Numericals of Ratio Analysis	Hands on practice	Lecture and presentation	1221.3	2nd Mid Term and End Term

23	Numericals of Ratio Analysis	Hands on practice	Lecture and Tutorial	1221.3	2nd Mid Term and End Term
24	Numericals of Ratio Analysis	Hands on practice	Lecture and Tutorial	1221.3	2nd Mid Term and End Term
25	Numericals of Ratio Analysis	Hands on practice	Lecture and Tutorial	1221.3	2nd Mid Term and End Term
26	Working Capital Management Introduction: Working Capital meaning, definitions andkinds of working capital	Working Capital Management Introduction: Working Capital meaning, definitions andkinds of working capital	Lecture and Tutorial	1221.4	2nd MidTermand End Term
27	Working Capital Adequacies and Inadequacies and Working Capital Financing	Working Capital Adequacies and Inadequacies and Working Capital Financing	Lecture and Tutorial	1221.4	2nd MidTermand End Term
28	Numericals of Working Capital Management	Hands on practice	Lecture and Tutorial	1221.4	2nd Mid Term and End Term
29	Numericals of Working Capital Management	Hands on practice	Discussion	1221.4	2nd Mid Term and End Term
30	Inventory Management Introduction	Inventory Management Introduction	Lecture and Tutorial	1221.4	End Term
31	Inventory Management Nemericals	Hands on practice	Lecture and Tutorial	1221.4	End Term
32	Inventory Management Nemericals	Hands on practice	Lecture and Tutorial	1221.4	End Term
33	Management of Receivables Introduction	Management of Receivables Introduction	Discussion	1221.4	End Term
34	Management of Receivables Numericals	Hands on practice	Discussion	1221.4	End Term
35	Management of Receivables Numericals	Hands on practice	Discussion	1221.4	End Term

36	Cash Management Introduction	Cash Management Introduction	Discussion	1221.5	End Term
37	Cash Management Numericals	Hands on practice	Lecture and Tutorial	1221.5	End Term
38	Cash Management Numericals	Hands on practice	Lecture and Tutorial	1221.5	End Term
39	Leverages Introduction	Leverages Introduction	Lecture and Tutorial	1221.5	End Term
40	Leverages Numericals	Hands on practice	Discussion	1221.5	End Term
41	Leverages Numericals	Hands on practice	Discussion	1221.5	End Term
42	Indifference Point Calculation	Indifference Point Calculation	Discussion	1221.5	End Term
43	Cost of Capital Introduction	Cost of Capital Introduction	Discussion	1221.6	End Term
44	Cost of Capital Numerical	Hands on practice	Lecture and Tutorial	1221.6	End Term
45	Cost of Capital Numerical	Hands on practice	Lecture and Tutorial	1221.6	End Term
46	Capital Structure Introduction	Capital Structure Introduction	Lecture and Tutorial	1221.6	End Term
47	Capital Structure Numericals	Hands on practice	Discussion	1221.6	End Term
48	Capital Structure Numericals	Hands on practice	Discussion	1221.6	End Term
49	Dividend Decisions Introduction	Dividend Decisions Introduction	Lecture and Tutorial	1221.6	End Term
50	Dividend Decisions Numerical	Hands on practice	Discussion	1221.6	End Term
51	Dividend Decisions Numerical	Hands on practice	Discussion	1221.6	End Term
52	Revision	Hands on practice	Discussion	1221.6	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	PSO 4
CM 122 1.1	Explain the system of Cost Accounting concepts, standards, principles and the application of it in the preparation of Cost Sheet.		3							3		1
CM 122 1.2	Describe the object of Financial Management with the functions of it and explaining the sources of finance available and role of finance manager also the role of SEBI.			2							2	
CM 122 1.3	Explain the use of present value and future value, tools of financial management in the form of cash flow statement, fund flow statement and ratio analysis.							2		2		
CM 122 1.4	Explain Working Capital, Working Capital Management, Working Capital Cycle, Working Capital Financing and Inventory Management.	3							2			2
CM 122 1.5	Explain the Determinants of Credit Policy, Cash Management, Leverages and Indifference Point				2					2		
CM 122 1.6	Describe the uses of Cost of Capital, Capital Structure and Dividend Decisions.						3		2		2	

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

MANIPAL UNIVERSITY JAIPUR

School of Computing & IT

Department of IT

Course Hand-out

MATHEMATICS-II | MA1222 | 4 Credits | 3 1 0 4

Session: Dec'18 – June'18

Faculty: Dr. Garima Agarwal

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 provide the fundamental knowledge of Differential calculus and its application. Solution of system of linear equations and concept of matrix is also the main focus of this course.

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

[1222.1]. Able to solve problems related to differential calculus-successive diff., curvature etc.

[1222.2]. understand the basic concept of linear algebra-Matrices, operations, determinant etc.

[1222.3]. learn the method to solve system of linear equations by using matrix method using case study for skill development

[1222.4]. able to solve problems related to inverse and rank of the matix

[1222.5]. understand the basic concept of infinite series, Taylors and Maclaurin's method of expansion etc for better employability.

C. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

PO1: Apply the knowledge of basic science and fundamental computing in solving complex engineering problems

PO2: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design solutions for complex IT engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the Information oriented public health and safety, and the cultural, societal, and environmental considerations

PO4: Use IT domain research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

PO5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

PO6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

PO8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

PO9: Function effectively as an individual, and as a <u>member or leader in diverse IT teams</u>, and in multidisciplinary settings.

PO10: <u>Communicate effectively</u> on complex computing engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PO11: <u>Demonstrate knowledge and understanding</u> of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

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

PSO1: clarity on both conceptual and application-oriented skills of IT Applications in Business context.

PSO 2: To develop and manage policies related to organizations' IT systems.

PSO3: In-depth knowledge &sustained learning leading to innovation& research to fulfil global interest.

PROGRAM SPECIFIC OUTCOMES

PSO 1: Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

PSO 2: To develop and manage policies related to organizations' IT systems.

PSO 3: In-depth knowledge &sustained learning leading to innovation& research to fulfil global interest.

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 (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.	

E. 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.

F. 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.

G. REFERENCE BOOKS

1. Das Mukherjee, "*Integral Calculus*", U.N. Dhur, 1977.

2. N. Piskunov, *"Differential and integral calculus"*, Vol I & Vol II, CBS, 2000.

H.   Lecture Plan:

Lecture#	Topics to be Covered
Module I : DIFFERENTIAL CALCULUS	
Lecture 1-18	- Differential Calculus: Introduction - Successive Differentiation - Leibnitz Theorem - Angle between radius vector and tangents - Angle of intersection between two curves - Derivatives of arc (Cartesian and polar curve) - Curvature, Radius of curvature - Evolutes and related problems - Rolle's Theorem and related problems - Mean value theorem (cauchy's and Lagrange's) - Partial Derivatives: Introduction - Euler's Theorem - Maxima and minima of two variable function
Module III : LINEAR ALGEBRA	
Lecture 19- 25	- Linear Algebra: Introduction - Matrix addition and multiplication - Linear system of equation, Gauss elimination - Gauss-Jorden elimination
Module IV: MATRIX	
Lecture 26-38	- Rank of matrix, Inverse of matrix - Solution of linear system - Cramers Rule - Infinite Series: Introduction - Comparison test - Ration test - Cauchy's root test - Cauchy's integral test
Module V:INFINITE SERIES	
Lecture 38-50	- Leibnitz Theorem - Absolute and Conditional convergence - Expansion of function into Taylors and Maclaurin series

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
MA 1222.1	Able to solve problems related to differential calculus-successive diff., curvature etc.	1					1					1		1		1
MA 1222.2	Understand the basic concept of linear algebra- Matrices, operations, determinant etc.				1				1		1		1		1	
MA 1222.3	learn the method to solve system of linear equations by using matrix method		1					1		1				1		
MA 1222.4	Able to solve problems related to inverse and rank of the matix	1				1	1				1					1
MA 1222.5	Understand the basic concept of infinite series, Taylors and Maclaurin's method of expansion etc	1		1							1				1	

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

Computer Organization and Architecture | CA 1301 | 4 Credits | 3 1 0 4

Session: Jul 18 – Dec 18 | Class: BCA

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 behaviour 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 analysing 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]. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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

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

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

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

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

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

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

[PO.9]. Functioneffectivelyasanindividual,andasa<u>memberorleaderindiverseteams</u>,andin multidisciplinary settings.

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

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

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

[PSO.1].Clarity on both conceptual and application-oriented skills of IT Applications in Business context.
[PSO.2]. To develop and manage policies related to organization's IT systems.
[PSO.3]. In-depth knowledge &sustained learning leading to innovation& research to fulfil global interest

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 Shit 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 Hammacher, "Computer Organization" (5th Edition), TMH, 2011.

F. REFERENCE BOOKS

1. M.M. Mano, "Computer System Architecture", PHI, 2009.

2. Govindarajalu, "Computer Architecture and Organization", (2nd Edition), TMH, 2008.

G.   Lecture Plan:

LEC NO	Major Topics	TOPICS	Mode of Delivery	Corresponding CO	Mode of Accessing CO
1	**General Computer Architecture**	Block Diagram of typical Computer, Memory Section	Lecture	1301.1	Mid Term I, Quiz & End Term
2		Input/Output Section,	Lecture	1301.1	Mid Term I, Quiz & End Term
3		CPU	Lecture	1301.1	Mid Term I, Quiz & End Term
4		Registers	Lecture	1301.1	Mid Term I, Quiz & End Term
5		Arithmetic Unit	Lecture	1301.1	Mid Term I, Quiz & End Term
6		Instruction handling Areas	Lecture	1301.1	Mid Term I, Quiz & End Term
7		Stacks	Lecture	1301.1, 1301.2	Mid Term I, Quiz & End Term
8		Micro operations: Register Transfer	Lecture	1301.1, 1301.3	Mid Term I, Quiz & End Term
9		Bus and Memory Transfer	Lecture	1301.1, 1301.2	Mid Term I, Quiz & End Term
10		Arithmetic Micro operations	Flipped Class	1301.1, 1301.3	Mid Term I, Quiz & End Term
11		Logic Micro operations	Lecture	1301.1, 1301.3	Mid Term I, Quiz & End Term
12		Shift Micro operations	Lecture	1301.1, 1301.3	Mid Term I, Quiz & End Term
13		Arithmetic Logic Shit Unit	Lecture	1301.1, 1301.3	Mid Term I, Quiz & End Term
14	**Basic Computer Organization and Design:**	Instruction Codes	Lecture	1301.3	Mid Term I, Quiz & End Term
15		Operation code	Lecture	1301.3	Mid Term I, Quiz & End Term
16		Timing and Control	Lecture	1301.3	Mid Term I, Quiz & End Term
17		Instruction Cycle	Lecture	1301.3	Mid Term I, Quiz & End Term
18		Memory Reference Instructions	Lecture	1301.2, 1301.3	Mid Term I, Quiz & End Term
19		Input Output Instructions	Flipped Class	1301.3	Mid Term I, Quiz & End Term
20		Interrupts	Lecture	1301.3	Mid Term I, Quiz & End Term
21		Tutorial	Activity	1301.2, 1301.3	Mid Term I, Quiz & End Term
22	**Control Memory**	Control Word	Lecture	1301.2	Mid Term II, Quiz & End Term
23		Microinstruction	Lecture	1301.3	Mid Term II, Quiz & End Term

24		Microprogramming	Lecture	1301.3	Mid Term II, Quiz & End Term
25		Control Memory	Lecture	1301.2, 1301.3	Mid Term II, Quiz & End Term
26		Hardwired	Lecture	1301.3	Mid Term II, Quiz & End Term
27	**Central Processing Unit**	General Register Organization	Lecture	1301.1	Mid Term II, Quiz & End Term
28		Stack Organization	Lecture	1301.2	Mid Term II, Quiz & End Term
29		Instruction Formats	Lecture	1301.3	Mid Term II, Quiz & End Term
30		Addressing Modes	Lecture	1301.3	Mid Term II, Quiz & End Term
31		RISC and CISC	Lecture	1301.4	Mid Term II, Quiz & End Term
32	**Pipelining and Vector Processing**	Parallel Processing	Lecture	1301.4,1301.5	Mid Term II, Quiz & End Term
34		Pipelining and Arithmetic Pipeline	Lecture	1301.4, 1301.5	Mid Term II, Quiz & End Term
35		Instruction Pipeline	Flipped Class	1301.4, 1301.5	Mid Term II, Quiz & End Term
36		Vector Processing, Array Processors	Lecture	1301.4	Mid Term II, Quiz & End Term
37		Tutorial	Activity	1301.4	Mid Term II, Quiz & End Term
38	**Input Output Organization**	I/O Interface	Lecture	1301.4	Mid Term II, Quiz & End Term
39		Asynchronous Data Transfer	Lecture	1301.2, 1301.4	Mid Term II, Quiz & End Term
40		Modes of Transfer	Lecture	1301.4	Mid Term II, Quiz & End Term
41		Priority Interrupt	Lecture	1301.4	Quiz & End Term
42		DMA	Lecture	1301.4	Quiz & End Term
43		IOP	Lecture	1301.4	Quiz & End Term
44		Serial Communication	Lecture	1301.4	Quiz & End Term
45	**Memory Organization**	Associative Memory	Lecture	1301.2	Quiz & End Term
46		Cache Memory	Lecture	1301.2	Quiz & End Term
47		Virtual Memory	Lecture	1301.2	Quiz & End Term
48	**Introduction to Microprocessor**	Machine Language and Assembly Language	Lecture	1301.3	Quiz & End Term
49		Assembler, High Level Language	Lecture	1301.1, 1301.3	Quiz & End Term
50		Compiler, Interpreter	Flipped Class	1301.1, 1301.3	Quiz & End Term
51		Internal Architecture 8085.	Lecture	1301.3	Quiz & End Term
52		Tutorial	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

MANIPAL UNIVERSITY JAIPUR

SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY
DEPARTMENT OF INFORMATION SCIENCES
COURSE HAND-OUT
Web Technology| CA 1302 | 4 Credits | 3 1 0 4
Session: Jul 18 – Dec 18 | Faculty: Mr Vivek Verma | 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**

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

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

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

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

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

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

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

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

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

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

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

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

PSO 1: Clarity on both conceptual and application-oriented skills of IT Applications in Business context.
PSO 2: To develop and manage policies related to organizations' IT systems.
PSO 3: In-depth knowledge &sustained learning leading to innovation& research to fulfil global interest.

