Gandhi Institute for Technology (GIFT),
(Autonomous)
BHUBANESWAR

Curriculum and Syllabus

2 Yrs. Master in Computer Application (MCA)

from the Admission Batch

2023-24
Gandhi institute For Technology (GIFT), Autonomous

Evaluation process

1. Evaluation Process of Theory Subjects:

Components	Marks	Frequency	Assigned To
Quiz Test	5	2	Concerned Faculty
Surprise Test	5	2	Concerned Faculty
Assignment	5	2	Concerned Faculty
Attendance	5	Closing of Instruction	To be retrieved from CMS
Mini Project	10	1 (Before Closing of Instruction)	Concerned Faculty
Mid-Semester Examination	20	1	Examination Cell
End-Semester Examination	100	1	Examination Cell
Total	**150**		

2. Evaluation Process of Practical Subjects:

Components	Marks	Frequency	Assigned To
Attendance	10	Closing of Instruction	To be retrieved from CMS
Daily Performance & Viva-voce	40	On the day of Experiment	Concerned Faculty (Upload in CMS in weeklybasis)
Lab Record	20	On the day of Experiment	Concerned Faculty
End-Semester Lab Test	30	1	At the end of the semester as per the schedulepublished by Examination Cell
Total	**100**		

3. Evaluation Process of Skill Courses:

Components	Marks	Frequency	Assigned To
End-Semester Examination	100	1	Examination Cell/ Concerned Faculty
Total	**100**		

4. Evaluation Process of Mandatory Courses:

Components	Marks	Frequency	Assigned To
In-Semester Evaluation	100	1	Examination Cell/ Concerned Faculty
Total	**100**		

FIRST YEAR
MCA SYLLABUS

First Semester MCA Admission Batch- 2023-24

MCA SYLLABUS- (Batch--2023-24) FIRST YEAR

FIRST SEMESTER

Sl. No.	Category	Course Code	Course Title	L-T-P	Credit
1	BS	MC-T-BS-101	Discrete Mathematics & Graph Theory	3-0-0	3
2	PC	MC-T-PC-102	Problem Solving Using C	2-0-0	3
3	PC	MC-T-PC-103	Computer Organization & Architecture	3-0-0	3
4	PC	MC-T-PC-104	Database Management Systems	3-0-0	3
5	SC	MC-T-SC-105	EET-1	1-0-0	1
6	PC	MC-T-PC-106	Data Structures	3-0-0	3
Total Credit (Theory)					**16**
Practical					
1	PC	MC-P-PC-102	Data Structures Using C Lab	0-0-3	2
2	PC	MC-P-PC-103	COA Lab	0-0-3	1.5
3	PC	MC-P-PC-104	Database Management Systems Lab	0-0-3	1.5
4	MC	MC-P-MC-107	IT & IS (Information Technology & Information System)	0-0-2	1
5	PS	MC-P-PS-108	Project-I	0-0-2	2
6	HS	MC-P-HS-119	Professional Communication Skills	0-0-2	2
Total Credit (Practical)					**10**
Total Semester Credit					**26**

SECOND SEMESTER

Sl. No.	Category	Course Code	Course Title	L-T-P	Credit
1	BS	MC-T-BS-201	Computer Graphics	3-0-0	3
2	PC	MC-T-PC-202	Object Oriented Programming using Java	3-0-0	3
3	PC	MC-T-PC-203	Internet & Web Technology	3-0-0	3
4	PC	MC-T-PC-204	Design and Analysis of Algorithms	3-0-0	3
5	SC	MC-T-SC-205	EET-2	1-0-0	1
6	OO	MC-T-OO-206	Operating Systems (NPTEL)	0-1-0	3
Total Credit (Theory)					**16**
Practical					
1	PC	MC-P-PC-202	Object Oriented Programming using Java Lab	0-0-3	2
2	PC	MC-P-PC-203	Web Technology Development Lab	0-0-3	1.5
3	PC	MC-P-PC-204	Design and Analysis of Algorithm Lab	0-0-3	1.5
4	PS	MC-P-PS-207	Project-II	0-0-2	2
Total Credit (Practical)					**7**
Total Semester Credit					**23**

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FIRST SEMESTER

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Type	Code	DISCRETE MATHEMATICS	L-T-P	Credits	Marks
BS	MC-T-BS-101		3-0-0	3	100

COURSE OUTCOMES

Students will be able to

CO.1	Understand mathematical logic and predicates.
CO.2	Explain set theory, functions and algebraic structures.
CO.3	Demonstrate the ability to describe computer programs using Recursive Functions.
CO.4	Apply basic Counting techniques to solve Combinatorial Problems.
CO.5	Utilize generating functions and substitutions to solve recurrence relations.
CO.6	Demonstrate the Graphs and Trees as tools to visualize and simplify situations.

Module-I (12 Hours)

Statements and Notations - Connectives - Well-formed Formulas - Truth Tables - Tautology - Equivalence Implication.

Logic - Methods of proofs (Equivalence - Converse - Inverse - Contra-positive - and Contradiction - Direct Proofs - Disproving by Counter Example - Proof by Contradiction - Method of Induction) .

Prepositional calculus -Predicative Logic – Existential Quantifiers - Universal Quantifiers - Free & Bound Variables.

Module-II (8 Hours)

Relations: Relations and their properties, and its applications, representing relations, closure of relations, Warshall's algorithm, equivalence of relations, partial orderings.

Module-III (06 Hours)

Sequences and Summation, recurrence relations, solving recurrence relations

Lattice theory: Lattices and algebras systems, principles of duality, basic properties of algebraic systems defined by lattices, distributive and complimented lattices, and Boolean algebras (CNF & DNF only)

Module-IV (08Hours)

Algebraic Structures-Algebraic Systems-Properties with Examples-Semi Groups-Monoids-Groups and Subgroup with Examples (Basic Concepts), isomorphism, and normal subgroups, rings (basics only),

Module-V (06 Hours)

Definition-Representation of Graph-Matrix Representation (Incident and Adjacent Matrices) -Sub-graphs. Planar Graphs - Isomorphism - Multi-graphs - Cut Sets (Vertices & Edges) - Euler Circuit and Hamiltonian Cycle - Chromatic Number.

Text Books:

1. K.H. Rosen, "Discrete Mathematics and its application", 7th edition, Tata McGraw Hill Publication
2. J. L. Mott, A. Kandel & T. P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians,

Prentice Hall India, 2nd Edition, 2009.
3. C. L. Liu, D.P. Mohapatra, "Elements of Discrete Mathematics- A Computer Oriented Approach", 4th Edition, Tata McGraw Hill, 2013.

Reference Books:
1. Tremblay J.P. and P. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGrawHill, 1997.
2. D. P. Acharjya, Sreekumar "Fundamental Approach to Discrete Mathematics", New Age Publisher
3. Seymour Lipschutz and Marc Lipson, Discrete Mathematics, Revised 3rd Edition, Schaum's Outline Series, Tata McGraw Hill, New Delhi, 2009.

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	2	3	2							3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3	2							3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Type	Code	PROBLEM SOLVING USING C	L-T-P	Credits	Marks
PC	MC-T-PC-102		3-0-0	3	100

COURSE OUTCOMES:

Students will be able to

CO.1	Basic of C Programming Using Data Types.
CO.2	Develop conditional and iterative statements to write C programs.
CO.3	Exercise user defined functions and pointers to solve real time problems.
CO.4	Inscribe C programs to access arrays, strings and functions.
CO.5	Exercise user defined data types including structures and unions to handle files.
CO.6	Explain basic operations of Sorting and Searching Techniques.

MODULE – I (8 Hours)

Algorithm, Representation of Algorithm: Flowchart/Pseudo-code with examples. From algorithms to programs; C Program source code, C Program structure, basic syntax, data types, variables, constants, storage class, syntax and logical errors in compilation, object and executable code, Arithmetic expressions, operators and precedence.

MODULE – II (8 Hours)

Decision making: Conditional Branching, if statement, if else statement, nested if else statement, switch, nested switch statements, Iteration and loops, break, continue, Decision making Application in solving real life problems.

MODULE – III (8 Hours)

Arrays: Arrays (1-D, 2-D), initialization, Accessing Array Elements, Matrix applications, Character arrays and Strings, Pointers, Pointer arithmetic, dynamic memory allocation, pointer to array and array of pointers Linear Search, Bubble Sort

MODULE – IV (8 Hours)

Functions, Parameter passing in functions, call by value, idea of call by reference, recursion with examples of Finding Factorial, Fibonacci series, and passing arrays to functions, nested function, local and global variables, static variables.

MODULE – V (8 Hours)

Structures, Array of structures, union, structure vs union, passing structure to function, File handling: ASCII and binary Files.