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:

Lectures	Major Topics	Topics	Mode of Delivery	Corresponding CO	Mode Of Assessing CO
1.	**Overview**	Overview of .Net framework and C#	Lecture	CA 1302 .1	Mid Term I, Assignment/Quiz & End Term
2.		Structure of C# programming language & features	Lecture	CA 1302 .1	Mid Term I, Assignment/Quiz & End Term
3.		Variables	Lecture	CA 1302 .1	Mid Term I, Assignment/Quiz & End Term
4.		Data types	Practice	CA 1302 .1	Mid Term I, Assignment/Quiz & End Term
5		Loops	Lecture	CA 1302 .1	Mid Term I, Assignment/Quiz & End Term
6-7		Classes and Objects, Methods, Abstraction and Encapsulation.	Lecture	CA 1302 .1	Mid Term I, Assignment/Quiz & End Term
8-9		Inheritance	Lecture	CA 1302 .1	Mid Term I, Assignment/Quiz & End Term
0-11		Polymorphism	Activity	CA 1302 .1	Mid Term I, Assignment/Quiz & End Term
2-13		Event handling	Lecture	CA 1302 .1	Mid Term I, Assignment/Quiz & End Term

14-15	**ASP.NET**	Understanding ASP.NET Controls, Applications	Lecture	CA 1302 .2	Mid Term I, Assignment/Quiz & End Term
16		Web servers, installation of WS-	Lecture	CA 1302 .2	Mid Term I, Assignment/Quiz & End Term
17-18		Web forms, web form controls	Activity	CA 1302 .2	Mid Term I, Assignment/Quiz & End Term
19-21		Running a web application, creating a multiform web project.	Lecture	CA 1302 .2	Mid Term I, Assignment/Quiz & End Term
22-26		Internet Explorer Control-State management- View state, Session state, Application state	Lecture	CA 1302 .2	Mid Term I, Assignment/Quiz & End Term
27	**ADO.NET**	Architecture of ADO.NET, Connected and Disconnected Database	Lecture	CA 1302 .3	Mid Term I, Assignment/Quiz & End Term
		Create Connection using ADO.NET Object Mode	Activity	CA 1302 .3	Mid Term I, Assignment/Quiz & End Term
9-31		Connection Class, Command Class, Data Adapter Class, Dataset Class	Lecture	CA 1302 .3	Mid Term I, Assignment/Quiz & End Term
32-33		Display data on data bound Controls and Data Grid	Lecture	CA 1302 .3	Mid Term I, Assignment/Quiz & End Term
34-35	**Web applications**	Database Accessing on web applications	Lecture	CA 1302 .4	Mid Term I, Assignment/Quiz & End Term

36.		Data Binding concept with web	Practice	CA 1302 .4	Mid Term I, Assignment/Quiz & End Term
		Creating data grid	Lecture	CA 1302 .4	Mid Term II, Assignment/Quiz & End Term
		Binding standard web server controls	Lecture	CA 1302 .4	Mid Term II, Assignment/Quiz & End Term
		Display data on web form using Data bound controls	Lecture	CA 1302 .4	Mid Term II, Assignment/Quiz & End Term
40.		Application deployment.	Activity	CA 1302 .4	Mid Term II, 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	PSO 1	PSO 2	PSO 3	
CA 1302.1	Create, compile and run object-oriented C# programs using Visual Studio	1					1							1	1		
CA 1302.2	Plan, design, and develop web applications using ASP.NET		1	2										1	2		
CA 1302.3	Access databases using ADO.NET													1	2		
CA 1302.4	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 Computing & Information Technology

DepartmentofInformationTechnology
Course Hand-out

Object Oriented Programming Using C++|CA 1303 |4 Credits |3 1 0 4

Session: Jul 18 – Dec 18 | Faculty: Shashank Sharma | Class: BCA

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.

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

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

    [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 AND PROGRAM SPECIFIC OUTCOMES**

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

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

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

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

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

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

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[PSO.1].Clarity on both conceptual and application-oriented skills of IT Applications in Business context.
[PSO.2].To develop and manage policies related to organization's IT systems.
[PSO.3].In-depth knowledge &sustained learning leading to innovation& research to fulfil global interest

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

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.

F. TEXT BOOKS

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

G. REFERENCE BOOKS

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

H. Lecture Plan:

Lectures	Major Topics	Topics	Delivery Mode	Corresponding CO	Mode Of Assessing CO
1.	Overview of C++	Introduction to OOPS	Lecture	1303.1	Mid Term I, Quiz & End Term
2.		Introduction to Concepts of Object Oriented Programming	Lecture	1303.2	Mid Term I, Quiz & End Term
3.	Classes & Objects	Classes & Objects	Lecture	1303.2	Mid Term I, Quiz & End Term
4.		OOP, Classes & Objects	Tutorial	1303.1, 1303.2	Mid Term I, Quiz & End Term
5.		Structure ,Union & Classes	Lecture	1303.2	Mid Term I, Quiz & End Term
6.		Inline function	Lecture	1303.2	Mid Term I, Quiz & End Term
7.		Friend function	Lecture	1303.2	Mid Term I, Quiz & End Term
8.		Inline & Friend function	Flipped Classroom	1303.2, 1303.4	Mid Term I, Quiz & End Term
9.		Quiz-1	Activity	1303.1, 1303.2	
10.		Scope resolution operator	Lecture	1303.2	Mid Term I, Quiz & End Term
11.		Static data member, Static member function	Lecture	1303.2	Mid Term I, Quiz & End Term
12.		Passing objects to function, Returning	Lecture	1303.2	Mid Term I, Quiz & End Term
13.		Objects as an arguments	Tutorial	1303.1, 1303.2	Mid Term I, Quiz & End Term
14.	Constructor & Destructor	Introduction to Constructor, Parameterized Constructor	Lecture	1303.2	Mid Term I, Quiz & End Term
15.		Copy constructor, Multiple Constructor in a	Lecture	1303.2	Mid Term I, Quiz & End Term
16.		Destructor	Lecture	1303.2	Mid Term I, Quiz & End Term
17.		Complex Problems on Constructor	Flipped Classroom	1303.2	Mid Term I, Quiz & End Term
18.		Quiz-2	Activity	1303.2	
19.		Introduction to Array and Pointers	Lecture	1303.2	Mid Term I, Quiz & End Term
20.		Array of Objects, Pointers to Object	Lecture	1303.2	Mid Term I, Quiz & End Term
21.		Type checking C++ pointer	Lecture	1303.2 & 1303.3	Mid Term I, Quiz & End Term
22.		This pointer, Pointer to class members	Lecture	1303.2	Mid Term II, Quiz & End Term
23.		Pointers of Object	Tutorial	1303.2 & 1303.3	Mid Term II, Quiz & End Term
24.	Function & Operator Overloading	Function overloading	Lecture	1303.2 & 1303.3	Mid Term II, Quiz & End Term
25.		Operator Overloading-Ist	Lecture	1303.5	Mid Term II, Quiz & End Term
26.		Operator Overloading-IInd	Lecture	1303.5	Mid Term II, Quiz & End Term
27.		Overloading of Operators	Tutorial	1303.1 & 1303.2	Mid Term II, Quiz & End Term
28.		Quiz-3	Activity	1303.3, 1303.5	
29.		Introduction to Inheritance	Lecture	1303.4, 1303.6	Mid Term II, Quiz & End Term

30.	**Inheritance & Types of Inheritance**	Types of Inheritance	Lecture	1303.4, 1303.6	Mid Term II, Quiz & End Term
31.		Virtual base class	Lecture	1303.4, 1303.6	Mid Term II, Quiz & End Term
32.		Abstract class	Lecture	1303.4, 1303.6	Mid Term II, Quiz & End Term
33.		Virtual base & abstract	Flipped Classroom	1303.4, 1303.6	Mid Term II, Quiz & End Term
34.	**Polymorphism & Virtual Functions**	Polymorphism & its types	Lecture	1303.3	Mid Term II, Quiz & End Term
35.		Virtual Constructor & virtual destructor	Lecture	1303.3	Mid Term II, Quiz & End Term
36.		Quiz-4	Activity	1303.4, 1303.6	
37.		Virtual function	Lecture	1303.3	Mid Term II, Quiz & End Term
38.		Pure virtual function	Lecture	1303.3	Mid Term II, Quiz & End Term
39.		Early Vs late binding	Lecture	1303.3	Mid Term II, Quiz & End Term
40.		Run time polymorphism	Tutorial	1303.3	Mid Term II, Quiz & End Term
41.	**Templates**	Introduction to Templates	Lecture	1303.5	Mid Term II, Quiz & End Term
42.		Class template	Lecture	1303.5	Quiz & End Term
43.		Function template	Lecture	1303.5	Quiz & End Term
44.		Templates	Tutorial	1303.5	Quiz & End Term
45.		Quiz-5	Activity	1303.3, 1303.5	
46.	**I/O Operations & File Handling**	Unformatted I/O operations	Lecture	1303.5	Quiz & End Term
47.		Formatted console I/O operations	Lecture	1303.5	Quiz & End Term
48.		Managing output using manipulators	Lecture	1303.5	Quiz & End Term
49.		File handling	Lecture	1303.4, 1303.6	Quiz & End Term
50.		Opening and closing files- Using	Lecture	1303.4, 1303.6	Quiz & End Term
51.		File modes	Lecture	1303.4, 1303.6	Quiz & End Term
52.		File handling	Flipped Classroom	1303.4, 1303.6	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
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										1	2		

CA	Course Outcome															
CA 1303.3	Demonstrate the concepts of Reusability and polymorphism.	1		1								1	2			
CA 1303.4	Integrate robustness, reusability, and portability into large-scale software development.			1							2	2				
CA 1303.5	Analyze advanced features of C++ specifically stream I/O, templates and operator overloading.											2			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

SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY
DEPARTMENT OF INFORMATION TECHNOLOGY
COURSE HAND-OUT
Multimedia Technologies|CA 1304 |4 Credits |3 1 0 4

Session: Jul 18 – Dec 18 | Faculty: Vivek K Verma | Class: BCA

A. **Introduction:** This course is offered by Department of Information Sciences 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**

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

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

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

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

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

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

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

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

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

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

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

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

[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

[PSO.2]. To develop and manage policies related to organizations' IT systems.

[PSO.3]. In-depth knowledge & sustained learning leading to innovation & research to fulfil global interest.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Closed Book)	20
	Sessional Exam II (Open Book)	20
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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	Topics	Session Outcome	Mode of Delivery	Corresponding CO	Mode of Assessing the Outcome
1.	**Introduction**	Introduction and Course Hand-out briefing	Lecture	CA 1304 .1	Class Quiz
2.		Multimedia elements, applications, architecture	Lecture	CA 1304 .1	Class Quiz Home Assignments I Sessional End Term
3		Multimedia system components, types, evolving technologies	Lecture	CA 1304 .1	Class Quiz Home Assignments I Sessional End Term
4-5		Defining objects for multimedia systems; Multimedia Data Interface Standards	Lecture	CA 1304 .1	Class Quiz Home Assignments I Sessional End Term
6.		Storage requirements and multimedia Databases	Lecture	CA 1304 .1	Class Quiz Home Assignments I Sessional End Term
7	**MEDIA AND DATA STREAMS**	Media of Perception, Representation, Presentation, Storage, Transmission, Information Exchange	Lecture	CA 1304 .1	Class Quiz Home Assignments I Sessional End Term
8.		Discrete, Continuous and independent media	Lecture	CA 1304 .1	Class Quiz Home Assignments I Sessional End Term
9.		Characterizing Data Streams	Lecture	CA 1304 .1	Class Quiz Home Assignments I Sessional
10-12	**AUDIO AND IMAGE REPRESENTATION ON COMPUTERS**	Audio Representation on Computers	Lecture	CA 1304 .2	Class Quiz Home Assignments I Sessional End Term

13.		Three Dimensional Sound Projection	Lecture	CA 1304 .2	Class Quiz Home Assignments I Sessional End Term
14-15		Speech Signals; Speech input, output and transmission;	Lecture	CA 1304 .2	Class Quiz Home Assignments I Sessional End Term
16		Capturing graphics and images	Lecture	CA 1304 .2	Class Quiz Home Assignments I Sessional End Term
17		Reconstructing Images	Lecture	CA 1304 .2	Class Quiz Home Assignments I Sessional End Term
18-20		Graphics and Image Output Options	Lecture	CA 1304 .2	Class Quiz Home Assignments I Sessional End Term
21	COMPUTER BASED ANIMATION AND AUDIO VIDEO COMPRESSION	Introduction to Computer based Animation	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
22.		Specification, controlling, display and transmission of animation	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
23.		Video Technology- Random and raster scan	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
24.		Introduction to Compression Techniques- Basics	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
25.		JPEG Compression	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term

26.		Hierarchical Mode H.261 (Px64) 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	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
29.		Fractal Compression	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
30.		History and basics of optical technology;	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional
31.		Video Discs and Other WORMs	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
32.		CDDigitalAudio CD-ROMExtended Architecture	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
33.		CD-Recordable; CD Magneto-Optical	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional
34.		CD Read/Write; DVD	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
35-36		Content Analysis-Simple Vs. Complex Features	Lecture	CA 1304 .3	Class Quiz Home Assignments II Sessional End Term
37.	ANALYSIS OF MULTIMEDIA DATA	Analysis of Individual Images and Image Sequences	Lecture/Expert Lec.	CA 1304 .4	Class Quiz Home Assignments
38.		Audio Analysis	Lecture/Expert Lec	CA 1304 .4	Class Quiz Home Assignments End Term

39-41		Data and File Format Standards-Rich-Text, TIFF, RIFF, MIDI, JPEG, DIB, AVI, MPEG Standards, TWAIN	Lecture	CA 1304 .4	Class Quiz Home Assignments End Term
42.		Conclusion and Course Summarization	Lecture	CA 1304 .4	Class Quiz Home Assignments End Term
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
CA1304.1	Describe the multimedia systems in terms of its architecture, requirements, representation and integration capability.										2				1	
CA1304.2	Understand and have in-depth knowledge of multimedia standards for audio, image and video compression/decompression.	2	2	3	1											3
CA1304.3	Experiment different techniques to construct multimedia such as speech, graphics, images and computer based animation.	1	2			3								2		
CA1304.4	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 Computing & IT

Department of IT

Course Hand-out

Basic Statistics and Probability | MA1322 | 4 Credits | 3 1 0 4

Session:July'18 – December'18

Faculty: Dr. Garima Agarwal

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 by conduction of interactive lecture for better opportunity and skill development.
[1322.4]. To understand the application of Permutation and combination in various real life problems for better employability
[1322.5]. To understand the concept of Probability.

C. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

PROGRAM OUTCOMES

PO1: Apply the knowledge of basic science and fundamental computing in solving complex engineering problems

PO2: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design solutions for complex IT engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the Information oriented public health and safety, and the cultural, societal, and environmental considerations

PO4: Use IT domain research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

PO5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

PO6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

PO8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

PO9: Function effectively as an individual, and as a <u>member or leader in diverse IT teams</u>, and in multidisciplinary settings.

PO10: <u>Communicate effectively</u> on complex computing engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PO11: <u>Demonstrate knowledge and understanding</u> of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

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

PSO1: clarity on both conceptual and application-oriented skills of IT Applications in Business context.

PSO 2: To develop and manage policies related to organizations' IT systems.

PSO 3: In-depth knowledge & sustained learning leading to innovation & research to fulfil global interest.

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 (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.	

A. 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).

B. 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.

A. 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

B.   Lecture Plan:

Lecture#	Topics to be Covered
Module I : BASIC STATISTICS	
Lecture 1-6	• Concept of population • Concept of data and its type • Frequency distribution
Module II : MEASURE OF CENTRAL TENDENCY	
Lecture 7-17	• Concept of central tendency • Arithmetic Mean • harmonic mean • geometric mean • mean, mode and median
Module III : MEASURE OF DISPERSION	
Lecture 18- 24	• concept of dispersion • Range variance • Standard Deviation • Coefficient of variation
Module IV: PERMUTATION AND COMBINATION	
Lecture 25-32	• Definition and basic concept of Permutation • Definition and basic concept of Combination • Illustrative examples
Module V:PROBABILITY	
Lecture 33-50	• Sample space • Concept of events and its types • Properties of an event • Definition of experiments and its type • Concept of probability • Total Probability • Bayes Theorem • Multiple correlation

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

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
MA 1322.1	To understand the concept of Basic Statistics.						1					1		1		
MA 1322.2	To understand the concept of Central tendency and Dispersion.			1			1		1			1			1	
MA 1322.3	To understand the concept of Dispersion.		1					1						1		
MA 1322.4	To understand the application of Permutation and combination.	1		1			1									1
MA 1322.5	To understand the concept of Probability.			1								1			1	

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

MANIPAL UNIVERSITY JAIPUR

School of Computing & Information Technology

Department ofInformation Technology
Course Hand-out

Database Management System| CA 1401 | 4 Credits | 3 1 0 4

Session: Jan 19 – May 19 | Faculty: Pradeep Kumar | Class: BCA IV Semester

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 to develop Employable skills

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

C. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

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

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

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

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

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

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

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

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

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

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

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

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

[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

[PSO.2]. To develop and manage policies related to organizations' IT systems.

[PSO.3]. In-depth knowledge & sustained learning leading to innovation & research to fulfil global interest.

D. Assessment Plan:

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

H.   Lecture Plan:

Lecture No.	Main Topics	Topic	Mode of delivery	Corresponding CO	Mode Of Assessing CO
1	Introduction to DBMS	Introduction to Database	Lecture	CA 1401.1	Mid Term-I,Quiz & End Term
2		Database Vs File System	Lecture	CA 1401.1	Mid Term-I,Quiz & End Term
3		Introduction to Database Management System & Database Management System-Examples	Lecture	CA 1401.1	Mid Term-I,Quiz & End Term
4		TUTORIAL	Activity	CA 1401.1	Mid Term-I,Quiz & End Term
5		Characteristicsofthedatabase approach	Lecture	CA 1401.1	Mid Term-I,Quiz & End Term
6		Components of databasesystem	Lecture	CA 1401.1	Mid Term-I,Quiz & End Term
7		actors on the scene, Workers behind the scene Database user and databaseapplication	Lecture	CA 1401.1	Mid Term-I,Quiz & End Term
8		TUTORIAL	Lecture	CA 1401.1	Mid Term-I,Quiz & End Term
9		Functions of DBMS	Lecture	CA 1401.1	Mid Term-I,Quiz & End Term
10		Advantages & Disadvantages of DBMS	Flipped class	CA 1401.1	Mid Term-I,Quiz & End Term
11		Database Architecture-Two Tire client/Server Architecture	Lecture	CA 1401.1	Mid Term-I,Quiz & End Term
12		Database Architecture-Three Tire client/Server Architecture	Lecture	CA 1401.1	Mid Term-I,Quiz & End Term
13		TUTORIAL	Lecture	CA 1401.1	Mid Term-I,Quiz & End Term

14	Database Modeling	Database Models-OverviewRelational Model with Examples	Lecture	CA1401.2 & CA1401.3	Mid Term-I,Quiz & End Term
15		Relational Model and Relational algebra	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	Activity	CA1401.2 & CA1401.3	Mid Term-II,Quiz & End Term
17		TUTORIAL	Lecture	CA1401.2 & CA1401.3	Mid Term-II,Quiz & End Term
18		Entity types, Entity sets	Lecture	CA1401.2 & CA1401.3	Mid Term-II,Quiz & End Term
19		attributes, relationships	Lecture	CA1401.2 & CA1401.3	Mid Term-II,Quiz & End Term
20		Concept of keys	Lecture	CA1401.2 & CA1401.3	Mid Term-II,Quiz & End Term
21		TUTORIAL	Lecture	CA1401.2 & CA1401.3	Mid Term-II,Quiz & End Term
22		Database Design-I & Database Design-II	Activity	CA1401.2 & CA1401.3	Mid Term-II,Quiz & End Term
23	Relation Model	Functional Dependencies	Lecture	CA1401.2 & CA1401.3	Mid Term-II,Quiz & End Term
24		Normalization for relational databases-Overview	Lecture	CA1401.2 & CA1401.3	Mid Term-II,Quiz & End Term
25		Problem without Normalization	Lecture	CA1401.2 & CA1401.3	Mid Term-II,Quiz & End Term
26		TUTORIAL	Lecture	CA1401.2 & CA1401.3	Mid Term-II,Quiz & End Term
27		Normalforms-I & Normalforms-II	Lecture	CA1401.2 & CA1401.3	Mid Term-II,Quiz & End Term
28		Example of Normal Form	Activity	CA1401.2 & CA1401.3	Mid Term-II,Quiz & End Term

29	SQL	Database languages and interfaces	Lecture	CA1401.5	Mid Term-II,Quiz & End Term
30		TUTORIAL	Lecture		Mid Term-II,Quiz &
31		Introduction to SQL & IntroductiontoSQLCommands-DDL,DML,DCL,TCL	Flipped Class	CA1401.5	Mid Term-I & II,Quiz& EndTerm
32		DDL: Data Definition Language(Basic Queries)-I	Lecture	CA1401.5	Mid Term-I & II,Quiz& EndTerm
33		DDL: Data Definition Language(Basic Queries)-II	Lecture	CA1401.5	Mid Term-I & II,Quiz& EndTerm
34		TUTORIAL	Lecture	CA1401.5	Mid Term-I & II,Quiz& EndTerm
35		DML: Data Manipulation Language(Basic Queries)-I & DML: Data Manipulation Language(Basic Queries)-II	Lecture	CA1401.5	Mid Term-I & II,Quiz& EndTerm
36		DCL:DataControlLanguage(Basic Queries)	Lecture	CA1401.5	Mid Term-I & II,Quiz& EndTerm
37	Transaction Concept	TCL: Transaction Control Language(Basic Queries)	Lecture	CA1401.5	Mid Term-I & II,Quiz& EndTerm
38		TUTORIAL	Lecture	CA1401.5	Mid Term-I & II,Quiz& EndTerm
39		More complex SQL queries	Activity	CA1401.5	Mid Term-I & II,Quiz& EndTerm
40		Specifying general constraints as assertion and Additional features of SQL-I	Lecture	CA1401.5	Quiz & End Term
41		Specifying general constraints as assertion and Additional features of SQL-II	Lecture	CA1401.5	Quiz & End Term
42		TUTORIAL	Lecture	CA1401.5	Quiz & End Term
43		Introductiontotransaction & Introduction to transaction processing-concepts	Lecture	CA 1401.6	Quiz & End Term
44		Transaction and system concepts	Flipped class	CA 1401.6	Quiz & End Term

45		Desirable properties of transactions	Lecture	CA 1401.6	Quiz & End Term
46		TUTORIAL	Lecture	CA 1401.6	Quiz & End Term
47		Techniques for concurrency-I	Lecture	CA 1401.6	Quiz & End Term
48		Introductionto concurrency & Techniques for concurrency-II	Lecture	CA 1401.6	Quiz & End Term
49		TUTORIAL	Lecture	CA 1401.6	Quiz & End Term
50		Database Recovery Techniques-I	Lecture	CA 1401.6	Quiz & End Term
51		Database RecoveryTechniques-II	Lecture	CA 1401.6	Quiz & End Term
52		TUTORIAL	Lecture	CA 1401.6	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
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							1				2	
CA 1401.3	Classify features of Relational Database and ER Models.				2									3		
CA 1401.4	Reciterelationalalgebra concepts and use it to translate queries to relational algebra.	2										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

Department of IT
Course Hand-out

Visual Programming using C#**.**Net CA1402 | 4 Credits | 3 1 0 4

Session: Jan 19 – June 19 | Faculty: Gaurav Aggarwal | Class: BCA

A. Introduction The objective of the course is to
- To develop background knowledge as well as core expertise in C#
- Understand, analyze and explain .NET Framework and C#
- Write, debug, and document well-structured .NET applications

B. Course Outcomes: On the completion of this course student will be able to
- [1402.1 (CO 1)]: Understand the basic concepts of C# and .NET framework
- [1402.2 (CO 2)]: Write programs using the fundamental concepts of object-oriented programming
- [1402.3 (CO 3)]: Apply the concepts of overloading and indexers
- [1402.4 (CO 4)]: Implement the concepts of reusability using inheritance and interfaces
- [1402.5 (CO 5)]: Handle events and develop multi-threaded programs for skill enhancement and Employability.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

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

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

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

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

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

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

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

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

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

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

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

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

[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

[PSO.2]. To develop and manage policies related to organizations' IT systems.

[PSO.3]. In-depth knowledge & sustained learning leading to innovation & research to fulfil global interest.

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

1: Introduction to C# Language and .Net Framework	Creation of C#, .Net framework, Common Language Runtime, Concepts of Object-Oriented Programming, Data Types, Literals and Variables, Operators and Program Control State
2: Classes & Objects, Arrays & Strings	Class Fundamentals, Constructors, Garbage Collection & Destructors, this reference, Arrays, Jagged Arrays, Strings, ref and out parameters, Overloaded constructors, Object Initializers, Static constructors & static classes.
3: Operator Overloading, Indexers and Properties	Operator Overloading fundamentals, Overloading Unary Operators, Overloading Binary Operators, Overloading relational and logical operators, Indexers, Multidimensional indexers, properties, auto implemented properties
4: Inheritance and Interface	Inheritance basics, Member access and inheritance, constructors and inheritance, Virtual methods and overriding, Abstract classes, sealed classes, Interfaces, Implementing interfaces, using interfaces references, interface properties, interface indexers, interface and inheritance, interface and abstract classes, structures.
5: Delegates, Events and Multithreading	Delegates: delegate method group conversion, multicasting, anonymous functions, anonymous methods, introduction to events, instance methods vs static methods as event handlers, Multithreading fundamentals, the thread class: creating & starting a thread, creating multiple threads, synchronization.

F. TEXT BOOKS

The Complete Reference C# 4.0 by Herbert Schildt, Tata McGraw-Hill

G. REFERENCE BOOKS

Microsoft Visual C#2010, Step By Step, John Sharp

H. Lecture PLan

Lecture#	Topics to be Covered
Module I : Object-Oriented and C# Basics	
Lecture 1-2: Object-Oriented Basics	• Object and Class Basics • Basic Pillars of Object-Oriented Programming (Abstraction, Encapsulation, Inheritance and Polymorphism]
Lecture 3-4: C# Programming Syntax	• C# Program Structure, • Compiling and Executing a Simple C# Application • Types of Variables in C# • Primitive Types in C# • Type Promotion and Type Casting Rules
Lecture 5-7: Defining Classes and Object Creation	• Defining Classes and Access Modifiers, • Creating Objects, Role of Constructors • Accessing Instance Fields and Methods • Local Variables versus Instance Fields, • Mutable and ImmutableObjects • Command-Line Arguments, • Reading Input from console Using Scanner class
Lecture 8-9: Use of static final keywords in C# Method Overloading	• Use of static and final keywords in C# • Method Overloading
Lecture 10: Objects as Parameters	• Objects as Parameters to Methods and • Object class in C#
Module II : Arrays and String in C#	
Lecture 11-13: Arrays in C#	• Implementing 1-D and 2-D Arrays in C#, Role of Arrays class • Implementing Dynamic Arrays Using Vector class
Lecture 14-16: Strings in C#	• String class, Important String Methods • StringBuffer and StringTokennizer class in C#
Module III : Polymorphism and Inheritance in C#	
Lecture 17-18: Inheritance in C#	• Extending classes and Role of super keyword • Method Overriding [Super Type vs Sub-Type Relationships]
Lecture 19-21: Abstract Classes, Abstract Methods and Interfaces	• Abstract Methods and Classes • Interfaces in C# [class vs interface] • Comparable and Comparator Interfaces in C# • Nested and InnerClasses
Module V: Exception Handling Mechanism	
Lecture 22-27: Exceptions in C#	• Exception Basics and Types • Catching Exceptions • Writing Your Own Exceptions
Module VI: Multithreaded Programming in C#	
Lecture 28-31: Multithreading	• Multithreading vs Multitasking • Thread Class in C# and Its Important Methods • Creating Your own Threads and Runnable Interface • Thread Synchronization • Inter Thread Communication • Suspending and Resuming Threads

Module VII: GUI Programming	
Lecture 32-36: GUI Programming () Windows and web based)	• Introduction to C#'s Swing Package • Components and Containers and Layouts • JFrame & JPanel Classes in C#, • JLabel , JTextField and JTextArea classes • Swing Buttons:JButton, JToggleButton • Check Boxes, Radio Buttons • JScrollPane , JMenu, JMenuBar and JMenuItem • Designing Frames and Adding GUI Components
Module VIII: Event Handling in C#	
Lecture 37-42: Event Handling	• Delegation Event Model • Windows and Web based applications

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

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC UTCOMES		
		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 2	PSO 3	PSO 4
[1402.1 (CO 1)]:	Understand the basic conceptsof C#and.NET framework	1	2										11		1	
[1402.2 (CO 2)]:	Write programs using the fundamental concepts of object-oriented programming	1	1											1	1	
[1402.3 (CO 3)]:	Apply the concepts of overloading and indexers	1	2			2								2		
[1402.4 (CO 4)]:	Implement the concepts of reusability using inheritance and interfaces		1	1	2	2						1		1		
[1402.5 (CO 5)]:	Handle events anddevelo multi-threaded programs	2			2					2	1			2	1	

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

MANIPAL UNIVERSITY JAIPUR

School of Computing & IT

Department of IT
Course Hand-out

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

Session: Jan 19 – May 19 | 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]. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

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

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

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

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

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

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

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

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

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

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

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

[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

[PSO.2]. To develop and manage policies related to organizations' IT systems.