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Text Books:
1. E. Balagurusamy, Programming in ANSI C, 8th Edition, Tata McGraw Hill, 2019.
2. M. Tanenbaum, Data Structures using C & C++, Prentice-Hall of India Pvt. Ltd.
3. Herbert Schild, C: Omplete Reference, Tata McGraw Hill

Reference Books:
1. A.K.Rath and A. K. Jagadev, "Data Structures and Program Design using C", 2nd Edition, Scitech Publications, 2011.
2. Bruno R Preiss, "Data Structures and Algorithms with Object Oriented Design Pattern in C++", John Wiley & Sons, Inc., 1999.
3. Horowitz and Sahani, "Fundamentals of Data Structures", Galgotia Publication Pvt. Ltd
4. Yashavant Kanetkar, Let Us C, 17th Edition, BPB Publications New Delhi, 2019

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		2	3	3	2							3	3	2	1
CO.2		3	3	3	2							3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	2	2							3	2	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

First Semester MCA Admission Batch- 2023-24

Type	Code	Computer Organization and Architecture	L-T-P	Credits	Marks
PC	MC-T-PC-103		3-1-0	3	100

COURSE OUTCOMES:

Students will be able to

CO.1	Identify various components of computer and their interconnection
CO.2	Identify basic components and design of the CPU: the ALU and control unit.
CO.3	Compare and select various Memory devices as per requirement.
CO.4	Illustrate the various types of IO mapping techniques
CO.5	Understand the fundamentals of Microprocessors and microcontroller.
CO.6	Implementation of 8086 microprocessor.

MODULE – I (10 Hours)
Data and number representation- binary-complement representation, BCD-ASCII, conversion of numbers from one Number system to the other, (r-1)'s & r's complement representation. Weighted and Unweighted Codes – Gray Code, Excess 3 Code, Binary Arithmetic, Floating Point Numbers. Fundamentals of Boolean Algebra, Logic gates (AND, OR, NOT, XOR, NAND, NOR) MINTERM, MAXTERM, truth table, Boolean expression, simplification, Boolean Algebra, K-map up-to 4 variable, Canonical Forms.

MODULE – II (12 Hours)
Combinational Circuits: Adder, subtractor, BCD adder, multiplexer, De-multiplexer, encoder, decoder : Sequential Circuits:- Flip-Flop (SR, JK, D, T, Master-slave), decade counter, mod-n-counter, Synchronous counter—ring counter, Johnson's count, Up down counter, Register.

Module-III (08 Hours)
BASIC COMPUTER ORGANIZATION AND DESIGN: Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt. Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC. MICRO-PROGRAMMED CONTROL: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.

Module-IV (08 Hours)
MEMORY SYSTEM: Memory Hierarchy, Semiconductor Memories, RAM (Random Access Memory), Read Only Memory (ROM), Cache Memory, Virtual memory. INPUT OUTPUT: I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA.MULTIPROCESSORS: Characteristics of multiprocessors, Interconnection structures, Inter Processor Arbitration.

Module-V (08 Hours)
Introduction to 8 bit and 16 bit Microprocessors-H/W architecture:
Introduction to microprocessor, computer and its organization, Programming system; Address bus, data bus and control bus, Tristate bus; clock generation; Connecting Microprocessor to I/O devices;

Data transfer schemes; Architectural advancements of microprocessors. Introductory System design using microprocessors; 8086 – Hardware Architecture; External memory addressing; Bus cycles; some important Companion Chips; Maximum mode bus cycle; 8086 system configurations; Memory Interfacing; Minimum mode system configuration, Interrupt processing.
Introduction to 8051 Micro-Controllers, Architecture; Memory Organization; Special Function register; Port Operation; Memory Interfacing, I/O Interfacing

Textbook:
1. Computer Organization, V. Carl Hamacher, Zvonko G. Vranesic, Safwat G. Zaky, Jan 1, 1978,
2. Computer architecture and parallel processing ,Book by Fayé A. Briggs and Kai Hwang
3. Computer System Architecture Book by M. Morris Mano

Reference book:
1. Computer Organization and Design: The Hardware/Software Interface: Third Edition Book by David A Patterson and John L. Hennessy
2. Computer Architecture and Parallel Processing by Kai Hwang and Faye A. Briggs

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Type	Code	DATABASE MANAGEMENT SYSTEMS	L-T-P	Credits	Marks
PC	MC-T-PC-104		3-0-0	3	100

COURSE OUTCOMES:

Students will be able to

CO.1	Understand data models to design a database.
CO.2	Illustrate the conceptual design for large enterprises.
CO.3	Formulate SQL queries and integrity constraints over relations.
CO.4	Apply normalization on database for eliminating redundancy.
CO.5	Summarize transaction properties, concurrency control and recovery techniques.
CO.6	Explain various data storage and security mechanisms.

Module -I (06 Hours)

Introduction to DBMS: concept and overview of DBMS, Types of DBMS, data models, DB languages, DB users and Administrator, 3-schema architecture of DBMS, data independence, EF Codd Rule.

Module -II (06 Hours)

ER Model: basic concepts, design issues, keys, ER diagram, Weak entity sets, Extended ER features. Relational model: structure of relational model, Relational algebra, Extended relational algebra Operations.

Module – III (08 Hours)

Relational database design: Properties of Relational Decomposition, Functional Dependency, Anomalies in designing DB, Normalization using FDs, various Normal forms-1NF, 2NF, 3NF, BCNF, 4NF, 5NF.

Module-IV (10 Hours)

SQL and Integrity Constraints: Concepts of DDL, DML, DCL, various SQL operations: set operations, aggregate functions, constraints, view, nested sub-queries, PL/SQL, cursor, trigger.

Module – V (10 Hours)

Internals of RDBMS: Query optimization, various optimization algorithms, Transaction processing, concurrency control and recovery management.
Emerging Database Technologies and Applications: Distributed Database, Data warehousing and Data mining. Mobile Data Management, Geographical Information Systems (GIS), Genomic Databases.

Text Books:
1. Korth, Silverschatz, Abraham, "Database system concepts", Tata McGraw Hill Publication
2. R.Elmasri, S.B Navathe, "Fundamentals of Database System", Adision Wesley Publishing

Reference Books:
1. Er.Rajiv chopra, "Database management systems, A Practical Approach", S.Chand Publishing
2. Ramkrishna, "Database management systems", Tata McGraw Hill Publication

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Type	Code	EET-1	L-T-P	Credits	Marks
SC	MC-T-SC-105		1-0-0	1	50

COURSE OUTCOMES:

Students will be able to

CO.1	Able to clear campus selection process.
CO.2	Develop an attitude of constant self-improvement.
CO.3	To increase the self-confidence to attain the employability.
CO.4	Develop the aptitude and reasoning skill.
CO.5	Able to demonstrate as well as lead the team.
CO.6	Able to develop overall programming skill and communication skill as well.

Total   Hours-40

Hrs

Module-I: **10 Hrs**
Quantitative Aptitude: Number system, Percentage and application, SI and CI, Profit and Loss, Ratio and Proportion, Average and Allegation, Mixture and Solution.

Module-II: **10 Hrs**
Quantitative Aptitude: Time –Speed-Distance, Time and Work, Function and equation Series and Progression, Trigonometric.

Module-III: **10 Hrs**
Logical Reasoning: Arrangement based problem, Blood relation problem, Deductive Logic, Data Interpretation, Age related problem Coding and Decoding Problems.

Module-IV: **10 Hrs**
Verbal ability: Sentence correction, Grammar, Para jumbles, Idioms and Phases, Syllogisms and Deductive logic.

Books:
1. Quantitative Aptitude by Dr.R.S. Aggarwal, S.Chand
2. Verbal and Non-verbal reasoning by Dr.R.S.Aggarwal

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

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Type	Code	Data Structures	L-T-P	Credits	Marks
PC	MC-T-PC-106		3-1-0	3	100

COURSE OUTCOMES:

Students will be able to

CO.1	Understand the concept of Dynamic memory management, data types, algorithms, Big O notation.
CO.2	Understand basic data structures such as arrays, linked lists, stacks and queues.
CO.3	Describe the hash function and concepts of collision and its resolution methods.
CO.4	Solve problem involving graphs, trees and heaps
CO.5	Implement to solve searching and sorting related problems.
CO.6	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data

MODULE- I: (10 Hrs)
Fundamentals: Introduction to Data Structures, Classification of Data Structures, Algorithms, Measuring Space and Time Complexities, Asymptotic Notations, Abstract Data types.
Arrays: Storage Structures for Arrays, Sparse Matrixes, Strings, Pattern Matching.
Linked Lists: Dynamic Memory Management, Single Linked Lists, Double Linked Lists, Circular Linked Lists, Operations on Polynomials.

MODULE- II: (06 Hrs)
Stacks and Queues: Representation, Linked Stacks and Queues, Operations on Stacks and Queues, Applications of Stack and Queues.

MODULE- III: (10 Hrs)
Trees: Terminology, Representation, Binary Trees, Binary Search Trees, Searching, Insertion and Deletions Operations in a Binary Search Tree, Height Balanced Trees, M-way Search Trees, B-Trees, B+ Trees, General Trees, Representation of General Trees and Binary Trees, Forests, Application of Trees.

MODULE- IV: (10 Hrs)
Graphs: Terminology, Representation, Path Matrix, Graph Traversal, Shortest Path Problems, Topological Sort. Searching and Sorting Techniques: Linear and Binary Search, Bubble Sort, Insertion Sort, Selection Sort, Quick Sort, Merge Sort, Heap and Heap Sort, Radix Sort, Comparison of Sorting Techniques.

MODULE- V: (04 Hrs)
Hashing: Hash Functions and Hashing Techniques. External sorting, Implementation using programming in C.

Text Book
1. Data Structures Using C - Aaron M. Tenenbaum
2. Tremblay, Jean-Paul, and Paul G. Sorenson, "An introduction to data structures with applications", McGraw-Hill, Inc., 1984.

Reference Books
1. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Second Edition, 2008, Universities Press Pvt. Ltd. Hyderabad.
2. Seymour, Lipchitz. "Data Structures with C."TMH (2010)

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Type	Code	DATA STRUCTURES USING C LAB	L-T-P	Credits	Marks
PC	MC-P-PC-102		0-0-3	2	100

COURSE OUTCOMES:

Students will be able to

CO.1	Basic of C Programming Using Data Types.
CO.2	Develop conditional and iterative statements to write C programs.
CO.3	Exercise user defined functions and pointers to solve real time problems.
CO.4	Inscribe C programs to access arrays, strings and functions.
CO.5	Exercise user defined data types including structures and unions to handle files.
CO.6	Explain basic operations of Sorting and Searching Techniques.

LIST OF EXPERIMENTS:

1. Familiarity with basic UNIX/LINUX command, vi editor.

2. Programs on arithmetic expressions, operators, and precedence.

3. Programs on Conditional Branching.

4. Programs on Loops.

5. Programs on single dimensional array.

6. Programs on two-dimensional array.

7. Programs on Functions.

8. Programs on Recursive Functions.

9. Programs on Pointers.

10. Programs on Dynamic Memory Allocation.

11. Programs on Structure.

12. Programs on Union.

13. Programs on File Handling.

14. Implementation of Linear and Binary Search.

15. Implementation of sorting algorithms: Bubble Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort using recursion.

Reading Material (s)

Programming using C Lab Manual, Department of CSE, GIFT, Bhubaneswar

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Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Type	Code	COMPUTER ORGANIZATION AND ARCHITECTURE LAB	L-T-P	Credits	Marks
PC	MC-P-PC-103		0-0-3	1.5	100

COURSE OUTCOMES:

Students will be able to

CO.1	Identifying various components of PC.
CO.2	Identifying the different types of printers.
CO.3	Design and verify the Logic Gates.
CO.4	Design and verify combinational circuits using basic gates.
CO.5	Design and verify various flip-flops.
CO.6	Understand and apply the fundamentals of assembly level programming.

LIST OF EXPERIMENTS:

1. Study of peripherals, components of a Computer System.

2. Assembling and Disassembling of a PC.

3. Study of motherboard and Installation

4. Study of different type of printer

5. Study and verify truth tables of basic gates.

6. Implementing Half adder and Full adder using basic logic gates.

7. Verify the excitation tables of various FLIP-FLOPS.

8. Programs for 16-bit arithmetic operations using 8086.

9. Programs for Sorting and Searching (Using 8086).

10. Programming using Arithmetic, Logical and Bit Manipulation instructions of 8051 microcontroller

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

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Type	Code	DATABASE MANAGEMENT SYSTEMS LAB	L-T-P	Credits	Marks
PC	MC-P-PC-104		0-0-3	1.5	100

COURSE OUTCOMES:

Students will be able to

CO.1	Illustrate ER model and identify the roles and privileges of various users in a database.
CO.2	Apply common SQL statements (including DDL, DML and DCL) to perform different operations.
CO.3	Construct SQL Queries for various operations on database.
CO.4	Interpret Embedded and Nested Queries.
CO.5	Implement control statements in PL/SQL.
CO.6	Apply triggers and assertions to stop malicious operations on tables

LIST OF EXPERIMENTS:

1. Execute a single line and group functions for a table.

2. Execute DCL and TCL Commands.

3. Create and manipulate various DB objects for a table.

4. Create views, partitions and locks for a particular DB

5. Write PL/SQL procedure for an application using exception handling

6. Write PL/SQL procedure for an application using cursors.

7. Write a DBMS program to prepare reports for an application using functions.

8. Write a PL/SQL block for transaction operations of a typical application using triggers.

9. Write a PL/SQL block for transaction operations of a typical application using package.

10. Design and develop an application using any front end and back-end tool (make use of ER diagram and DFD).

11. Create table for various relation.

12. Implement the query in sql for a) insertion b) retrieval c) updating d) deletion.

13. Creating Views

14. Writing Assertion

15. Writing Triggers

16. Implementing operation on relation using PL/SQL

17. Creating Forms

18. Generating Reports

Reading Material (s)
Database Management Systems Lab Manual, Department of CSE, GIFT, Bhubaneswar

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

First Semester MCA Admission Batch- 2023-24

sType	Code	IT & IS (INFORMATION TECHNOLOGY & INFORMATION SYSTEM)	L-T-P	Credits	Marks
MC	MC-P-MC-107		0-0-2	1	100

COURSE OUTCOMES:

Students will be able to

CO.1	To give basic fundamental concept about computer system.
CO.2	To get familiar with MS Windows.
CO.3	To get hands on expertise in MS Office.
CO.4	Able to solve problems systematically using MS excel.
CO.5	Able to design professional presentation using MS PowerPoint.
CO.6	Able to manage the information in computer system

Experiment-1   Introduction Windows OS, OS Commands and operations, Introduction to MS 2 Hours Office

Experiment-2   MS-Word: Create, open, save, print command of file. Home tab: Edit texts, 2 Hours Format text, Paragraph setting and apply styles.

Experiment-3   MS-WORD: Insert tab: Cover page, blank page, page break, table, picture, clip 2 Hours art.

Experiment-4   MS-WORD: Insert tab: shape, chart, hyperlink, header and footer, textbox, 2 Hours word art, equation and symbols.

Experiment-5   MS-WORD: Mailing tab : Mail merge, Page Layout tab: margin, orientation, 2 Hours size, columns, watermark, page color, page border, Review tab: spelling and grammar checking, Thesaurus.

Experiment-6   MS-EXCEL: Create workbook, Home tab, Insert tab : Table, picture, Clip art, 2 Hours Shapes, Charts, Hyperlink, Textbox, Word Art.

Experiment-7   MS-EXCEL: Page Layout tab : Margin, Orientation, Paper size, print area, 2 Hours Background

Experiment-8   MS-EXCEL: Formulas tab : Auto sum(sum, average, count numbers, max, 2 Hours min), Insert Function(if, sum if, count if, average if, max if, min if)

Experiment-9   MS-EXCEL: Data Tab: Sort and filter, Text to column, Remove Duplicate, Data 2 Hours Validation, Group.

Experiment-10   MS-POWER POINT: Create file, Home tab, Insert new slide, change layout, 2 Hours Insert tab : Table, picture, Clip art, Shapes, Charts, Hyperlink, Textbox, Word Art, Header Footer, movie, sound.

Experiment-11   MS-POWERPOINT: Design tab : Theme, color, font, background style. 2 Hours Animation Tab: Custom animation, Transition(style, sound, speed), Slide show.

Experiment-12   MS-ACCESS: Overview, Home Tab: Views, Records, Sort & Filter Create 2 Hours Tab: Create new Table,

Experiment-13   MS-ACCESS: Table: Template, Table Design, Insert data. External Data Tab: 2 Hours Import, Export

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EXPERIMENT BEYOND SYLLABUS

Experiment-14   Create a resume using MS-Word. Create a table named Student Mark Entry to2 Hours enter roll no, name, mark of 6 subjects. Enter total and average mark.

Experiment-15   Create a datasheet contains 100 student information using MS-Excel. Create a2 Hours column chart named Student Mark Graph that contains name, mark of 6 subjects for five students.

Reading Material (s)

IT & IS Lab Manual, Department of CSE, GIFT, Bhubaneswar

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

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Type	Code	INDICATIVE PROJECT LAB (PROJECT-I)	L-T-P	Credits	Marks
PS	MC-P-PS-108		0-0-2	2	50

COURSE OUTCOMES:

Students will be able to

CO.1	Students will be able to do understand the concept of sensors, Arduino.
CO.2	Should be able to formulate the problem with proper diagnosis.
CO.3	Able to learn the parts of Arduino system and their assembling program.
CO.4	Interpret Embedded coding to interact with hardware.
CO.5	Apply new ideas to solve one problem in various ways.
CO.6	Apply and learn to make product with sensor feasibility.

MODULE – I (8 Hours)
Arduino Programming – Introduction to Sensors, Introduction to Microcontrollers.
Arduino: Introduction, Pin Configuration, Installation of software and Programing, Serial Communication.

MODULE – II (12 Hours)
Project Work: Implementation of Sensors & Microcontroller Programing using Arduino.
(Group Activity: 2 students per Group, any 3 projects have to be completed by each group)

Sample Projects:

- ➢ Obstacle detection using Arduino
- ➢ Controlling 4 LEDs to make different patterns
- ➢ Voice Activation System
- ➢ Use Humidity Sensor using Arduino
- ➢ Arduino Based Color Detector
- ➢ Touch Dimmer Switch Circuit Using Arduino
- ➢ Wireless Door Bell
- ➢ Arduino Traffic Light Controller
- ➢ Frequency Counter Using Arduino
- ➢ Arduino 4-Digit 7-Segment LED Display
- ➢ Arduino based Digital Thermometer
- ➢ Arduino Light Sensor
- ➢ Portable Ultrasonic Range Meter

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- ➢ Security Alarm System Using Arduino
- ➢ Arduino Alarm Clock
- ➢ Interfacing LCD with Arduino

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Type	Code	**PROFESSIONAL COMMUNICATION SKILLS**	L-T-P	Credits	Marks
HS	MC-P-HS-119		0-0-2	2	100

COURSE OUTCOMES:

Students will be able to

CO.1	Define the fundamentals of communication Skills in general.
CO.2	Compose speech clearly on a specific topic using appropriate language in informal discussions.
CO.3	Explain the implicit and explicit meanings of a text while reading.
CO.4	Develop learners' communicative ability through frequent exchange of ideas and discussions.
CO.5	Evaluate the concepts of verbal and non-verbal cues for professional communication
CO.6	Create the techniques of Information Transfer through presentation.