[PSO.3]. In-depth knowledge &sustained learning leading to innovation& research to fulfil global interest.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	20
	Sessional Exam II (Open Book)	20
	Inclass Quizzes and Assignments , Activityfeedbacks (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)	Studentswhomissesaclasswillhavetoreporttotheteacher abouttheabsence. A makeup assignment on the topic taught on the day of absence will be given which hastobesubmittedwithinaweekfromthedateof absence. No extensionswillbe 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"*, Addision
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	Mode of delivery	Corresponding CO	Mode Of Assessing CO
1	Introduction to E Commerce	IntroductiontoE commerce	Lecture	CA1403.1	Mid Term-I,Quiz & End Term
2		Motivation and Forces behind E-Commerce	Lecture	CA1403.1	Mid Term-I,Quiz & End Term
3		E-Commerce Industry Framework	Lecture	CA1403.1	Mid Term-I,Quiz & End Term
4		Tutorial-1	Activity	CA1403.1	Mid Term-I,Quiz & End Term
5		Brief history of Ecommerce	Lecture	CA1403.1	Mid Term-I,Quiz & End Term
6	Types of E Commerce	Inter Organizational E-Commerce	Lecture	CA1430.1 & CA1403.5	Mid Term-I,Quiz & End Term
7		Intra Organizational E-Commerce	Lecture	CA1430.1 & CA1403.5	Mid Term-I,Quiz & End Term
8		Tutorial-2	Activity	CA1430.1 & CA1403.5	Mid Term-I,Quiz & End Term
9		Consumer- to - BusinessandBusiness –to -consumer Electronic Commerce.	Lecture	CA1430.1 & CA1403.5	Mid Term-I,Quiz & End Term
10		Architectural framework of e commerce	Lecture	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term

		Network Infrastructure for E-Commerce	Lecture	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term
11					
12		Tutorial-3	Activity	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term
13		Component of I way Access Equipment	Lecture	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term
14		Global Information Distribution Network	Lecture	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term
15		Broad band Telecommunication	Lecture	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term
16		Tutorial-4	Discussion	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term
17	M-Commerce	Introduction to Mobile Commerce	Lecture	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term
18		Mobile Computing Application	Lecture	CA1403.2 & CA 1403.4	Mid Term-I,Quiz & End Term
19		Wireless Application Protocols	Lecture	CA1403.2 & CA 1403.4	Mid Term-II,Quiz & End Term
20		Tutorial-5	Lecture	CA1403.2 & CA 1403.4	Mid Term-II,Quiz & End Term
21		WAP Technology	Lecture	CA1403.2 & CA 1403.4	Mid Term-II,Quiz & End Term
22		Mobile Information Devices	Lecture	CA1403.4	Mid Term-II,Quiz & End Term
23		Web Security	Flipped Class	CA1403.4	Mid Term-II,Quiz & End Term
24		Tutorial-6	Lecture	CA1403.4	Mid Term-II,Quiz & End Term
25		Introduction toWeb security, Firewalls & Transaction Security	Lecture	CA1403.4	Mid Term-II,Quiz & End Term

			Lecture	CA1403.4	Mid Term-II,Quiz & End Term
26		Client Server Network			
27		Emerging Client Server Security Threats	Lecture	CA1403.4	Mid Term-II,Quiz & End Term
28		firewalls & Network Security	Lecture	CA1403.4	Mid Term-II,Quiz & End Term
29		Tutorial-7	Lecture	CA1403.4	Mid Term-II,Quiz & End Term
30	Basic cryptography for enabling E-commerce	World WideWeb & Security	Flipped Class	CA1403.4	Mid Term-II,Quiz & End Term
31		Encryption and encryption algorithm	Lecture	CA1403.4	Mid Term-II,Quiz & End Term
32		Transaction security	Lecture	CA1430.3	Mid Term-II,Quiz & End Term
33		Tutorial-8	Lecture	CA1430.3	Mid Term-II,Quiz & End Term
34		Secret Key Encryption	Lecture	CA1430.3	Mid Term-II,Quiz & End Term
35		Public Key Encryption	Lecture	CA1430.3	Mid Term-II,Quiz & End Term
36		Virtual Private Network	Lecture	CA1430.3	Mid Term-II,Quiz & End Term
37		Tutorial-9	Lecture	CA1430.3	Mid Term-II,Quiz & End Term
38	Eletronic Payment	Overview of Electronics payments	Flipped Class	CA1430.3	Quiz & End Term
39		Digital Token based Electronics payment System	Lecture	CA1430.3	Quiz & End Term
40		Smart Cards	Lecture	CA1430.3	Quiz & End Term
41		Tutorial-10	Lecture	CA1430.3	Quiz & End Term

42		Smart Cards; Credit Card, Debit Card based EPS	Lecture	CA1430.3	Quiz & End Term
43		Emerging financial Instruments	Lecture	CA1430.3	Quiz & End Term
44		Reviews of E commerce	Lecture	CA1430.3	Quiz & End Term
45	Revision	Revision	Activity		Quiz & End Term
46		Revision	Activity		Quiz & End Term
47		Revision	Activity		Quiz & End Term
48		Revision	Activity		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
CA 1403.1	Elaborate the components and roles of the Electronic Commerce environment.					1							2			2
CA 1403.2	Explain how businesses sell products and services on the Web & Describe the qualities of an effective Web business presence.						2			1						2
CA 1403.3	Describe the working of E- payment systems.	2							1						2	
CA 1403.4	Depict the client/server infrastructure that supports electronic commerce and basic e-commerce functions.					1							2			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 Computing and Information Technology

Department of IT
Course Hand-out

Data Communication| CA 1404| 4 Credits | 3 1 0 4

Session: Jan 19 – May 19 | Faculty: Kavita | Class: BCA IV

A. **Introduction:** This course is intended to deliver students an overview of the concepts and fundamentals of data communication and computer networks. Methods for constructing digital communication systems with highlights on data-link and network protocols, and provides an introduction to TCP/IP protocols as well as OSI Model.

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

[1404.1]. Describe the network protocols and analyze network topologies with respect to applications.

[1404.2]. Illustrate the various techniques of signal encoding.

[1404.3]. Describe each layer of TCP/IP and same for OSI layer.

[1404.4]. Implementation of transmission media and compare all.

[1404.5]. Explain Types of Errors, Error Detection, Error Correction, Flow Control and Error Control techniques.

[1404.6]. Synthesize routing algorithm and Illustrate three way handshaking for connection establishment

C. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

PO1: Apply the knowledge of basic science and fundamental computing in solving complex engineering problems

PO2: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design solutions for complex IT engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the Information oriented public health and safety, and the cultural, societal, and environmental considerations

PO4: Use IT domain research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

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

PO6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

PO8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

PO9: Function effectively as an individual, and as a member or leader in diverse IT teams, and in multidisciplinary settings.

PO10: Communicate effectively on complex computing engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

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

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

PSO 1: Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

PSO 2: To develop and manage policies related to organizations' IT systems.

PSO 3: In-depth knowledge &sustained learning leading to innovation& research to fulfil global interest.

D. **Assessment Plan:**

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	20
	Sessional Exam II (Open Book)	20
	Inclass 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.	

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, DTEDCE 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.

F.   TEXT BOOKS

Tanenbaum A. S., "Computer networks" (5th Edition). Pearson Education, 2009

Behrouz Forouzan, "Data communication & networking" (5th Edition). TMH

G.   REFERENCE BOOKS

William Stallings, "Data and Computer Communications" (9th Edition). Pearson Education, 2009

H.   Lecture Plan:

LEC NO	TOPICS
1	Introduction of course
2	Networks and protocols
3,4	Line Configuration
5,6	Introduction and Types of topologies
7.8	Transmission modes, Parallel & Serial Transmissions
9	Analog & Digital Signals
10	Periodic & Aperiodic Signals
11,12	Modulation: Amplitude Modulation, Frequency Modulation, Phase Modulation, Pulse Code Modulation
13,14,15	Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying
16	Sampling
17	Bit/ Baud rate and Comparison
18	DTEDCE Interface, 56 K Modem
19,20	OSI Model
21	Transmission Media: Twisted Pair Cable, Coaxial Cable, Fiber-Optics Cable, Radio frequency Allocation,
22	Terrestrial Microwave, Infrared rays, Satellite Communication, Cellular Telephony
23	Introduction to ISDN
24	Framing, Line Discipline
25	Types of Errors, Error Detection
26,27	Error Correction
28	Flow Control, Error Control
29,30	CSMA/CD
31	IEEE802.X Standards
32	Introduction to Bridges
33	Internal Organization of Network Layer
34	Introduction of Routing Algorithms
35	Shortest Path Routing,
36	Flooding
37	Distance Vector Routing
38	Link State Routing
39	General Principles of Congestion
40	Congestion Prevention Policies
41	Duties of Transport Layer
42,43	Connection Establishment & Connection Termination
44,45	Introduction to TCP/IP
44	Data Link Layer in Internet-- SLIP & PPP
45	Network Layer in Internet--IP protocol
46	IP addressing
47,48	Subnetting
49	Internet Control Protocols
50	Transport Layer in Internet-TCP.

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
CA 1404.1	Describe the network protocols and analyze network topologies with respect to applications	1									1	1		1		1
CA 1404.2	Illustrate the various techniques of signal encoding			2				1		1	1				1	1
CA 1404.3	Describe each layer of TCP/IPandsameforOSI layer	1				1	2	1					2		1	
CA 1404.4	Implementation of transmission media and compare all				1		2				1		2			
CA 1404.5	Explain Types of Errors, Error Detection, Error Correction,FlowControl and Error Control techniques				2		1							1		1
CA 1404.6	Synthesize routing algorithm and Illustrate three way handshaking for connection establishment	1		2	1	1		1			2		1	1		1

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

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

MANIPAL UNIVERSITY JAIPUR

School of Computing & IT

Department of IT
Course Hand – Out

Numerical Methods | MA1422 | 4 Credits | 3 1 0 4

Session: Jan 19 – May 19 | Faculty: Dr. Mahesh Kumar Dubey| Class: BCA IV Sem.

A. Introduction:-

The Graduate shall able to use modern techniques of Numerical methods, innovative formulas, development, and by pursuing successful careers in Indian and multinational companies. It is well-known that the use of numerical methods for the analysis, simulation, and design of engineering processes and industrial systems has been increasing at a rapid rate. Therefore, this course is intended to better prepare future graduates and computational scientists in understanding the fundamentals of numerical methods, especially their application, limitations, and potentials. This course is designed as an introductory course in computational techniques for solving problems from science with emphasis on applications. The course will cover the classical fundamental topics in numerical methods such as, approximation, solution of nonlinear algebraic systems and solution of ordinary differential equations. The viewpoint will be modern, with connections made between each topic and a variety of applications. By the end of the course, the student should not only be familiar, but more confident, in effectively using numerical tools to solve problems in their own field of interest.

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

1422.1	Understand the concept of finite difference techniques.
1422.2	Learn different methods of interpolation with different intervals for better employability.
1422.3	Develop the conceptual framework of central difference interpolation techniques.
1422.4	Solve the different data problem with help of numerical integration for better skill development.
1422.5	Generate the solution of algebraic, transcendental and ordinary differential equations.

C. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

PO1: Apply the knowledge of basic science and fundamental computing in solving complex engineering problems

PO2: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design solutions for complex IT engineering problems and design system components or processes that meet

the specified needs with appropriate consideration for the Information oriented public health and safety, and the cultural, societal, and environmental considerations

PO4: Use IT domain research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

PO5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

PO6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

PO8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

PO9: Function effectively as an individual, and as a member or leader in diverse IT teams, and in multidisciplinary settings.

PO10: Communicate effectively on complex computing engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

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

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

  PSO1: clarity on both conceptual and application-oriented skills of IT Applications in Business context.

  PSO 2: To develop and manage policies related to organizations' IT systems.

  PSO 3: In-depth knowledge &sustained learning leading to innovation& research to fulfil global interest.

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
2. Introductory Methods of Numerical Analysis: S. S. Sastri, Prentice Hall.

3. T.Veerarajanand T.Ramachandran,Numerical Methods:ItsProgramsinC,TataMcGrawHillPub.Co. Ltd, New Delhi,2005.

F. REFERENCE BOOKS:-

1. Applied Numerical Analysis: Gerald and Whealtey.
2. Numerical Analysis: Scarbourogh.
3. Introduction to Numerical Analysis: Gupta & Bose S.C., Academic Press, Kolkata.
4. J. G. Kori, Numerical Methods in 'C', Firewall Media, 2002.
5. S. Rajasekaran, Numerical Methods in Science and Engineering, S. Chand and Co., 2003.

G. Lecture Plan:

Lecture No.	Main Topics	Topic	Mode of delivery	Corresponding CO	Mode Of Assessing CO
1	Numerical solution of algebraic and transcendental equation	Introduction of Numerical Methods and its application.	Lecture	CO1422.1 & CO1422.5	Mid Term-I,Quiz & End Term
2		Introduction of Algebraic and Transcendental equations and its numerical solutions	Lecture	CO1422.1 & CO1422.5	Mid Term-I,Quiz & End Term
3		Introduction of Numerical solution Algebraic and Transcendental equations in computer applications.	Lecture	CO1422.1 & CO1422.5	Mid Term-I,Quiz & End Term
4		Tutorial-1	Activity	CO1422.1 & CO1422.5	Mid Term-I,Quiz & End Term
5		Introduce of Bisection Method and using this to findnumericalsolutionof Algebraic and	Lecture	CO1422.1 & CO1422.5	Mid Term-I,Quiz & End Term

		Transcendental equations.			
6		Introduce Iterative Method and using this to find Numerical solution of Algebraic and Transcendental equations.	Lecture	CO1422.1 & CO1422.5	Mid Term-I,Quiz & End Term
7		Introduce Newton-Rophan Method and using this to find numerical solution of Algebraic and Transcendental equations.	Lecture	CO1422.1 & CO1422.5	Mid Term-I,Quiz & End Term
8		Tutorial-2	Activity	CO1422.1 & CO1422.5	Mid Term-I,Quiz & End Term
9		Introduce Secant Method and using this to find numerical solution of Algebraic and Transcendental equations.	Lecture	CO1422.1 & CO1422.5	Mid Term-I,Quiz & End Term
10		Solvesome problems on Algebraic and Transcendental equations by using methods discussed in previous lecture.	Lecture	CO1422.1 & CO1422.5	Mid Term-I,Quiz & End Term
11		Review on Numerical Methods for solution of Algebraic and Transcendental equations.	Lecture	CO1422.1 & CO1422.5	Mid Term-I,Quiz & End Term
12		Tutorial-3	Activity	CO1422.1 & CO1422.5	Mid Term-I,Quiz & End Term
13	Interpolation	Introduction of Interpolations	Lecture	C01422.2	Mid Term-I,Quiz & End Term

14			Introduction of Polynomial Interpolation with equal interval and Finite Difference	Lecture	C01422.2	Mid Term-I,Quiz & End Term
15			Introduction of forward and backward difference operator	Activity	C01422.2	Mid Term-I,Quiz & End Term
16			Tutorial-4	Activity	C01422.2	Mid Term-I,Quiz & End Term
17			Solve some problems by using methods discussed in previouslectures	Lecture	C01422.2	Mid Term-I,Quiz & End Term
18			Introduction of Central difference operator	Lecture	C01422.2	Mid Term-I,Quiz & End Term
19			Introduction of Symbolic relations and separation of different operators	Lecture	C01422.2	Mid Term-I,Quiz & End Term
20			Solve some problems by using methods discussed in previouslectures	Lecture	C01422.2	Mid Term-I,Quiz & End Term
21			Tutorial-5	Activity	C01422.2	Mid Term-I,Quiz & End Term
22			Introduction of Newton's forward and backward difference formula	Lecture	C01422.2	Mid Term-I,Quiz & End Term
23			Introduction of Gauss forward and backward difference formula	Lecture	C01422.2	Mid Term-I,Quiz & End Term
24			Introduction of Stirling's difference formula.	Lecture	C01422.2	Mid Term-I,Quiz & End Term
25			Tutorial-6	Activity	C01422.2	Mid Term-I,Quiz & End Term
26			Introduction of Polynomial Interpolation with unequal intervals.	Lecture	C01422.2	Mid Term-I,Quiz & End Term