Sl No	LS	Name of the Activity
1	S1	ROLE PLAY ON NEGOTIATION SKILLS
2	S2	WELCOME & FAREWELL SPEECH
3	W1	REPORTING AN EVENT
4	L1	LISTENING
5	S3	DEBATE
6	S4	GROUP DISCUSSION
7	W2	E MAIL WRITING
8	R1	READING COMPREHENSION
9	W3	FORMAL LETTERS
10	W4	CV WRITING
11	S5	PERSONAL INTERVIEW
12	W5	PREPARING AGENDA & MINUTES
13	S6	BUSINESS PRESENTATION
14	AlL	FINAL LAB. EXAM

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

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SECOND SEMESTER

Type	Code	Computer Graphics	L-T-P	Credits	Marks
PC	MC-T-PC-201		3-0-0	3	100

COURSE OUTCOMES:

Students will be able to

CO.1	Know and be able to discuss hardware system architecture for computer graphics. This includes, but is not limited to graphics pipeline, frame buffers.
CO.2	Know and be able to design and implement model and viewing transformations, the graphics pipeline and an interactive render loop with a 2D and 3D graphics API.
CO.3	Know and be able to use the underlying algorithms, mathematical concepts, supporting computer graphics.
CO.4	Know and be able to select and use among models for lighting/shading.
CO.5	Know and be able to use and select among current models for surfaces.
CO.6	Be able to discuss the application of computer graphics concepts in the development of computer games, information visualization, and future scope of computer graphics.

MODULE – I (10 Hours)
Graphics devices: Input devices and output devices (Cathode Ray Tube, , CRTs for Color Display, Beam Penetration CRT, The Shadow - Mask CRT, Direct View Storage Tube, Tablets, The light Pen) , Raster-Scan and Random Scan Systems and others.
Output Primitives: Line drawing Algorithms: DDA and Brenham's Line   Algorithm, Circle drawing Algorithms: Midpoint Circle Algorithm and Bresenham's Circle drawing Algorithm and ellipse drawing Algorithms
Polygon drawing: Representation of polygon, different techniques for polygon drawing ,Filled area primitives(Bounday fill,flood fill,polygon fill).

MODULE – II (08 Hours)
TWO DIMENSIONAL TRANSFORMATIONS: Scaling, Rotation, Translation, Shearing, Reflection, Homogeneous coordinates, Composite Transformations and their representation Transformation between coordinate systems.
2D VIEWING: Viewing pipeline, Window-to-viewport transformation, 2-D Clipping, point clipping ,line clipping (Chen-Sutherland Line Clipping, Mid-point subdivision algorithm, Liang-Barsky clipping, Cyrus-Beck line clipping); Polygon Clipping: Sutherland-Hodgeman and Weiler-Atherton.

MODULE-III (08 Hours)
THREE DIMENSIONAL TRANSFORMATIONS: Scaling, Rotation, Translation, Shearing, Reflection ,Homogeneous coordinates, Composite Transformations and their representation Transformation between coordinate systems. :
3D VIEWING: Viewing pipeline, viewing coordinates, projection ,Parallel Projection, Perspective Projection.clipping:view port clipping, clipping in homogeneous coordinates .**MODULE-IV (10 Hours)**
Basics of the permutation & combination, Probability: Sample Space, Probability, Conditional Probability, Independent Events, Random variables, Probability distributions, Expectations, Mean and variance.

MODULE-IV (08 Hours)
Curves and Surfaces: Cubic splines, Bezier curves, B-splines, Fractal curves and surfaces, Hidden line/surface removal methods.
VISIBLE SURFACE DETECTION METHODS: Back-face detection, depth- buffer, A-buffer, Z- buffer , scan-line
ILLUMINATION MODEL:Displaying light intensities,Ambient light,Look up tables,halftone patterns and dithering techniques
POLYGON RENDERING METHODS: Gouraud shading, Phong shading, Introduction to Ray-tracing.

MODULE-V: (**06 Hrs**)
COLOR MODELS : XYZ color model, RGB color model ,YIQ color model ,CMY color model,color selection and application.
COMPUTER ANIMATION: Types of Animation, Key frame Vs. Procedural Animation, Methods of Controlling Animation, Morphing. Introduction to Virtual Reality and Augmented Reality.

Text Book:

1. Donald Hearn, M. Pauline Baker, *Computer Graphics*, 2nd edition, C version, Prentice Hall, 1996.
2. James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes, *Computer Graphics : Principles & Practices*, Addison Wesley Longman, 2nd edition in C, 1994

Book of Reference:

1. Computer Graphics, Foley and van Dam, Person Education
2. Procedural Methods for computer graphics, Rogers, TMH
3. Computer Graphics with virtual reality systems, R. K. Maurya, Wiley-India
4. Computer Graphics, Sinha & Udai, TMH

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

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Type	Code	**Object Oriented Programming using JAVA**	L-T-P	Credits	Marks
PC	MC-T-PC-202		3-0-0	3	100

COURSE OUTCOMES:

Students will be able to

CO.1	Understand the benefit of a well-structured program.
CO.2	Understand different computer programming paradigms.
CO.3	Understand underlying principles of object-oriented programming in JAVA.
CO.4	Develop problem solving and programming skills using OOP concepts.
CO.5	Apply the concept of multi-threading, inheritance and Exception Handling.
CO.6	Develop the ability to solve real world problems through software development in high level programming language like JAVA.

MODULE – I (8 Hours)
An introduction to programming, Different types of programming languages, Description of Compiler and Interpreter, Advantage of Object-Oriented Programming, Object Oriented Programming, Features of Object-Oriented Programming. Introduction to Java, History behind Java, Difference between C/C++ and Java, Features of Java, First Java Program, Prerequisites Before start writing a java program, Writing the program, Compiling the program, How Java Program compiles? Executing the program, How Java program executes? What is JVM and its Significance in executing a program? Architecture of JVM. Java Tokens, Datatypes, Operators, what are Operators? Different types of Operators, Typecasting, Control Structures and Arrays, Different types of control structures, Conditional Statements, Loops/ Iterators, Jumping Statements, Java Arrays, Multidimensional Arrays, Taking Input from keyboard, Command Line Arguments, Using Scanner Class, Using Buffered Reader class.

MODULE – II (12 Hours)
Introduction to Classes, Objects and Methods, Description of data hiding and data encapsulation, Constructors, Use of static Keyword in Java, Use of this Keyword in Java, Array of Objects, Concept of Access Modifiers (Public, Private, Protected, Default). Understanding Inheritance, Types of Inheritance and Java supported Inheritance, Significance of Inheritance, Constructor call in Inheritance, Use of super keyword in Java, Polymorphism, Understanding Polymorphism, Types of polymorphism, Significance of Polymorphism in Java, Method Overloading, Constructor Overloading, Method Overriding, Dynamic Method Dispatching. Introduction to different classes, String class, String Buffer, String Builder, String Tokenizer, Concept of Wrapper Classes, Introduction to wrapper classes, Different predefined wrapper classes, Predefined Constructors for the wrapper classes. Conversion of types from one type (Object) to another type (Primitive) and Vice versa, Concept of Auto boxing and unboxing. Basics of Data Abstraction, Understanding Abstract classes, Understanding Interfaces, Multiple Inheritance Using Interfaces, Packages,

Module-III (8 Hours)
Introduction to Packages, Java API Packages, User-Defined Packages, Accessing Packages, Error and Exception Handling, Introduction to error and exception, Types of exceptions and difference between the types, Runtime Stack Mechanism, Hierarchy of Exception classes, Default exception handling in Java,

User defined/Customized Exception Handling, understanding different keywords (try, catch, finally, throw, throws), User defined exception classes, commonly used Exceptions and their details. Introduction of multithreading/Multitasking, Ways to define a Thread in Java, Thread naming and Priorities, Thread execution prevention methods. (yield (), join (), sleep ()), Concept of Synchronization, Inter Thread Communication, Basics of Deadlock, Demon Thread, Improvement in Multithreading, Inner Classes, Introduction, Member inner class, Static inner class, Local inner class, Anonymous inner class.

Module-IV (10 Hours)
Instruction to IO Streams (java.io package), Byte Stream and Character Stream, Files and Random Access Files, Serialization, Collection Frame Work (java.util), Introduction, Util Package interfaces, List, Set, Map etc, List interfaces and its classes, Setter interfaces and its classes. Introduction to Applet, Introduction, Life Cycle of an Applet, GUI with an Applet, Abstract Window Toolkit (AWT), Introduction to GUI, Description of Components and Containers, Component/Container hierarchy, Understanding different Components/Container classes and their constructors, Event Handling, Different mechanisms of Event Handling, Listener Interfaces, Adapter classes.

Module-V (6 Hours)

Introduction Swing (JFC), Diff b/w awt and swing, Components Hierarchy, Panes, Individual Swings Components JLabel, JButton, JTextField, JTextArea. Introduction to JavaFX, Getting started with JavaFX, Graphics, User Interface Components, Effects, Animation, and Media, Application Logic, Interoperability, JavaFX Scene Builder 2, Getting Started with scene Builder. Working with scene Builder.

Text Book:
1. Herbert schildt (2010), The complete reference, 7th edition, Tata Mc graw Hill, New Delhi.
2. Head First Java, O'rielly publications 2. T. Budd (2009), An Introduction to Object Oriented Programming, 3rd edition, Pearson Education, India.

Reference Book:
1. Programming with Java, E. Balagurusamy, McGraw-Hill Education, 6th Edition.
2. Y. Daniel Liang (2010), Introduction to Java programming, 7th edition, Pearson education, India.
3. J. Nino, F. A. Hosch (2002), An Introduction to programming and OO design using Java, John Wiley & sons, New Jersey.

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

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Type	Code	Internet and Web Technology	L-T-P	Credits	Marks
PC	MC-T-PC-203		3-0-0	3	100

COURSE OUTCOMES:

Students will be able to

CO.1	Understanding the internet Architecture and html
CO.2	Design Image Map: Attributes, Client-Side Image Maps and Server-Side Maps. HTML Layout.
CO.3	Design Java Script and operator.
CO.4	Applying JavaScript (Properties and Methods of Each).
CO.5	Understanding the Server-Side Programming: Common Gateway Interface (CGI), Active Server Pages.
CO.6	To apply the client server chat or communication.

Module I (8 Periods):
Internet Architecture: Internet overview, evolution of internet. Internet components: Local Area Networks, Access Networks, Core Networks, Routers, Transmission infrastructure, ISPs. TCP/IP model, TCP/IP vs OSI model. HTML: HTML Overview, Structure of HTML Documents, Document Types, HTML Elements and attributes. Anchor Attributes, Image Tag and its attributes, Image and Anchors, Table.

Module II (8 Periods):
Image Map: Attributes, Client-Side Image Maps and Server-Side Maps. HTML Layout: Background, colors and text, Tables, Frames, Layers, Page content Division
CSS: Style Sheet Basic, Properties, Positioning with Style Sheet. Forms:
Elements, Form controls. Dynamic HTML.

Module III (8 Periods):
Java Script: Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security. Operators: Assignment Operators, Comparison Operators, Arithmetic Operators, Increment, Decrement, Unary Negation, Logical Operators, String Operators, Special Operators, Conditional operator, Comma operator, delete, new, this, void. Statements: Break, comment, continue, delete, do … while, export, for, for…in, function, if…else, import, labelled, return, switch, var, while.

Module IV (8 Periods):
JavaScript (Properties and Methods of Each): Array, Boolean, Date, Function, Math, Number, Object, String, regExp. Document and its associated objects, document, Link, Area, Anchor, Image, Applet, Layer. Events and Event Handlers: General Information about Events, Defining Event Handlers, event.

Module V (8 Periods):
Server-Side Programming: Common Gateway Interface (CGI), Active Server Pages. Internet applications: FTP, Telnet, Email, Chat. World Wide Web: HTTP protocol. Search Engines. E-commerce and security issues including symmetric and asymmetric key, encryption and digital signature, and authentication. Emerging trends, Internet telephony, and virtual reality over the web, etc. Intranet and extranet, firewall.

Text Book:

1. Computer Networking: A Top-Down Approach Featuring the Internet by Kurose and Ross, Pearson.
2. Web Design the Complete Reference by Thomas Powell, Tata McGrawHill.
3. HTML The Complete Reference by Thomas Powell, Tata McGrawHill.

Reference Book:
1. JavaScript the Complete Reference, Second Edition by Thomas Powell, Fritz Schneider. Tata McGrawHill

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

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Type	Code	Design and Analysis of Algorithms	L-T-P	Credits	Marks
PC	MC-T-PC-204		3-0-0	3	100

COURSE OUTCOMES:

Students will be able to

CO.1	Analyze the asymptotic performance of algorithms.
CO.2	Write rigorous correctness proofs for algorithms
CO.3	Demonstrate a familiarity with major algorithms and data structures.
CO.4	Apply important algorithmic design paradigms and methods of analysis.
CO.5	Synthesize efficient algorithms in common engineering design situations.
CO.6	To apply mathematical foundations, algorithmic principles, and computer science theory to the modeling and design of computer-based systems.

MODULE – I (06 Hours)
Notion of Algorithm : Growth of functions, Recurrences: The Master method, The Substitution method, The Iteration method, Asymptotic Notations and Basic Efficiency Classes (Use of Big O, θ, etc.) in analysis of algorithms, Mathematical Analysis of few Non-Recursive and Recursive Algorithms.

MODULE – II (10 Hours)
Sorting and Searching Techniques : Selection Sort, Bubble Sort, Insertion Sort, Sequential Search, Binary Search, Depth First Search and Breadth First Search, Balanced Search Trees, AVL Trees, Red-Black Trees, Heaps and Heap Sort, Disjoint Set and their Implementation, Divide and Conquer Paradigm of problem solving, Complexity analysis and understanding of Merge Sort, Quick Sort, Binary Search Trees.

Module-III (08 Hours)
Greedy Techniques: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's and Bellman Ford Algorithm, Huffman Trees, Knapsack problem.
Dynamic Programming Paradigm : Floyd-Warshall Algorithm, Optimal Binary Search trees, Matrix Chain Multiplication Problem, Longest Common Subsequence Problem, 0/1 Knapsack Problem, Maximum Network Flow Problem.

Module-IV (08 Hours)
String Matching Algorithms: Naive string matching algorithm, The Rabin-Karp Algorithm, string matching with Finite Automata, Knuth Morris Pratt string matching algorithm.
Backtracking: n-Queen's problem, Hamiltonian Circuit problem, Subset-Sum problem, State Space Search Tree for these problems

Module-V (08 Hours)
Branch and Bound: Travelling Salesman Problem and its State Space Search Tree.
Introduction to Computability: Polynomial-time verification, NP-Completeness and Reducibility, NP-Complete problems.
Approximation Algorithms: Vertex Cover Problem.

Text Books:
1. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, "Introduction to Algorithms", Third Edition, PHI Learning Private Limited, 2012.
2. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", Third Edition, Pearson Education, 2012.

Reference Books:
1. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, "Data Structures and Algorithms", Pearson Education, Reprint 2006.
2. Donald E. Knuth, "The Art of Computer Programming", Volumes 1& 3 Pearson Education, 2009.
3. http://nptel.ac.in/
4. "Fundamentals of Data Structures", Illustrated Edition by Ellis Horowitz, Sartaj Sahni, Computer Science Press.
5. Algorithms, Data Structures, and Problem Solving , Illustrated Edition by Mark Allen Weiss, Addison-Wesley Publishing Company

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Type	Code	EET-2	L-T-P	Credits	Marks
SC	MC-T-SC-205		1-0-0	1	50

COURSE OUTCOMES:

Students will be able to

CO.1	To improve habits, attitudes, preferences and experience.
CO.2	Identify their own potentials and accept their own limitations.
CO.3	Overcome their limitations and move towards self-esteem.
CO.4	Maximize self-potential in enabling a holistic development.
CO.5	Participate effectively in Group Discussions.
CO.6	To present their views in public, perform well in Personal.

MODULE – I (10 Hours)
Self – knowledge:
1. Exploring habits, attitudes, preferences and experience
2. becoming aware of strengths and weaknesses, talents and problems, emotions and ideas
3. Identifying the optimum means of improving personal performance
4. Identifying areas of expertise and use these to solve problems in new contexts
5. Knowing your ambitions, goals, and values
6. Understanding feelings and emotions: primary feelings and secondary feelings, Self-regulating emotions

MODULE – II (10 Hours)
Self-management:
1. IQ, EQ, SQ, MI
2. Understanding of life story
3. Focusing on Internal narratives
4. Managing change, confusion and uncertainty
5. Sharpening the Intellect
6. Schooling the mind
7. Socializing the individual

Module-III (10 Hours)
Introduction to Group Discussions (GD):
1. Mock GD 1
2. Mock GD 2.
Interview skills:
1. Preparing for interviews through mock interview session.
2. Writing a good and effective C.V. and SWOC presentation.

Module-IV (10 Hours)
Assertiveness and EI:
1. Theory inputs and activities.
2. Conducting Mock Interviews
Team work activity:
1. Building blocks of a team - discussion & activity.
2. Panel Discussion.
Summarizing and note making:
1. Techniques and important tips.
Personality assessment:
1. self-assessment and discussion

Text Books:
1.Personality Development by D.P.Sabharwal
2. Personality Development by L.Kendo
3.Effective Technical communication by M.A.Rijvi
4.English Phonetics of Indian Students by T.Balasubramaniam

Reference Books:
1.Here, There & Everywhere by Sudha Murty
2. Personality Development by Swami Vivekananda
3.Technical communication: Principle and practice by M.Raman and S,Sharma

Online Resources:
1. https://nptel.ac.in/courses/109104107
2. https://nptel.ac.in/courses/109104031

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

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Type	Code	OPERATING SYSTEM (NPTEL)	L-T-P	Credits	Marks
PC	MC-T-PC-206		3-0-0	3	100

COURSE OUTCOMES
Students will be able to

CO.1	Explain the concepts of process and implement CPU scheduling algorithms.
CO.2	Illustrate different problems and solutions related to process synchronization.
CO.3	Understand deadlock and use various algorithms to handle deadlocks.
CO.4	Understand various memory management mechanisms.
CO.5	Analyze various mechanisms used in virtual memory management.
CO.6	Analyze various file system and disk storage mechanisms.