		Introduction of Lagrange's Interpolation formula.	Lecture	C01422.2	Mid Term-I,Quiz & End Term
27					
28		Review on Interpolations and different types of methods discussed in previous lecture.	Lecture	C01422.2	Mid Term-I,Quiz & End Term
29		Tutorial-7	Activity	C01422.2	Mid Term-I,Quiz & End Term
30	Numerical Differentiation and Integration.	Introduction of Numerical Differentiation and Integration	Lecture	CO1422.3	Mid Term-I,Quiz & End Term
31		Introduction of numerical differentiation formula with function value	Lecture	CO1422.3	Mid Term-I,Quiz & End Term
32		Introduction of Trapezoidal rule for numerical Integration.	Lecture	CO1422.3	Mid Term-II,Quiz & End Term
33		Tutorial-8	Activity	CO1422.3	Mid Term-II,Quiz & End Term
34		Introduction of geometrical significance of Trapezoidal rule for numerical Integration	Lecture	CO1422.3	Mid Term-II,Quiz & End Term
35		Introduction of Simpson's one-third rule for numerical Integration	Lecture	CO1422.3	Mid Term-II,Quiz & End Term
36		Introduction of Simpson's three-eight rule for numerical Integration.	Lecture	CO1422.3	Mid Term-II,Quiz & End Term
37		Tutorial-9	Activity	CO1422.3	Mid Term-II,Quiz & End Term
38	Numerical solution of ordinary differential equations	Introduction of differential equations	Lecture	C01422.4 & C01422.5	Mid Term-II,Quiz & End Term

		Introduction of numerical solution of ordinary differential equations	Lecture	C01422.4 & C01422.5	Mid Term-II,Quiz & End Term
39					
40		Introduction of numerical solution of ordinary differential equations by using Taylor's Series Methods	Lecture	C01422.4 & C01422.5	Mid Term-II,Quiz & End Term
41		Tutorial-10	Activity	C01422.4 & C01422.5	Mid Term-II,Quiz & End Term
42		Introduction of numerical solution of ordinary differential equations by using Picard's Methods	Lecture	C01422.4 & C01422.5	Mid Term-II,Quiz & End Term
43		Introduction of numerical solution of ordinary differential equations by using Euler's Methods	Lecture	C01422.4 & C01422.5	Mid Term-II,Quiz & End Term
44		Introduction of numerical solution of ordinary differential equations by using Modified Euler's Methods	Lecture	C01422.4 & C01422.5	Mid Term-II,Quiz & End Term
45		Tutorial-11	Activity	C01422.4 & C01422.5	Mid Term-II,Quiz & End Term
46		Introduction of numerical solution of ordinary differential equations by using Runge-Kutta Methods	Lecture	C01422.4 & C01422.5	Mid Term-II,Quiz & End Term
47		Review on numerical solution of ordinary differential equations by using different types of methods discussed in previous lecture	Lecture	C01422.4 & C01422.5	Mid Term-II,Quiz & End Term
48		Discuss some more problems on numerical solution of ordinary differential equations	Lecture	C01422.4 & C01422.5	Mid Term-II,Quiz & End Term

		Tutorial-11	Activity	C01422.4 & C01422.5	Mid Term-II,Quiz & End Term
49					

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

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOME							CORRELATION WITH PROGRAM SPECIFIC OUTCOME			
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PSO 1	PSO 2	PSO 3	PSO 4
MA1422.1	Understand the concept of finite difference techniques.	2			2			3				
MA1422.2	Learn different methods of interpolation with different intervals		2	3		2						
MA1422.3	Develop the conceptual framework of central difference interpolation techniques.	2		3			1					
MA1422.4	Solve the different data problem with help of numerical integration.		3		2			3				
MA1422.5	Generate the solution of algebraic, transcendental	2		2			2			2	1	

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Information Technology
Course Hand-out

Software Engineering | CA 1501 | 4 Credits | 3 0 1 4

Session: July'18 – December'18

Faculty: Kavita

Class: BCA

A. **Introduction:** This course is offered by Dept. of Computer Science and engineering as a compulsory subject, targeting students who wish to pursue research & development in industries or higher studies in field of Software engineering. This course aims to make the students aware of software engineering concepts and to explain its importance in real world, how large scale software development takes place and what are the various aspects involved, Software development life cycle, idea of ethical and professional issues and to explain why they are of concern to software engineers and also to make students aware of Software quality assurance and software testing related concepts.

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

  [1501.1]. Understand the need and use of Software Engineering methods and their appropriate applications; Software Development Life Cycle and software process models.
  [1501.2]. Implement and Understand software Design, Architecture, UML diagram to represent the design and flow of software application.
  [1501.3]. Illustrate the Testing methods and their procedures to implement in any project for improving skills and employability
  [1501.4]. Describe the effect of quality control and how to ensure good quality software.
   [1501.5]. Analyse the project cost and resource planning by various tools on the basis of different parameters for learning the skills of entrepreneurship.

B. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

 PO1: Apply the knowledge of basic science and fundamental computing in solving complex engineering problems

 PO2: Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

 PO3: Design solutions for complex IT engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the Information oriented public health and safety, and the cultural, societal, and environmental considerations

 PO4: Use IT domain research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

 PO5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

 PO6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

 PO7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

 PO8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

PO9: Function effectively as an individual, and as a <u>member or leader in diverse IT teams</u>, and in multidisciplinary settings.

PO10: <u>Communicate effectively</u> on complex computing engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PO11: <u>Demonstrate knowledge and understanding</u> of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments

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

PSO1: clarity on both conceptual and application-oriented skills of IT Application in Business context.

PSO 2: To develop and manage policies related to organizations' IT systems.

PSO 3: In-depth knowledge & sustained learning leading to innovation & research to fulfil global interest.

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.	
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, and Qualities of Good Design, Coupling, Types of Coupling, Cohesion, and Types of Cohesion. **Software Testing:** Definition, Test characteristics, Types of testing - Black-Box Testing, White-Box Testing, Stress Testing, Performance Testing.

E. TEXT BOOKS

- Pressman R, Software Engg. Practioner Approach (MGH), 2006
- Valiet, Software Engineering: Principles and Practice, Wiley India, 3rd edition,2005

F. REFERENCE BOOKS

- Jalote Pankaj, An integrated approach to Software Engineering (Narosa)
- Rajib Mall, Introduction to Software Engineering, TMH

G. Lecture Plan:

LEC NO	Major Topics	TOPICS	Mode of Delivery	Corresponding CO	Mode Of Assessing CO
1	**Introduction of System Concepts(1-5 Lectures)**	Introduction to system, System Definition	Lecture	1501.1	Mid Term I, Quiz & End Term
2		Elements of System	Lecture	1501.1	Mid Term I, Quiz & End Term
3		Characteristics of System	Lecture	1501.1	Mid Term I, Quiz & End Term
4		Types of System, System Concepts	Lecture	1501.1	Mid Term I, Quiz & End Term
5		Case studies/Tutorial	Activity	1501.1	Mid Term I, Quiz & End Term
6	**Introduction of Software Engineering(6-11 Lectures)**	Introduction in Software Engineering	Lecture	1501.1	Mid Term I, Quiz & End Term
7		Need for software Engineering,	Lecture	1501.1	Mid Term I, Quiz & End Term
8,9		Software Characteristics	Lecture	1501.1	Mid Term I, Quiz & End Term
10,11		Software Qualities (McCall's Quality Factors)	Lecture	1501.4 and 1501.1	Mid Term I, Quiz & End Term
12		Quiz		1501.1 and 1501.4	Quiz
13	**Requirement Analysis (3-24 Lectures)**	Definition of System Analysis	Lecture	1501.2	Mid Term I, Quiz & End Term
14		Requirement Anticipation	Lecture	1501.2	Mid Term I, Quiz & End Term
15,16		Knowledge and Qualities of System Analyst	Lecture	1501.2	Mid Term I, Quiz & End Term
17		Role of a System Analyst	Lecture	1501.2	Mid Term I, Quiz & End Term
18,19		Feasibility Study And It's Types	Lecture	1501.2	Mid Term I, Quiz & End Term
20		User Transaction Requirement	Lecture	1501.2	Mid Term II, Quiz & End Term
21		User design Requirements	Lecture	1501.2	Mid Term II, Quiz & End Term

22-24		SRS(System Requirement Specification)	Flipped class	1501.2 and 1501.5	Mid Term II, Quiz & End Term
25	**Software Development Methodologies (25-28 Lectures)**	SDLC (System Development Life Cycle),	Lecture	1501.1 and 1501.5	Mid Term II, Quiz & End Term
26		Case study/Tutorial	Activity	1501.1 and 1501.5	Mid Term II, Quiz & End Term
27		Waterfall Model	Lecture	1501.1 and 1501.5	Mid Term II, Quiz & End Term
28		Spiral Model, Prototyping model	Lecture	1501.1 and 1501.5	Mid Term II, Quiz & End Term
29		Quiz		1501.1 and 1501.5	Mid Term II, Quiz & End Term
30	**Analysis And Design Tools (30 -37 Lectures)**	Entity-Relationship Diagrams	Lecture	1501.2	Mid Term II, Quiz & EndTerm
31-33		Data Flow Diagrams (DFD),	Lecture	1501.2	Mid Term II, Quiz & EndTerm
34		Data Dictionary & Elements of Data Dictionary	Lecture	1501.2	Mid Term II, Quiz & End Term
35		Tutorial	Activity	1501.2	Mid Term II, Quiz & End Term
36		Pseudo code	Flipped Class	1501.2	Mid Term II, Quiz & End Term
37		Input And Output Design	Lecture	1501.2	Mid Term II, Quiz & End Term
38	**Structured System Design (38-42 Lectures)**	Modules Concepts and Types of Modules	Lecture	1501.2	Quiz and End Term
39		Structured Chart	Lecture	1501.2	Quiz and End Term
40		Qualities of Good Design	Lecture	1501.2 and 1501.4	Quiz and End Term
41		Coupling, Types of Coupling	Lecture	1501.2	Quiz and End Term
42		Cohesion, Types of Cohesion	Lecture	1501.2	Quiz and End Term
43	**Software Testing (43-52 Lectures)**	**Software Testing:** Definition	Lecture	1501.3	Quiz and End Term
44		Test characteristics	Lecture	1501.3	Quiz and End Term
45		Types of testing - Black-Box Testing	Lecture	1501.3	Quiz and End Term
46		White-Box Testing	Lecture	1501.3	Quiz and End Term

47		Stress Testing, Performance Testing	Lecture	1501.3 and 1501.4	Quiz and End Term
48		Tutorial	Activity	1501.3 and 1501.4	Quiz and End Term
49-52		Case study	Activity	1501.2, 1501.3 and 1501.4	Quiz and 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 1501.1	Understand the need and use of Software Engineering methods and their appropriate applications; Software Development Life Cycle and software process models.	1		1	1	3		1		2	1		2	3	2	
CA 1501.2	Implement and Understand software Design, Architecture, UML diagram to represent the design and flow of software application.	2		3	3	1	1			1	3	2	1	3	2	3
CA 1501.3	Illustrate the Testing methods and their procedures to implement in any project.	2	1		3	1			1			2		2	3	3
CA 1501.4	Describe the effect of quality control and how to ensure good quality software.	2	2	3	2	1	2			2		1		1		2
CA 1501.5	Analyse the project cost and resource planning by various tools on the basis of different parameters.	1	3	1	3	2	1			2	2		1		2	3

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

MANIPAL UNIVERSITY JAIPUR
School of Computing and Information Technology

Department of Information Technology
Course Hand-out

Computer Graphics | CA 1502 | 4 Credits | 3 0 1 4

Session: Aug 18 – Dec 18 | Faculty: Dr. D. P. Sharma | Class: BCA V

A. **Introduction:** This course is offered by Dept. of Information Technology as a compulsory subject, targeting students of computer application who wish to pursue job in industries or higher studies in field of Computer graphics. This course aims to make the students aware of components of automated visual technology and related concepts that include display devices, and visual display units, geometric, mathematical and algorithmic concepts necessary for programming computer graphics, windows, clipping and view-ports object representation in relation to images displayed on screen, the models of lighting and shading: color, ambient light, phong reflection model etc. 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 the Visual Devices.

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

[1502.1]. Describe the visual device displays system and their components work over display unit such as monitor, TV etc.

[1502.2]. Analyse the underlying algorithms of graphic primitives, mathematical concepts, supporting computer graphics. These include but are not limited to: Composite homogeneous matrices for translation, rotation, and scaling transformations.

[1502.3]. Design and implement model and viewing transformations.

[1502.4]. Recognize and implement among models for lighting/shading: Color, ambient light; distant and light with sources; 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 AND PROGRAM SPECIFIC OUTCOMES**

PO1: Apply the knowledge of basics science and fundamental computing in solving complex engineering problems

PO2: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design solutions for complex IT engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the Information oriented public health and safety, and the cultural, societal, and environmental considerations

PO4: Use IT domain research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

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

PO6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

PO7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

PO8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices

PO9: Function effectively as an individual, and as a member or leader in diverse IT teams, and in multidisciplinary settings.

PO10: Communicate effectively on complex computing engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

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

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

PSO 1: Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

PSO 2: To develop and manage policies related to organizations' IT systems.

PSO 3: In-depth knowledge &sustained learning leading to innovation& research to fulfil global interest.

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

Basics Of Computer Graphics: Introduction, What is computer Graphics?, Area of Computer Graphics, Design and Drawing, Simulation, How are pictures actually stored and displayed, Difficulties for displaying pictures; Graphic 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 Device; C Graphics Basics: Graphics programming, initializing the graphics, C Graphical functions, simple programs; Simple Line Drawing Methods: Point Plotting Techniques, Qualities of good line drawing algorithms, The Digital Differential Analyzer (DDA), Brenham's Algorithm, Generation of Circles; **Two Dimensional Transformations:** 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 Transformations; Curves And Surfaces: Shape description requirements, parametric functions, Bezier methods, Bezier curves, Bezier surfaces, B-Spline methods; Solid Area Scan Conversion: Solid Area Scan Conversion, Scan Conversion of Polygons, Algorithm Singularity, **Three Dimensional transformation:** translations, Scaling, Rotation, Viewing Transformation, The Perspective, Algorithms, Three Dimensional Clipping, Perspective view of Cube.

F. TEXT BOOKS

- "Computer Graphics C version / OpenGL version", Donald Hearn and M. Pauline Baker, Pearson Education.
- "Computer Graphics Principles & practice", second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.