MODULE-I (10 Hours)
Overview of Operating Systems: Introduction, how OS takes System Control, Why OS is essential, Functions of the Operating Systems, Evolution of Operating Systems, Generations of OS.
Operating System Structure & Processes: Introduction, System Components, Operating System Structure, Operating System Services, System Calls, System Programs, Process, Process States, Process Control.

MODULE-II (08 Hours)
Operating System Services for Process Management & Scheduling: Introduction, Process Creation, Termination & Other Issues, Threads, Multithreading, Types of Threads, Schedulers, Types of Schedulers, Types of Scheduling, Scheduling Algorithms, Types of Scheduling Algorithms.

MODULE-III (08 Hours)
Process Synchronization, Inter process Communication & Deadlock: Introduction, Data Access and Control Synchronization, Critical Sections, Race Condition, Classical Problems & Solutions of Process Synchronization, Semaphores, Message Passing, Deadlock, Conditions for Deadlock, Resource Allocation Graph, Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlocks.

MODULE-IV (08 Hours)
Memory Management & Virtual Memory: Introduction, Memory Management Schemes, Sharing and Protection in Paging, Sharing and Protection in Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Thrashing.

MODULE-V (06 Hours)
File System Interface: File Concept, Access methods, Directory Structure, Allocation methods, Free space management, Disk Scheduling, Disk Management, Swap space management, RAID Concepts of Advanced OS: Distributed, Real Time, Multiprocessor, Network, Embedded, Database Operating Systems.

Text Books:
1. Silberschatz and Galvin, "Operating System Concepts", John Wiley Publishing

2. William Stallings, "Operating Systems Internals & Design Principles", Pearson Education

Reference Books:
1. Naresh Chauhan, "Principles of Operating Systems", Oxford India Publications
2. Pabitra Pal Choudhury, "Operating System Principles and Design", PHI Publication
3. Sibsankar Halder and Alex A. Aravind, "Operating System", Pearson Education

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Gandhi Institute For Technology (GIFT) , Autonomous

Type	Code	**Web Technology Development Lab**	L-T-P	Credits	Marks
PC	MC-P-PC-203		0-0-3	1.5	100

COURSE OUTCOMES:

Students will be able to

CO.1	Understanding about html tags and formatting elements.
CO.2	Design tables, image tags, order and unorder list
CO.3	Using CSS design the login and registration form.
CO.4	Describe about various CSS selectors.
CO.5	Applying JavaScript variables, operators and functions.
CO.6	Develop dummy website applying the stylesheet.

EXPERIMENT-1 [2 Hrs]

1. Create your first web page using head, paragraph, br, title and heading tags.
2. Create your web page using formatting elements like bold, italic, delete, insert, sup, sub etc.
3. Create a web page using inline and block level element.

EXPERIMENT-2 [2 Hrs]
1. Create a web page using anchor tag and image tag.
2. Create a web page using order and unorder list tag.
3. Create a table with all attributes.

EXPERIMENT -3 [2 Hrs]
1. Create a marksheet of a student using table.
2. Create a registration form of a college using all attributes of form.

EXPERIMENT-4 [2 Hrs]
1. Create a div and fill the div with contents and make text color as red, background color as yellow and give a 2px border color blue.
2. Create a span tag and color a part of text.

EXPERIMENT-5 [2 Hrs]
   1.Create three container with div tag, where you should give margin and padding property.
   2. Write the code for the selectors and shows the output.
EXPERIMENT-6 [2 Hrs]
1. Design and modify the mark sheet of a student using CSS.
EXPERIMENT-7 [2 Hrs]

1. Write the code for displaying "Hello students" using JavaScript.
2. Write the code for local and global variables using JavaScript and discuss the difference between them.

EXPERIMENT-8 [2 Hrs]
1. Write the code which shows all the arithmetic operators at once.
2. Write the code for comparisons operators in JavaScript which shows the output false and true.

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EXPERIMENT-9 [2 Hrs]
1. Write the code for call the function in JavaScript where you should use alert.
2. Write the code in JavaScript to display the power of provided value.
3. Write the code to block and unblock a table at once.

EXPERIMENT-10 [2 Hrs]
1.Write a JavaScript program to find the area of a triangle where length of the three of its sides are 5,6,7.
2. Given a string reverse each word in the sentence.
3.Given a string return true if they are anagram of one another.

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Gandhi Institute For Technology (GIFT) , Autonomous

Type	Code	Object Oriented Programming using Java Lab	L-T-P	Credits	Marks
PC	MC-P-PC-202		0-0-3	2	100

COURSE OUTCOMES:

Students will be able to

CO.1	To understand the basic concepts and fundamentals of platform independent object-oriented language.
CO.2	To demonstrate skills in writing programs using exception handling techniques and multithreading.
CO.3	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
CO.4	Demonstrate streams and efficient user interface design techniques.
CO.5	Define random variable and get the knowledge of different distributions problems of discrete & continuous.
CO.6	Design event driven GUI and web related applications which mimic the real word scenarios.

[2 Hrs. each for 10 experiments]

1. Introduction, Compiling & executing a java program.
2. Data types & variables, decision control structures: if, nested if etc.
3. Loop control structures: do, while, for etc.
4. Classes and objects.
5. Data abstraction & data hiding, inheritance, polymorphism.
6. Interfaces and inner classes, wrapper classes, generics
7. Java Threads, Thread Synchronizations
8. Exception handlings in JAVA
9. JAVA applet programs
10. Mouse and Keyboard Event handling in JAVA
11. Use of JAVA Swing Components

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Gandhi Institute For Technology (GIFT) , Autonomous

Type	Code	**Design and Analysis of Algorithm Lab**	L-T-P	Credits	Marks
PC	MC-P-PC-204		0-0-3	1.5	100

COURSE OUTCOMES:

Students will be able to

CO.1	Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.
CO.2	Ability to Implement searching and sorting algorithms
CO.3	To write programs to solve problems using divide and conquer strategy.
CO.4	To write programs to solve problems using backtracking strategy.
CO.5	To write programs to solve problems using greedy and dynamic programming techniques
CO.6	To develop application or design algorithm to solve real life problems.

Programs to Practice: **2Hrs [10 programs]**

1. Implementation of different searching algorithms.

2. Implementation of different sorting algorithms.

3. Problem solving using Divide and Conquer technique.

4. Problem solving using Dynamic Programming technique.

5. Problem solving using Greedy technique.

6. Problem solving using Backtracking technique.

7. Problem solving using disjoint-set data structure operations.

8. Problem solving using Branch and Bound technique.

9. Implementation of Graph Traversal algorithms – Breadth-First-Search (BFS) and Depth-First-Search (DFS).

10. Implementation of Minimum Spanning Tree construction algorithms – Kruskal and Prim.

11. Implementation of different String-Matching algorithms.

12. Problem solving for the Shortest Path problems.

13. Problem solving using Approximation algorithms.

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Gandhi Institute For Technology (GIFT) , Autonomous

Type	Code	Project-II	L-T-P	Credits	Marks
PS	MC-P-PS-207		0-0-2	1	50

COURSE OUTCOMES:

Students will be able to

CO.1	Apply fundamental and disciplinary concepts and methods in ways appropriate to their principal areas of study.
CO.2	Demonstrate skill and knowledge of current information and technological tools and techniques specific to the professional field of study.
CO.3	Use effectively oral, written and visual communication.
CO.4	Identify, analyze, and solve problems creatively through sustained critical investigation.
CO.5	Integrate information from multiple sources.
CO.6	Demonstrate an awareness and application of appropriate personal, societal, and professional ethical standards.