G. REFERENCE BOOKS

- "Computer graphics second edition", Zhigandxiang, RoyPlastock, Schaum's outlines, Tata Mc Graw Hill Edition.
- "Procedural elements for computer graphics", David f Rogers, Tata Mc Graw Hill 2nd Edition.
- "Principles of Interactive Computer Graphics", Neuman and Sproul, Tata Mc Graw Hill Edition.
- "Principles of Computer Graphics", Shalini, Govil-Pai, Springer Publication.

H. Lecture Plan:

LEC NO	TOPICS	Corresponding CO	Mode Of Assessing CO
1	Introduction, What is computer Graphics.		Mid Term I, Assignment/Quiz & End Term
2	Area of Computer Graphics, Design and Drawing, Simulation.		Mid Term I, Assignment/Quiz & End Term
3	How are pictures actually stored and displayed		Mid Term I, Assignment/Quiz & End Term
4	Difficulties for displaying pictures		Mid Term I, Assignment/Quiz & End Term
5	Introduction of input and output devices		Mid Term I, Assignment/Quiz & End Term
9	Cathode Ray Tube		Mid Term I, Assignment/Quiz & End Term
10	Random Scan and Raster Scan		Mid Term I, Assignment/Quiz & End Term
11	CRTs for Color Display		Mid Term I, Assignment/Quiz & End Term
12	Beam Penetration CRT, The Shadow Mask CRT		Mid Term I, Assignment/Quiz & End Term
13	Direct View Storage Tube, The light Pen		Mid Term I, Assignment/Quiz & End Term
14	Tablets		Mid Term I, Assignment/Quiz & End Term
15	Three Dimensional Devices		Mid Term I, Assignment/Quiz & End Term
16	Input Devices		Mid Term I, Assignment/Quiz & End Term
17,18	Tutorial		Mid Term I, Assignment/Quiz & End Term
19	Graphics programming, initializing the graphics		Mid Term I, Assignment/Quiz & End Term
20	C Graphical functions		Mid Term I, Assignment/Quiz & End Term
21	Simple programs		Mid Term I, Assignment/Quiz & End Term
22	Tutorial		Mid Term I, Assignment/Quiz & End Term
23	Simple Line Drawing Methods: Point Plotting Techniques		Mid Term II, Assignment/Quiz & End Term
24	Qualities of good line drawing algorithms		Mid Term II, Assignment/Quiz & End Term
25	The Digital Differential Analyser (DDA)		Mid Term II, Assignment/Quiz & End Term
26	Brenham's Algorithm		Mid Term II, Assignment/Quiz & End Term

27	Generation of Circles		Mid Term II, Assignment/Quiz & End Term
28	Generation of Ellipse		Mid Term II, Assignment/Quiz & End Term
29	Polygon fill algorithms		Mid Term II, Assignment/Quiz & End Term
30	Tutorial		Mid Term II, Assignment/Quiz & End Term
31	Tutorial		Mid Term II, Assignment/Quiz & End Term
32	Two Dimensional Transformations: What is transformation		Mid Term II, Assignment/Quiz & End Term
33	Matrix representation ofpoints		Mid Term II, Assignment/Quiz & End Term
34	Basic transformation		Mid Term II, Assignment/Quiz & End Term
35	Basic transformation		Mid Term II, Assignment/Quiz & End Term
36	Homogeneous matrixrepresentation		Mid Term II, Assignment/Quiz & End Term
37	Homogeneous matrixrepresentation		Mid Term II, Assignment/Quiz & End Term
38	Reflection, shearing		Mid Term II, Assignment/Quiz & End Term
39	Tutorial		Mid Term II, Assignment/Quiz & End Term
40	Need for Clipping and Windowing		Mid Term II, Assignment/Quiz & End Term
41	Line Clipping Algorithms		Mid Term II, Assignment/Quiz & End Term
42	The midpoint subdivision Method		Mid Term II, Assignment/Quiz & End Term
43	Other Clipping Methods		Mid Term II, Assignment/Quiz & End Term
44	Sutherland – Hodgeman Algorithm, Viewing Transformations		Mid Term II, Assignment/Quiz & End Term
45	Solid Area Scan Conversion, Scan Conversion of Polygons		Mid Term II, Assignment/Quiz & End Term
46	Tutorial		End Term , Assignment/Quiz
47	Tutorial		End Term , Assignment/Quiz
48	Introduction to 3-Dimensional objects		End Term , Assignment/Quiz
49	3-D Transformations –translations		End Term , Assignment/Quiz
50	Scaling, Rotation		End Term , Assignment/Quiz
51	Viewing Transformation		End Term , Assignment/Quiz
52	The Perspective, Algorithms		End Term , Assignment/Quiz
53	Three Dimensional Clipping, Perspective view of Cube.		End Term , Assignment/Quiz
54	Tutorial		End Term , Assignment/Quiz

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
CA 1502.1	Describe how a visual device displays components work over display unit such as monitor, TV etc	1				1	1		1							
CA 1502.2	Analyse the underlying algorithms of graphics primitives, mathematical concepts, supporting computer graphics. These include but are not limited to: Composite homogeneous matrices for translation, rotation, and scaling transformations.	3														2
CA 1502.3	Design and implement model and viewing transformations		1	2								1	1			1
CA 1502.4	Recognize and implement among models for lighting/shading: Color, ambient light; distant and light with sources; Phong reflection model; and shading (flat, smooth, Gourand, Phong).				2	2				1						
CA 1502.5	Analyse future trends in computer graphics applications and also able to design 3D graphics system and to visualize them.							1			1			2	1	

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

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Information Technology Course

Hand-out

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

Session: July'18 – December'18

Faculty: Mr. Gaurav Aggarwal

Class: BCA

A. **Introduction:** Object oriented techniques have revolutionized the software development process and are used Tremendously in IT industry to develop software products of various kinds. The course is designed to give students an in-depth understanding of the basic concepts of object-oriented programming such as encapsulation, inheritance and polymorphism using Java programming language as an aid ind tool. The course curriculum and structure has been divided into eight basic modules which covers the programming aspects related with object oriented domain such as exception handling, multithreading, GUI programming, event handling etc. The course will be taught with the help of several teaching aides such as power point presentation and via live debugging and execution demonstrations of several programming problems using Eclipse tool.
The main objective of the course are as follows:
- To teach students about the basics of classes and objects using Java programming language
- To enable the students to properly use the basic object oriented pillars such as encapsulation, inheritance and polymorphism.
- To enable the students to understand the basic difference between a class and an interface.
- To teach students about the implementation aspect of various basic data structures such as Linked Lists and Arrays using object oriented techniques
- To teach students how to provide various types of inheritance and polymorphism using classes and interfaces
- To introduce students about the role of modern programming constructs such as exceptions in modern programming languages
- To teach students about the basic of Multithreading, GUI Programming and Event handling

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

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

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

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

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

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

[1304.6]. Visualize a real world problem in the form of various collaborating classes and objects or skill development.

C. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

PROGRAM OUTCOMES

[PO.1]. Engineering knowledge: : Apply the knowledge of basic science and fundamental computing in solving complex engineering problems

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

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

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

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

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

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

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

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

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

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

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

PROGRAM SPECIFIC OUTCOMES

[PSO 1]: clarity on both conceptual and application-oriented skills of IT Applications in Business context.

[PSO 2]: To develop and manage policies related to organizations' IT systems.

[PSO 3]: In-depth knowledge &sustained learning leading to innovation& research to fulfil global interest.

D.   **Assessment Plan:**

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

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**; **Introduction to AWT**: Classes, component, Container, Panel, Window, frame, Canvas, working with frame, working with Graphics, using AWT Controls.

F.   TEXT BOOKS

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

G.   REFERENCE BOOKS

1. Core Java Volume I—Fundamentals (10th Edition), By Cay Horstmann, Prentice Hall, ISBN-10:0134177304, ISBN-13: 978-0134177304, Year(2|06)
2. 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
3. Java Concepts (4th Edition), Bt Cay horstmann, Wiley India, ISBN-10:0471697044, ISBN-13:978-0471697046, (Year:2005)

H.   Lecture Plan:

Lectures	Major Topics	Topics	Corresponding CO	Mode Of Assessing CO	Mode of Teaching
1.		Introduction and Course Hand-out briefing	NA		PPT,Board,Prog.
2.		C,C++andJava Comparison,Java ByteCode,Java Buzzwords,JavaSE8	1304.1	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
3.	History and Evolution and overviewofjava(1-7 Lecture)	Lexical issues, java keywords	1304.1	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
4.		OOP Programming, First Simple program	1304.1	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
5.		Control Statements	1304.1	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
6.		Operators	1304.1	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
7.		Tutorial	1304.1	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
8.	Data Types, Variables and Arrays (8-11 Lecture)	Primitive Types, Floating point, Characters, Booleans	1304.1	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
9.		Literals, Variables, Type Conversion and casting, wrapper classes , Boxing and Unboxing	1304.1	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
10.		1D Arrays, 2D Array, multi dimension Array, Variable Length Array	1304.1	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
11.		Tutorial	1304.1	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
12.	Introduction to Classes (12-17 Lecture)	Class Fundamentals, Declaring Objects	1304.2 & 1304.6	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
13.		Methods in Classes, returning values, parameterized methods	1304.2 & 1304.6	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
14.		Constructors, parameterized constructors	1304.2 & 1304.6	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
15.		This keyword, This Constructor, Constructor Chaining	1304.2	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
16.		Tutorial	1304.2	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
17.		Garbage Collection, finalize() method	1304.2	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
18.	Classes and its Methods(18-23 lecture)	Overloading Methods, Using Objects as parameters, Argument passing, Returning Objects	1304.2	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
19.		Recursion, Access Control	1304.2 & 1304.3	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
20.		Tutorial	1304.2	MidTermI,Quiz&EndTerm	PPT,Board,Prog.
21.		Static, final, Nested and Inner class	1304.2 & 1304.3	Mid Term II, Quiz & End	PPT,Board,Prog.
22.		Variable length arguments	1304.2 & 1304.3	Mid Term II, Quiz & End	PPT,Board,Prog.
23.		Tutorial	1304.2 & 1304.3	Mid Term II, Quiz & End	PPT,Board,Prog.
24.	I/O Basics (24-26 lecture)	Using Command line arguments ,I/O Basics, reading Console Input and	1304.1 & 1304.2	Mid Term II, Quiz & End	PPT,Board,Prog.
25.		PrintWriter Class, Scanner Class	1304.1 & 1304.2	Mid Term II, Quiz & End	PPT,Board,Prog.
26.		reading and Writing Files, Closing files	1304.1 , 1304.2	Mid Term II, Quiz & End	PPT,Board,Prog.
27.	Inheritance (27-29 Lecture)	Inheritance Basics, Using Super, Creating multilevel hierarchy	1304.3	Mid Term II, Quiz & End	PPT,Board,Prog.
28.		Method overriding, Dynamic method dispatch, Using Abstract class,	1304.3	Mid Term II, Quiz & End	PPT,Board,Prog.
29.		Tutorial	1304.3	Mid Term II, Quiz & End	PPT,Board,Prog.
30.		Packages, Access protection, Importing packages, static import	1304.3	Mid Term II, Quiz & End	PPT,Board,Prog.

#	Unit	Topic	CO	Assessment	Resources
31.	Packages and	Interfaces, default Interface methods	1304.3	Mid Term II, Quiz & End	PPT, Board, Prog.
32.	Interfaces (30-34	Comparator and comparable interface	1304.3	Mid Term II, Quiz & End	PPT, Board, Prog.
33.	lecture)	static methods in interfaces	1304.3	Mid Term II, Quiz & End	PPT, Board, Prog.
34.		Tutorial	1304.3	Mid Term II, Quiz & End	PPT, Board, Prog.
35.		Fundamentals, Exception types, Uncaught Exceptions, check uncheck	1304.2 & 1304.6	Mid Term II, Quiz & End	PPT, Board, Prog.
36.		Using try and catch, multiple catch clauses, nested try statements	1304.2 & 1304.6	Mid Term II, Quiz & End	PPT, Board, Prog.
	Exception Handling	Throw, throws, finally, built-in exceptions, creating own exception	1304.2 & 1304.6	Mid Term II, Quiz & End	PPT, Board, Prog.
37.	(35-38 lecture)	Sub classes		Term	
38.		Tutorial	1304.5	Mid Term II, Quiz & End	PPT, Board, Prog.
39.		Thread Model: thread priorities, synchronization, messaging	11304.2 & 1304.6	Quiz & End Term	PPT, Board, Prog.
40.	Multithreaded Programming (39-42 lecture)	main thread, creating single thread and multiple threads, using isAlive(), join()	1304.2 & 1304.6	Quiz & End Term	PPT, Board, Prog.
41.		Interthread communication, suspending, resuming and stopping threads, using multithreads	1304.2 & 1304.6	Quiz & End Term	PPT, Board, Prog.
42.		Tutorial	1304.5	Quiz & End Term	PPT, Board, Prog.
43.	String Handling (43-	Constructors, Constructor chaining, string operations	1304.4	Quiz & End Term	PPT, Board, Prog.
44.	45 lecture)	Character extraction, comparision, searching and modifying	1304.4	Quiz & End Term	PPT, Board, Prog.
45.		String Class Methods and String Buffer Class	1304.4	Quiz & End Term	PPT, Board, Prog.
46.	GenericsClass(46-	Making own generics class	1304.4	Quiz & End Term	PPT, Board, Prog.
47.	49 lecture)				
48.		Collection framework, Arraylist,	1304.4	Quiz & End Term	PPT, Board, Prog.
		LinkList, HashMap, Vector	1304.4	Quiz & End Term	PPT, Board, Prog.
49.		Tutorial	1304.4	Quiz & End Term	PPT, Board, Prog.
50.	GUI and Event	GUI lifecycle, Events, Eventslistener, adapterclasses	1304.4 & 1304.5	Quiz & End Term	PPT, Board, Prog.
51.					
52.	Handling(50-52 Lecture				

Different Event classes

1304.4 & 1304.5

Quiz & EndTerm

PPT,Board, Prog.

Event Listener Interfaces

1304.4 & 1304.5

Quiz & End Term

PPT,Board, Prog.

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

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC OUTCOMES		
		PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CS 1304.1	Students will be able to understand and learn how to compile and execute a simple as well as complex Java Application using Command Based Interface as well as using Eclipse Tool.	1	2	2	2	-	-	-	-	1	1	1	1	2	-	-
CS 1304.2	Learn and apply the concepts of encapsulation and abstraction using class, objects and interfaces.	2	2	2	2	-	-	-	-	1	-	-	1	2	-	-
CS 1304.3	Students will be able to develop and Implement various inheritance and polymorphism forms using Java Classes and Interfaces.	3	2	2	1	-	-	-	-	1	-	-	1	3	-	-
CS 1304.4	Student will be able to Implement various collection data structure such as linked lists, queues, stacks using Java's collection framework.	3	2	2	1	-	-	-	-	1	-	-	1	2	-	-
CS 1304.5	Student will be able to understand, learn and finally Implement the use of advanced programming constructs/features such as exception handling, multithreading and event handling in real-life programming domains.	3	2	2	2	-	-	-	-	1	-	-	1	2	-	-
CS1304.6	Students will be able to visualize a real world problem in the form of various collaborating classes and objects	1	2	1	1	-	-	-	-	1	-	-	2	2	-	-

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

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of IT
Course Hand-out

Introduction to Unix Programming | IUP | CA1504 | 4 Credits | [3 1 0 4]

Session: July 18 – Dec 18 | Faculty: Pradeep Kumar | 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 the 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 OS concepts 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

[CA1504.1]: Describe the architecture and features of UNIX Operating System and distinguish it from other Operating System.

[CA1504.2]: Understand, Identify and use UNIX commands and utilities to create and manage simple file processing operations, organize directory structures with appropriate security and develop shell scripts to perform more complex tasks.

[CA1504.3]: Analyse a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem.

[CA1504.4]: Apply fundamental concepts of UNIX programming to automate the jobs and processes in Unix environment.

C. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

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

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

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

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

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

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

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

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

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

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

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

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

[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

[PSO.2]. To develop and manage policies related to organizations' IT systems.

[PSO.3]. In-depth knowledge & sustained learning leading to innovation & research to fulfil global interest.

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	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

Unix Operating System, Multiuser, Multitasking, Kernel and Shell, System calls and system programs, 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 links and Symbolic links, System calls for low level I/O, Process commands, Process states, System processes, System calls for process control –fork, wait, exec, and exit, Signals, Orphan and Zombie, Shell Wild-cards, 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

1. Lecture Plan:

LEC NO	TOPICS
1	Introduction and Course Hand-out briefing, Introduction to operating system
2	Unix Operating System- Overview and History
3	Features of Unix,
4	Tutorial
5	Structure of Unix Systems
6	Difference between Unix and Linux
7	Unix Environment, Introduction to files
8	Tutorial
9	File Descriptors ,File attributes
10	Types of Files, Hard Links, Symbolic Links
11	Revision and Briefing
12	Tutorial
13	Basic Unix Commands: Internal and External Commands
14	Structure of commands
15	Basic Commands, Understanding of Command Usage
16	Tutorial

17	General Purpose utilities: cal, date, echo
18	General Purpose utilities: Passwd, mailx, uname , man
19	Directory and File based Commands
20	Tutorial
16	More file handling commands
17	File and Directory permissions
18	Changing file ownership, File access permissions: umask, chmod, groups
19	Tutorial
20	Introduction to Vi Editor
21	Introduction to shell programing: Types of Shell
22	Revision and Briefing
23	Tutorial
24	Unix Wild Cards, Escaping, Quoting, Redirection, Pipe, Command substitution
25	Command Substitution, Shell variables ,Script example
26	Interactive Shell scripting, Evaluating Expressions: expr, let ,base Conversion: bc
27	Tutorial
28	Simple shell scripts examples
29	Logical Operators, Control Structures: If ,nested- IF, elif
30	Case Structure,Example shell Scripts on Control Structures
31	Tutorial
32	For Loop, Nesting of For Loop, Example scripts
33	While Loop, Do While
34	LoopNesting of While and Do While
35	Tutorial
36	Repeat Until Loop, Example Scripts
37	Processes Concepts: structure, States and Transitions
38	Revision and Briefing
39	Tutorial
40	System Processes ,Orphan and Zombie Processes
41	System Calls: Introduction to user mode, Kernel Mode
42	Tutorial
43	Process related System calls: exec(),fork(), wait(), exit(),
44	System calls for Redirection
45	System calls for Pipe
46	System calls for low level input output
47	Tutorial
48	Signals: Introduction, Classes of Signals
49	Revision and briefing-Unix Commands
50	Revision and Briefing-Unix Commands
51	Revision and briefing
52	Revision and briefing

2. 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 1504.1	Describe the architecture and features of UNIX Operating System and distinguish it from other Operating Systems.	1	2	2									1	2		1
CA 1504.2	Understand, Identify and use UNIX commands and utilities to create and manage simple file processing operations, organize directory structures with appropriate security and develop shell scripts to perform more complex tasks.	2	2	2		1								2		1
CA 1504.3	Analyse a given problem and apply requisite facets of SHELL programming in order to devise a SHELL script to solve the problem.		2	2										2		1
CA 1504.4	Apply fundamental concepts of UNIX programming to automate the jobs and processes in Unix environment.	2		2									1	2		1

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

Non Linear Data Structures & Algorithms| CA 1505 | 4 Credits | 3 1 0 4

Session: Jul 18 – Dec 18 | Faculty: Pradeep Kumar | Class: BCA V SEMESTER

A. **Introduction:** Data Structures and algorithms form the base of computer science and hence this course is introduced at this level so that the students can gain the understanding of how the data gets stored into computer memory and how efficiently by making use of different storage structures, they can save space and time. The course is intended to provide the students the experience in program design and to emphasize aspects of program efficiency.

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

[1505.1]. Solve the programming problem using non-linear data structures like tree and graph.

[1505.2]. Outline searching and sorting techniques and comparative study among various techniques of Searching and sorting.

[1505.3]. Compare between different data structures. Pick an appropriate data structure for a design Situation for enhancing employability.

[1505.4]. Describe the greedy paradigm and explain when an algorithmic design situation calls for it.

[1505.5]. Analyze worst-case running times of algorithms using asymptotic analysis.

[1505.6]. Analyze algorithm and data structures in terms of time and memory complexity of basic Operations for skill development.

PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

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

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

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

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

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

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

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

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

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

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

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

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

[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

[PSO.2]. To develop and manage policies related to organizations' IT systems.

[PSO.3]. In-depth knowledge & sustained learning leading to innovation & research to fulfil global interest.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	20
	Sessional Exam II (Open Book)	20
	Inclass 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.	

D. SYLLABUS

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, Best-case, 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.

E. **TEXT BOOKS**

1. O.G. Kakde &U.A. Deshpandey, *"Data Structures and Algorithms"* , ISTE/EXCEL BOOKS,2003

2. Aho Alfred V., Hopperoft John E., UIlman Jeffrey D., *"Data Structures and Algorithms"* , Addison Wesley , 2002

3. Drozdek, "Data Structures and Algorithms", Vikas Pu blications,2003

F. **REFERENCE BOOKS**

1. H. Cormen, Charles E. Leiserson, Ronald L. Rivest, *"Introduction to Algorithms"* ,2002

2. Heileman, *"Data Structure Algorithims & 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.

H.**Lecture Plan:**

Lecture no.	Topic to be covered
1.	Introduction to non-linear data structure
2.	Basic terminologies, binary tree representation
3.	In order and preorder tree traversal
4.	Post order tree traversal
5.	Binary Search Tree and its implementation
6.	Threaded Binary tree
7.	Tutorial based on Binary tree
8.	tutorial based on Binary Search Tree
9.	Height balanced tree and AVL Tree
10.	AVL Insertion
11.	AVL deletion
12.	Tutorial based on AVL tree
13.	Advantage of M-way tree over AVL tree, Implementation of.
14.	M-way tree , B-tree Insertion & Deletion
15.	B+ tree insertion & Deletion
16.	Tutorial based on B+ tree
17.	Heap sort
18.	Tutorial based on tree
19.	Terminology and definition of graph, Graph operations
20.	Linked list and array representation of graph
21.	Breadth first traversal
22.	depth first and level order traversal
23.	Tutorial based on Graph and Tree
24.	Spanning trees, minimum cost spanning tree
25.	Shortest path
26.	Prim's algorithm

27.	Kruskal's algorithm
28.	Tutorial based on Spanning trees
29.	Introduction to algorithm and its complexity
30.	Trade off time and space complexity
31.	Asymptotic notations
32.	Linear search and Binary search
33.	Interpolation of search using array
34.	Tutorial based on searching
35.	Insertion Sort, Selection
36.	Bubble sort
37.	Quick Sort
38.	Merge sort
39.	Radix sort
40.	Hashing, its advantage
41.	Collision resolution
42.	Tutorial based on hashing.
43.	Tutorial based on sorting
44.	Introduction to non-linear data structure
45.	Basic terminologies, binary tree representation
46.	In order and preorder tree traversal
47.	Post order tree traversal
48.	Binary Search Tree and its implementation
49.	Threaded Binary tree
50.	Tutorial based on Binary tree
51.	tutorial based on Binary Search Tree

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
CA 1505.1	Solve the programming problem using non-linear data structures like tree and graph.	2				1								2		
CA 1505.2	Outline searching and sorting techniques and comparative study among various techniques of searchingandsorting.				2									1		
CA 1505.3	Compare between different data structures. Pick an appropriate data structure for a design situation.			1	1									2		

CO	Description															
CA 1505.4	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Perform algorithms that employthis paradigm.	2			1											2
CA 1505.5	Analyze worst-case running times of algorithms using asymptotic analysis.			1		2								1		
CA 1505.6	Analyzealgorithm and data structures In terms of time And memory complexity of basic operations.										1		2		

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

MANIPAL UNIVERSITY JAIPUR

School of Computing & IT

Department of IT
Course Hand-out

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

Session: Jan 19 – May 19 | Faculty: Kuntal Gaur | Class: B.C.A VI

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.

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 sills for design functionality.

[16013]. 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.

A. PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

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

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

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

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

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

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

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

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

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

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

make effective presentations, and give and receive clear instructions.

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

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

[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

[PSO.2]. To develop and manage policies related to organizations' IT systems.

[PSO.3]. In-depth knowledge &sustained learning leading to innovation& research to fulfil global interest.

B. 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.	

C. 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.

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D.   TEXT BOOKSE

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

E.   REFERENCE BOOKS

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

F.   Lecture Plan:

LEC NO.	TOPICS
1	***Introduction:*** What operating systems do? Operating system structure
2	Operating system operations, Process management, Memory management
3	Storage management, Protection and security, Special purpose systems **(T)**
4	***System structure:*** Operating system services, User operating system interfaces
5	System calls, Types of system calls, System programs
6	Operating system structure, Virtual machines, System boot **(T)**
7	***Process Concept:*** Overview Process scheduling
8	Operations on processes
9	Inter-process Communication **(T)**
10	***Process scheduling:*** Basic concepts, Scheduling criteria, Scheduling algorithms
11	Scheduling algorithms
12	Scheduling algorithms
13	Thread Scheduling, Linux Scheduling **(T)**
14	***Deadlocks:*** System model, Deadlock Characteristics
15	Methods for handling deadlocks, Deadlock prevention
16	Deadlock avoidance
17	Deadlock detection, Recovery from deadlock **(T)**
18	***Memory Management:*** Logical vs physical address space, Swapping
19	Contiguous allocation
20	Paging, Page table structure
21	Segmentation, Comparison of paging and segmentation, Pentium Segmentation and Linux on Pentium System
22	***Multithreaded Programming:*** Overview, multithreaded models
23	Thread libraries, Threading issues **(T)**
24	Linux threads
25	***Virtual memory management:*** Background, Demand paging, copy-on-write

26	Page replacement
27	Page replacement
28	Allocation of frames **(T)**
29	Thrashing, Allocating Kernel Memory, other considerations
30	*Secondary storage:* Disk structure, Disk scheduling
31	Disk schedulingalgorithm(Contd..), Diskmanagement, Swapspacemanagement **(T)**
32	*Process Synchronization:* Background, Critical section problem
33	Peterson's solution, Semaphores
34	Classical problems of synchronization
35	Classical problems of synchronization (Contd...)
36	Monitors, Synchronization in Linux **(T)**
37	*System security :* The security problem, Program threats
38	System and network threats, User Authentication
39	*System Protection:* Goals of protection, Principles of protection, Domain of Protection
40	Access matrix, Implementation of access matrix **(T)**
41	*File system:* File concept, access methods
42	Directory structure
43	File system mounting, File sharing
44	File sharing(contd..), Protection **(T)**
45	*Linux systems*: Design Principles, Kernel Modules
46	Process Management, Scheduling
47	Memory management Security
48	File system, Inter-process communication **(T)**

G.   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
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					1	
CA1601.3	In depth knowledge of process and threads and their scheduling.							1			1		1			1
CA1601.4	Better understanding of process synchronization and management.				1	1			1					1	1	
CA1601.5	Understand resource allocationprocessand deadlocks.		1	1			1									
CA1601.6	Understanding of disk scheduling and various storage strategies.				1						1		1			1

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

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Information Technology
Course Hand-out

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

Session: Jan 17 – May 17 | Faculty: Priyank Singh Hada | Class: VI Semester

Introduction: The main objective of this course is to familiarize students with computer networks of today which are based on the TCP/IP model and its layered structure.

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

CA1602.1: Demonstrate the Network Layer architecture, IPV4, class full addressing, sub netting and classless addressing.

CA1602.2: Implement the Routing and its types.

CA1602.3 Demonstrate the Internet control protocols, IPV6 transitions.

CA1602.4: Analyse the Transport Layer and Its protocols, congestion control.

CA1602.5: Describe the Application Layer, its protocols and Network Security.

PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

Program Outcomes (POs of IT):

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

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

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

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

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

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

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

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

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

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

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

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

[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

[PSO.2]. To develop and manage policies related to organizations' IT systems.

[PSO.3]. In-depth knowledge & sustained learning leading to innovation & research to fulfil global interest.

B.   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.

C.   SYLLABUS

Introduction: **IPv4 Addresses** Classfull addressing, other issues, Sub-netting Classless, addressing, variable length blocks, Sub-netting, address allocation, **IP Protocol:** options, checksum, Types of messages, message format, error reporting, Query, Checksum, fragmentation, IP Package, **ICMP Protocol**: Messages, Debugging tools, **Unicasting Protocols:** Unicasting routing, RIP: RIP Message Format ,Requests and Responses, Timers in RIP , Introduction to OSPF and BGP**, Multicasting Protocol:** IGMP : Group Management, IGMP Messages, IGMP Protocol Applied to Host ,IGMP Protocol Applied to Router, Role of IGMP in Forwarding **ARP package & RARP**: Introduction, packet format, Encapsulation, RARP: Introduction, datagram, **UDP Protocol**: Process to process communication, User datagram, checksum; UDP package, **TCP Protocol** :Introduction, TCP services, TCP features, segment, TCP connection, State transition diagram, Flow control, Error control, Congestion control, TCP timers, options, TCP package **SCTP Protocol:** SCTP features, packet format, association, state transition diagram, flow control, error control, congestion control.

TEXT BOOKS:
1. W. R Stevens, "*TCP/IP Illustrated, Volume 1: The Protocols*", Addison-Wesley,1994.
2. P. Loshin, "*IPV6 Clearly Explained*", Morgan Kauffman, 1999.

REFERENCES:
1. B. A. Forouzan, "*TCP/IP Protocol Suite*", Third Edition, TMH, 2005.