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

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SECOND YEAR
MCA SYLLABUS

<u>CONTENTS</u>

SECOND YEAR MCA

MCA (Third Semester)

MCA (Fourth Semester)

CURRICULUM STRUCTURE
Gandhi institute For Technology (GIFT), Autonomous
MCA SYLLABUS- (Batch--2022-23) SECOND YEAR

Sl. No.	Category	Course Code	Course Title	L-T-P	Credit
THIRD SEMESTER					
1	PC	MC-T-PC-311	Operating System	3-0-0	3
2	PC	MC-T-PC-302	Computer Networks	3-0-0	3
3	PC	MC-T-PC-303	Object oriented Software Engineering	3-0-0	3
4	PC	MC-T-PC-304	Artificial Intelligence	3-0-0	3
5	PC	MC-T-PC-305	Internet Of Things	1-0-0	3
6	OE	MC-T-OE-306	1. Research Methodology 2. Intellectual Property 3. Project Management	3-0-0	1
Total Credit (Theory)					**16**
Practical					
1	PC	MC-P-PC-303	Software Engineering Lab	0-0-3	2
2	PC	MC-P-PC-304	Machine Learning using Python Lab	0-0-3	1.5
3	PC	MC-P-PC-305	Internet Of Things Lab	0-0-2	1.5
4	PS	MC-P-PS-307	Project-III	0-0-2	2
5	SC	MC-P-SC-307	Evaluation of summer internship	----	2
Total Credit (Practical)					**9**
Total Semester Credit					**25**

Sl. No.	Category	Course Code	Course Title	L-T-P	Credit
FOURTH SEMESTER					
1	OO	MC-T-OO-401	Elective-1 (NPTEL MOOCS)	3-0-0	3
2	OO	MC-T-OO-402	Elective-2 (NPTEL MOOCS)	3-0-0	3
Total Credit (Theory)					**6**
Practical					
1	PS	MC-P-PS-403	Seminar & Technical Writing	0-0-3	2
2	PJ	MC-P-PJ-404	Major Indicative Project	0-0-3	8
Total Credit (Practical)					**10**
Total Semester Credit					**16**

EVALUATION PROCESS

1. **Evaluation Process of Theory Subjects:**

Components	Marks	Frequency	Assigned To
Quiz Test	5	2	Concerned Faculty
Surprise Test	5	2	Concerned Faculty
Assignment	5	2	Concerned Faculty
Attendance	5	Closing of Instruction	To be retrieved from CMS
Mini Project	10	1(Before Closing of Instruction)	Concerned Faculty
Mid-Semester Examination	20	1	Examination Cell
End-Semester Examination	100	1	Examination Cell
Total	**150**		

2. **EvaluationProcessof Practical Subjects:**

Components	Marks	Frequency	Assigned To
Attendance	10	Closing of Instruction	To be retrieved from CMS
Daily Performance &Viva-voce	40	On the day of Experiment	Concerned Faculty (Upload in CMS in weekly basis)
Lab Record	20	On the day of Experiment	Concerned Faculty
End-Semester Lab Test	30	1	At the end of the semester as per the schedule published by Examination Cell
Total	**100**		

3. **Evaluation Process of Skill Courses:**

Components	Marks	Frequency	Assigned To
End-Semester Examination	100	1	Examination Cell/Concerned Faculty
Total	**100**		

4. **Evaluation Process of Mandatory Courses:**

Components	Marks	Frequency	Assigned To
In-Semester Evaluation	100	1	Examination Cell/Concerned Faculty
Total	**100**		

Detailed Syllabus For
THIRD SEMESTER

Type	Code	OPERATING SYSTEM	L-T-P	Credits
PC	MC-T-PC-301		3-0-0	3

COURSE OUTCOMES

CO.1	To understand the operating system concepts and its functions.
CO.2	To understand the concept of process and various scheduling algorithm.
CO.3	To understand the need for Process synchronization and techniques to achieve it.
CO.4	To Understand the concepts of deadlock and the use of various algorithms to handle deadlocks.
CO.5	To analyze various approaches used for memory management
CO.6	To analyze various file systems and understand Android OS.

Module-#	Topics	Hours
Module-1	Overview of Operating Systems: Introduction, Functions of the Operating Systems, Evolution of Operating Systems, Operating System Components, Operating System Structure, Operating System Services, System Calls, System Programs,	06 Hours
Module-2	Operating System Services for Process Management & Scheduling: Introduction, Process, Process States, Process Creation, Termination & Other Issues, Threads, Multithreading, Types of Threads, Schedulers, Types of Schedulers, Types of Scheduling, Scheduling Algorithms, Types of Scheduling Algorithms.	06 Hours
Module-3	Process Synchronization, Inter process Communication: Introduction, Data Access and Control Synchronization, Critical Sections, Race Condition, Classical Problems & Solutions of Process Synchronization, Semaphores, Message Passing,	07 Hours
Module-4	Deadlock: introduction, Conditions for Deadlock, Resource Allocation Graph, Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlocks.	07 Hours
Module-5	Memory Management & Virtual Memory: Introduction, Memory Management Schemes, Sharing and Protection in Paging, Sharing and Protection in Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Thrashing.	07 Hours

Module-6	File System Interface: File Concept, Access methods, Directory Structure, Allocation methods, Free space management, Disk Scheduling, Disk Management, Swap space management, Concepts and architecture of Android OS	07 Hours
	Total	**40Hours**

Text Book
1. Silberschatz and Galvin, "Operating System Concepts", John Wiley Publishing, ISBN-13: 978-0471364146.
2. William Stallings, "Operating Systems Internals & Design Principles", Pearson Education, ISBN-13: 978-1-292-21429-0.

Reference Books	
1	Naresh Chauhan, "Principles of Operating Systems", Oxford India Publications, ISBN-13:978-0198082873.
2	Pabitra Pal Choudhury, "Operating System Principles and Design", PHI Publication, ISBN-13: 978-8120338111.
3	Sibsankar Halder and Alex A. Aravind, "Operating System", Pearson Education, ISBN-13: 978-8131715482.

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1	2		1		1			1	1			2	1		1
CO.2	2		1		2			1	1			2	1		2
CO.3	2		1		2			1	1	1		2	1		2
CO.4	2		2		2			1	1	1		3	2		2
CO.5	2		3		2			1	1	1		3	2	2	1
CO.6	2		3		2			1	1	1		3	2	2	1

Type	Code	Computer Networks	L-T-P	Credits
PC	MC-T-PC-302		3-0-0	3

COURSE OUTCOMES:

Students will be able to

CO.1	To develop an understanding of modern network architectures from a design and performance perspective.
CO.2	Illustrate the conceptual design for Physical Layer and Transmission Media.
CO.3	Formulate the different Data Link Layer Protocols
CO.4	Understand and Apply Error Detection and Correction Methods of Data Link Layer.
CO.5	Summarize different Network Routing Algorithms
CO.6	Explain various Transport Layer Processes.

Detailed Syllabus

Module - #	Topics	Hours
Module - 1	Introduction to Data Communications and Networking: Uses of Computer Networks, Communication Types, Serial and Parallel Data Transmission; Principles of Network Design: Evolution of Computer Networks, Topologies, Network Models (ISO-OSI, TCP/IP), Network Architecture.	7 Hrs
Module - 2	Physical Layer: Transmission Medium: Guided Media, Unguided Media, switching: Circuit Switching, Packet Switching, Message Switching	6 Hrs
Module - 3	Data Link Layer: Framing; Elementary Data Link Protocols: Simplest Protocol, Stop and Wait Protocol; Sliding Window Protocol: Stop and Wait Automatic Repeat Request (ARQ), Go Back N-ARQ, Selective ARQ; Multiple Access Protocols: Pure ALOHA, Slotted Aloha, CSMA, CSMA/CD, CSMA/CA; Controlled Access Protocol: Reservation, Pooling, Token Passing; Error Detection and Correction, Standard Ethernet, MAC Sublayer	7 Hrs

Module 4	Network Layer: Network Layer Design issues; Networks-routing algorithms: optimality principle, shortest path, flooding, Distance Vector Routing, Link State Routing, Path Vector Routing, Hierarchical Routing; Congestion control algorithms: Warning bit, Choke packets, Load shedding, Random early discard, Traffic shaping; IP addresses: IPv4, IPv6; Network devices: Repeater, Hubs, Bridges, Switches, Routers, Gateways.	7 Hrs
Module 5	Transport Layer: Transport Service; Transport Layer Features; Process to Process Delivery: TCP, TCP Connection Establishment-3 Way Handshaking, SYN Flodding Attack, Connection Termination, Flow Control and TCP Sliding Window, Nagel's Rule, TCP Congestion Control, UDP	7Hrs
Module 6	Application Layer: DNS, Remote Logging, File transfer, Multimedia, Ziff's law; Security: Cryptography, Network Security; Internet Security: IPSec, SSL/TLS, PGP, VPN, Firewalls.	6 Hrs
TOTAL		40 Hours

	Text Books:
1	Data Communications and Networking, Behrouz A. Forouzan, Tata McGraw-Hill, ISBN-13: 978-0070634145.
2	Computer Networks, A.S. Tannenbum, Imprint of Pearson, ISBN-13: 978-0132126953.
	Reference Books:
1	Computer Networks A System Approach, Larry L, Peterson, ISBN-13: 978-0123850591.

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Type	Code	**Object Oriented Software Engineering**	L-T-P	Credits
PC	MC-T-PC-303		3-0-0	3

COURSE OUTCOMES:

Students will be able to

CO.1	To learn object-oriented (OO) analysis and design using UML and other techniques.
CO.2	To acquire knowledge how to OO languages support abstraction and polymorphism.
CO.3	To develop an agile software process, with multiple iterations, design patterns, test-driven development & pair programming.
CO.4	To improve communications skills in the contact of software development. Students will present project ideas, analyses, designs, prototypes.
CO.5	Ability to abstract object-based views for generic software systems.
CO.6	To explore specialized topics in OO software.