D.   Lecture Plan:

Lecture No.	Topics to be covered
1.	Introduction to Computer Networks and OSI Layered architecture.
2.	Introduction to Network layer and its architecture and features
3.	Classes and importance and functioning of Class full addressing
4.	Method to do Sub-netting and Introduction to Classless addressing
5.	Defining Variable length blocks
6.	Numerical based on Sub-netting address allocation
7.	Functionality of Network Address Translation
8.	Numerical based on Network Address Translation
9.	Introduction to Routing and its types: Flooding

10.	Routing type: Distance Vector Routing
11.	Routing type: Hierarchical Routing
12.	Introduction to Congestion control
13.	Functionality of Admission control to avoid congestion
14.	Traffic Shaping methods: Leaky and token buckets
15.	Choke packets for Network Maintenance and Quality Management
16.	Introduction to Dynamic routing protocols
17.	Dynamic Routing Protocol type: Routing Information Protocol (RIP), Open Shortest Path First (OSPF)
18.	Dynamic Routing Protocol: Border Gateway Protocol (BGP)
19.	Functionality of IPv4 datagram each field
20.	Types of messages, message format of IPV4 datagram
21.	IPV4 Error reporting, Query, Checksum
22.	Internet control protocols: ICMP
23.	Address Resolution ARP & RARP
24.	Multicasting Protocols: IGMP
25.	Introduction to IPV6-header
26.	Types and purpose of Extension headers
27.	Transition from IPv4-v6
28.	Transport services
29.	Explanation of State diagram of Transport Layer transmission
30.	*Elements of Transport Protocols*: addressing
31.	Connection establishment, connection release
32.	Functioning of Error control and Flow Control
33.	Crash Recovery, Multiplexing
34.	*Congestion Control:* Bandwidth allocation
35.	How to Regulate the sending rate
36.	*Introduction to UDP and* UDP header
37.	*TCP:* TCP service model, TCP segment header
38.	TCP connection establishment, TCP connection release, TCP window management, Timer management.
39.	*Introduction to DNS*: Name space

40.	Domain resource records
41.	*Electronic Mail:* SMTP, POP, IMAP, MIME
42.	Application Layer Protocols HTTP, HTTPS
43.	Network Management Protocol: SNMP
44.	Security Goals of Computer Networks
45.	CIA, Types of Attacks
46.	Attack prevention techniques
47.	Firewall, IDS, DMZ
48.	IPsec Protocol

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

CO	Statement																
CA1602.1	Demonstrate the Network Layer architecture, IPV4, class full addressing, sub netting and classless addressing.																
CA1602.2	Implement the Routing and its types																
CA1602.3	Demonstrate the Internet control protocols, IPV6 transitions.																
CA1602.4	Analyse the Transport Layer and Its protocols, congestion control.																
CA1602.5	Describe the Application Layer, its protocols and Network Security.																

1: LowCorrelation 2: ModerateCorrelation   3: SubstantialCorrelation

MANIPAL UNIVERSITY JAIPUR

School of Computing and IT

Department of IT
Course Hand-out

Data Warehousing using OLAP | CA 1603 | 4 Credits | 3 1 0 4

Session: Jan 19 – May 19 | Faculty: Shikha Kabra | Class: BCA VI

A. **Introduction:** In this subject the students are going to learn about how data is collected from various data bases and how it will be transform to understand by search engine and according to the users query, how that query is processed by the warehouse and according to the query the pattern will get as anoutput.

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

[1603.1] Illustrate the different ways to gather and analyse large sets of data to gain useful business understanding.

[1603.2] Describe the fundamental concepts, benefits and problem areas associated with data warehousing.

[1603.3] Describing and demonstrating basic skill development for data mining algorithms, methods, and tools .

[1603.4] Describe the various architectures and main components of a data warehouse for better employement.

[1603.5] Compare and contrast OLAP and data mining techniques for extracting knowledge from a data warehouse

PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES

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

[PO.2]. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions usingfirstprinciples ofmathematics, naturalsciences, andengineering sciences.

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

[PO.4].Useresearch-basedknowledgeandresearchmethodsincludingdesignofexperiments,analysisand interpretation of data, and synthesis of the information to provide valid conclusions.

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

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

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

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

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

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

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

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

[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

[PSO.2]. To develop and manage policies related to organizations' IT systems.

[PSO.3]. In-depth knowledge &sustained learning leading to innovation& research to fulfil global interest.

C. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	20
	Sessional Exam II (Open Book)	20
	Inclass 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.	

D.   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.

E.   TEXT BOOKS

1. Han, M. Kamber, "Data Mining Concepts and Techniques", Elsevier, 2007.

2. M. Berry, G. Linoff, "Data Mining Techniques", Wiley Publishing, 2004.)

F.   REFERENCE BOOKS

1. T. Davenport, "Competing on Analytics", Harvard Business Review (Decision Making), January 2006.

2. R.N Prasad, S. Acharya, "Fundamentals of Business Analytics", John Wiley & Sons, 2011.

G.   Lecture Plan:

LEC NO	TOPICS
1	Introduction to Data Warehousing
2	Meaning and Characteristics of Data Warehousing
3,4	OnLine Transaction Processing
5,6	Data warehousing Models
7.8	Architecture and Principles of Data warehousing
9	Building a Data Warehouse Project
10,11	Data warehousing and Operational Systems
12	Benefits of Data Warehousing
13,14	Managing and Implementing a Data Warehouse Project
15	Project Management Process, Scope Statement
16,17	Project Estimation, analyzing Probability and Risk
18,19	Managing Risk: Internal and External, Critical Path Analysis
20,21	Data Mining , Data Mining Concepts
22	Elements and uses of Data Mining
23	Data Information and Knowledge
24,25	Data Mining Models
26,27	Issues and challenges in DM, DM Applications Areas
28,29,30	Data Mining Techniques
31	Various Techniques of Data Mining Nearest Neighbor and Clustering Techniques
32,33	Decision Trees
34	Association Rules
35	Frequent itemset mining
36,37	Frequent mining using apriori
38	Tutorial
39,40	Online Analytical Processing, Need for OLAP Multidimensional Data Model
41,42,43	OLAP vs. OLTP, Characteristics of OLAP
44,45,46	Multidimensional verses Multirelational OLAP, Features of OLAP
47,48	OLAP Operations
49,50	Categorization of OLAP Tools Concepts used in MOLAP/ ROLAP

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 1603.1	Illustrate the different ways to gather and analyse large sets of data to gain useful business understanding	2			3	3				2		3		3		1
CA 1603.2	Describe the fundamental concepts, benefits and problem areas associated with data warehousing			2								2				1
CA 1603.3	Describing and demonstrating basic data mining algorithms, methods, and tools.		2		3	2										
CA 1603.4	Describe the various architectures and main components of a data warehouse.			3										3		
CA 1603.5	Compare and contrast OLAP and data mining techniques for extracting knowledge from a data warehouse		2	1										1		

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

MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department Of IT
Course Hand-out

Python Programming| CA1604| 4 Credits | 3 1 0 4

Session: Jan 19 – May 19 | Faculty: Venkatesh Gauri Shankar | Class: BCA VI

A. **Introduction:** In this course, students will study a comprehensive understanding of the course of Python Programming to the development and implementation of python programs and some python applications. This course also motivates towards Implement of trivial Python programs dealing with a wide variety of subject matter domains.

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

[1604.1]. Implement Python code on different platform.
[1604.2]. Implement Python control flow construct and written Python programs using various collection data types.
[1604.3]. Managed Python environments and packages with many inbuilt and user defined function for better employability.
[1604.4]. Implement many of the standard Python library and used the IO model in Python to read and write disk files.
[1604.5]. Understand and use the Object Oriented paradigm in Python programs for skill development.
[1604.6]. Analyse Text Processing, Threading, Networking and implement database Access in Python Using various Python libraries.

C. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

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

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

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

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

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

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

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

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

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

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

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

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

[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.
[PSO.2]. To develop and manage policies related to organizations' IT systems.
[PSO.3]. In-depth knowledge &sustained learning leading to innovation& research to fulfil global interest.

D.　Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	20
	Sessional Exam II (Open Book)	20
	Inclass 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

Python concepts: Expressions, values, types, variables, programs & algorithms, control flow, file I/O, the Python execution model. **Data structures:** List, set, dictionary (mapping), tuple, graph (from a third-party library), List slicing (sublist), list comprehension (shorthand for a loop), Mutable and immutable data structures, Distinction between identity and (abstract) value. **Functions:** Procedural abstraction, functions as values, recursion, function design methodology. **The Python Library:** String and Text Handling, Data Structures and Algorithms, Threading, Networking, Web Programming, Graphical Programming, Database Access.

F.　TEXT BOOKS

A. David M. Beazley, *"Python Essential Reference"*, Amazon Books, 2010.

B. M. Lutz, *"Programming Python, 4th Edition"*, O'Reilly Media, 2010

G.　REFERENCE BOOKS

A. Alex Martelli, "Python in a Nutshell", Second Edition.

B. John Georzen, T. Bower, Brandon Rhodes, "Foundations of Python Network Programming: The comprehensive guide to building network applications with Python", APress, 2010.

H.   Lecture Plan:

LEC NO	TOPICS
1	Introduction, A Brief History of Python,
2	Python Versions, Installing Python, Environment Variables,
3	Executing Python from the Command Line, Editing Python Files, Python Documentation
4	Getting Help, Python Reserved Words,
5,6	Naming Conventions (One tutorial)
7	Basic Syntax, String, Comments,
8,9	String Values, String Methods, the format Method, (One tutorial)
10,11	String Operators, Numeric Data Types, Conversion (One tutorial)
12	Functions, Simple Output, Simple Input, The print Function
13	Indenting Requirements, The if Statement,
14,15	Relational and Logical Operators, Bit Wise Operators, (One tutorial)
16,17	The while Loop, break and continue, The for Loop (One tutorial)
18,19	Introduction, Lists
20, 21	Tuples, Sets, (One tutorial)
22, 23	Dictionaries, Sorting Dictionaries, (One tutorial)
24,25	Copying Collections (One tutorial)
26, 27,28	Introduction, Defining Your Own Functions,, Variable Number of Arguments, Scope, Functions - "First Class Citizens", (One tutorial)
29,30,31	Parameters, Function Documentation, Keyword and Optional Parameters, Passing Collections to a Function (One tutorial)
32, 33	Passing Functions to a Function, Mapping Functions in a Dictionary
34,35, 36	Introduction, Data Streams, Creating Your Own Data Streams, Access Modes,
37,38	Writing Data to a File, Reading Data From a File, Additional File Methods
39,40,41	Introduction to Networking, Client Server Programming, A Simple Pair Client/Server Programs, An Echo Client and Server, (One tutorial)
42, 43	An Evaluation Client and Server, Python Threads, A Threaded Client and Server.
44,45	Accessing Values in String, Updating Strings, Escape Characters, String special Operators, String Formatting
46, 47, 48	Installing MySQLdb, Database Connection, Tkinter Programming, Tkinter widgets, Standard attributes, (One tutorial)

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
CA1604.1	Implement Python code on different platform.	3			2				2					1		
CA1604.2	Implement Python control flow construct and written Python programs using various collection data types.		1	3				2				2			1	2
CA1604.3	Managed Python environments and packages with many inbuilt and user defined function.				3	2								2	1	3
CA1604.4	Implement many of the standard Python library and used the IO model in Python to read and write disk files.						2		2	3				3	2	
CA1604.5	Understand and use the Object Oriented paradigm in Python programs.			2						1	2			3		2
CA1604.6	Analyse Text Processing, Threading, Networking and implement database Access in Python using various Python libraries.	2						3					1	3		2

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

MANIPAL UNIVERSITY JAIPUR

School of Computing & IT

Department of IT
Course Hand-out

Soft Computing Techniques | CA1605 | 3 Credits | 3 1 0 4

Session: Jan 19 – May 19 | Faculty: Bhavna Saini | Class: BCA VI

A. **Introduction:** This course is offered by Department of Computer Application as a Compulsory, targeting students who wish to learn Soft Computing techniques or pursue higher studies in field of Soft Computing. Offers in depth knowledge of classification and clustering techniques and gives an introductory level knowledge on Neural Network and feature extraction, measurement devices and alternative fuels. Students are expected to have background knowledge of Database Management System.

B. **Course Outcomes:** At the end of the course, students will be able to
    [1605.1]. Describe the importance of Pattern recognition for better employability.
    [1605.2]. Identify the types of data present in data sets and perform suitable analysis on it.
    [1605.3]. Analyse, compare and apply various classification techniques based on the various domain.
    [1605.4]. Analyse, compare and apply various clustering techniques based on the various domain.
    [1605.5]. Describe various feature extraction techniques.

C. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

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

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

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

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

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

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

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

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

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

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

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

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

[PSO.1]. Clarity on both conceptual and application-oriented skills of IT Applications in Business context.

[PSO.2]. To develop and manage policies related to organizations' IT systems.

[PSO.3]. In-depth knowledge & sustained learning leading to innovation & research to fulfil global interest.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I (Open Book)	20
	Sessional Exam II (Open Book)	20
	Inclass 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.	

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 BOOKS

1. R.O.Duda, P.E.Hart and D.G.Stork, Pattern Classification, John Wiley, 2001.

G. REFERENCE BOOKS

1. *Statistical pattern Recognition; K. Fukunaga; Academic Press, 2000.*
2. *S.Theodoridis and K.Koutroumbas, Pattern Recognition, 4th Ed., Academic Press, 2009.*

LECTURE PLAN

LCE NO	TOPICS
1	What is pattern recognition?
2	Clustering vs. Classification
3	Applications
4, 5	Linear Algebra, vector spaces, probability theory, estimation techniques.
6, 7	Bayes decision rule
8	Error probability, Error rate,
9, 10	Minimum distance classifier, Mahalanobis distance;
11	K-NN Classifier
12	Linear discriminant functions and Non-linear decision boundaries.
12	Fisher's LDA
14	Single and Multilayer perceptron
15	training set and test sets,
16	standardization and normalization.
17, 18	**CLUSTERING**: Different distance functions and similarity Measures
19	Minimum within cluster distance criterion
20	K-means clustering
21	DBSCAN
22, 23	single linkage and complete linkage clustering,
24	MST, medoids
25, 26	Visualization of datasets, existence of unique clusters or no clusters.
27, 28	**FEATURE SELECTION**: Problem statement and Uses
29, 30	Probabilistic separability based criterion functions
31, 32	interclass distance based criterion functions
33	Branch and bound algorithm
34	sequential forward/backward selection algorithms
35	(l,r) algorithm
36, 37	**FEATURE EXTRACTION**: PCA, Kernel PCA
38, 39	Recent advances in PR
40	Structural PR
41	SVMs

42	, FCM
43, 44, 45	Soft-computing and Neuro-fuzzy.

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

CO	STATEMENT	CORRELATION WITH PROGRAM OUTCOMES												CORRELATION WITH PROGRAM SPECIFIC UTCOMES		
		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
AU 1492.1	Describe the effects of pollution on environment engine operation, gas turbine pollution, global warming.	3							1							
AU 1492.2	Interpret and illustrate the formation of different pollutants based on different operating and design parameters		2	2								2				
AU 1492.3	Experiment different fuels on engine, analyse formation of pollutants, calculate engine performance and modify different operating parameters to control those emissions.				2	2										
AU 1492.4	Recognize different emission control techniques and judge the best way to achieve overall emission control for a specific engine						2		2	3						
AU 1492.5	Recall different commercial testing procedures for different types of vehicles, chose and test emissions in an automobile for Indian driving cycle			1						1	1					

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