Module-#	Topics	Hours
Module-1	System Concepts – Project Organization – Communication- Life cycle models – Classical waterfall model, iterative waterfall model, prototype model, spiral model, Unified Process – Interactive and Incremental - Workflow – Agile Processes.	07 Hours
Module-2	Requirements Elicitation – Requirement Documentation - Data Flow Diagram, Data Dictionary, Structured English, Decision Trees, Decision Tables -Use Cases-	06 Hours
Module-3	Unified Modelling language- Introduction, UML Diagrams – Class diagrams, Sequence diagrams, Object diagrams, Deployment diagrams, Use case diagrams, State diagrams, Activity diagram, Component diagrams – Case Study- Identifying Classes- Noun Phrase Approach, Common class Pattern Approach, Use-Case Driven Approach, CRC. Design Principles – Design Concepts, Object Constraint Language	07 Hours
Module-4	Project Planning & Project Organizations - Top-Down and Bottom-Up Planning -Project Estimation COCOMO-I, COCOMO-II - Types of Activity - Project Duration: Schedule Monitoring Tools - Gantt chart, PERT Chart, Critical Path.	07 Hours
Module-5	Manual testing-Unit Testing- Integration Testing-System Testing-User Interface Testing. Acceptance testing. Test Case Design Techniques, Bug Life Cycle, The Bug Template, Bug Tracking, Flow Graph Notations, Cyclomatic Complexity. White box, black box, grey box testing. Automated Testing- Fundamentals of Test Automation, Role of ROI In Automation, Automation Framework, Various Automated Tools and Their Comparisons.	07 Hours
Module-6	Software Quality - Quality Measures - FURPS - Software Quality Assurance The Software Quality Assurance Plan - Formal approaches to SQA - Clean room Methodology -Configuration Management – Maintenance process- System documentation.	06 Hours

		Total	40 Hours

Text Book

1. Pressman, R.S. (2010) Software Engineering: A Practitioner's Approach. 7th Edition, McGraw Hill, New York, ISBN-13: 978-0071267823.
2. Rajib Mall(2014)Fundamentals of Software Engineering, Prentice-Hall of India Pvt. Ltd, ISBN-13: 9788120348981.
3. Bernd Bruegge, Alan H Dutoit, "Object-Oriented Software Engineering" Second edition, Pearson Education, 2004, ISBN-13: 9788177587685.

Reference Books

1	Craig Larman, "Applying UML and Patterns" Third edition, Pearson Education, 2005, ISBN-13: 978-0131489066.
2	Stephen Schach, " Software Engineering" Seventh edition, McGraw-Hill, 2007, ISBN-13: 978-0070647770.
3	Ivar Jacobson, Grandy Booch, James Rumbaugh, " The Unified Software Development Process", Pearson Education, 1999, ISBN-13: 978-8177583151.
4	Alistair Cockburn, "Agile Software Development" Second edition, Pearson Education, 2007, ISBN-13: 9780321482754.

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1	2	1	1	2	3							3			
CO.2	2	2	2	2	3		3	3		3		3			
CO.3	2	2	2	2	3		3					3		3	
CO.4		3	2	3								3	3	2	3
CO.5	2	2	2	2	2									3	2
CO.6	2			2	3						3	3		3	2

Type	Code	Artificial Intelligence	L-T-P	Credits
PC	MC-T-PC-304		3-0-0	3

COURSE OUTCOMES:

Students will be able to

CO.1	Understand the fundamental concepts, theories, and principles of Artificial Intelligence and Machine Learning.
CO.2	Acquire knowledge about different search techniques of AI applications.
CO.3	Develop practical skills to build search trees by applying advanced search techniques.
CO.4	Learn techniques for logic, reasoning & knowledge representation in AI.
CO.5	Learn the basics of Machine Learning as a subfield of Artificial Intelligence area.
CO.6	Apply AI & ML algorithms to real-world problems and analyze their performance.

Module-#	Topics	Hours
Module-1	Introduction –The Foundations of Artificial Intelligence, INTELLIGENT AGENTS – Agents and Environments, Good Behavior: The Concept of Rationality, the Nature of Environments, the Structure of Agents.	06 Hours
Module-2	Solving problems by search – Problem-Solving Agents, formulating problems, Searching for Solutions, Uninformed Search Strategies: Breadth-first search, Depth-first search, Searching with Partial Information, informed (Heuristic) Search Strategies, Greedy best-first search, A* Search, CSP, Means-End-Analysis.	08 Hours
Module-3	Advanced Search: Constructing Search Trees, Stochastic Search, Hill climbing, A*, AO* Search Implementation, Min-max Search, Alpha-Beta Pruning Basic knowledge.	06 Hours
Module-4	Knowledge Representation and Reasoning: Propositional logic, Predicate logic, First order logic, Inference in first order logic, Clause form conversion, Resolution. Chaining- concept, forward chaining and backward chaining, Utility theory and Probabilistic reasoning, Hidden Markov model, Bayesian networks. Learning from observation Inductive learning, Decision trees, Explanation based learning, Statistical Learning methods , Reinforcement Learning.	08 Hours
Module-5	Expert systems:- Introduction, basic concepts, structure of expert systems, human elements and working, success factors, types of expert system and interaction with internet and web.	06 Hours
Module-6	Applications of AI System – Language Models – Information Retrieval- Information, Classification fundamentals of machine learning, data preprocessing.	06 hours
Total		40 Hours

Text Book
1. Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", Fourth Edition,

Pearson Education, 2021, ISBN-13: 978-0134610993.

2.	Kevin Night, Elaine Rich, and Nair B., "Artificial Intelligence", McGraw Hill, 2008, ISBN-13: 978-0070087705.

Reference Books	
1	Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Pearson Education, 2007, ISBN-13: 9780134829289.
2	Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Fourth Edition, 2020, ISBN-13: 9780262043798.
3	Deepak Khemani, "Artificial Intelligence", Tata McGraw Hill Education, 2013, ISBN-13: 978-1259029981.
4	Patrick H. Winston, "Artificial Intelligence", Third Edition, Pearson Education, 2006, ISBN-13: 978-0201533774.
5	Tom Mitchell, "Machine Learning", McGraw Hill, 3rd Edition, 1997, ISBN-13: 978-1259096952.

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Type	Code	Internet Of Things	L-T-P	Credits
PC	MC-T-PC-305		3-0-0	3

COURSE OUTCOMES:

Students will be able to

CO.1	Able to Understand the concepts of Internet of Things.
CO.2	Able to realize the revolution of Internet in Mobile Devices, Cloud &Sensor Networks
CO.3	Able to introduce the scopes of using sensing, edge computing, Machine learning mechanisms in pervasive cyber physical systems.
CO.4	Able to understand the innovation opportunity in IOT application segments Identify physical and logical design of IoT.
CO.5	Able to Develop an IOT Application using Arduino Uno board .
CO.6	Able to Develop an IOT Applications using Raspberry Pi board.

Module-#	Topics	Hour
Module-1	Introduction to IoT, Definition, Conceptual Framework), Architectural view (Functional blocks of IoT, Communication models & APIs), technology behind IoT, Sources of the IoT, Sensing, Edge computing, Data processing, Learning, Overview of IoT supported Hardware platforms such as: Raspberry pi, ARM Cortex Processors, Arduino and Intel Galileo boards, Wireless networking equipment and configurations, accessing hardware and device file interactions. Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.	**10 Hours**
Module-2	M2M & System Management with NETCONF-YANG: M2M, Difference between IOT And M2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG. Sensing Layer (4L) Different type of sensors, working principle of some sensors like Ultrasonic sensor, Thermal Sensors, Infrared Sensors, Pollutant Sensors, Temp, IMU Sensor etc.	**6 Hours**
Module-3	**Hardware for IOT:** Sensors, Digital sensors, actuators, radio frequency identification (RFID) technology, wireless sensor networks, participatory sensing technology. **Embedded Platforms for IOT:** Embedded computing basics	**6 Hours**
Module-4	Developing Internet of Things & Logical Design using Python: Introduction, IOT Design Methodology, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages. Wireless Networks Present and Future (10L) Concept of TCP/IP protocol Stack, 802.11Protocol (WiFi Network), LoRa Network, Acoustic Communication, Socket Programming,	**06 Hours**

Module-5	IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Linux on Raspberry Pi, Interfaces, and Programming& IOT Devices, Cloud Computing, Fog Computing, Connected Vehicles, Data Aggregation for the IOT in Smart Cities.	06 Hours
Module-6	IOT Protocols: HTTP, QUIC, COAP, MQTT, , RFID Technology, IOT RFID Hardware and Software, Building an MQTT Server on a Raspberry Pi, the Software on the Raspberry Pi, Performance and Security in IOT .	06 Hours
Total		**40 Hours**

Text Book

1. Vijay Madisetti, Arshdeep Bahga," Internet of Things A Hands- On- Approach",2014, ISBN:978 0996025515.
2. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press), ISBN-13: 9781032339719.
3. Matt Richardson & Shawn Wallace, Getting Started with Raspberry Pi, O'Reilly (SPD), 2014, ISBN-13: 9781457186127.

Reference Books

1 Adrian McEwen, "Designing the Internet of Things", Wiley Publishers, 2013, ISBN:978-1-118-43062-0.

2 Daniel Kellmereit, "The Silent Intelligence: The Internet of Things". 2013, ISBN: 0989973700.

3 R.K. Mittal and I J Nagrath, Robotics and Control, TMH, 2003, ISBN-13: 978-0070482937.

4 Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013, ISBN:978-14302-5740-0.

5 Cuno Pfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1- 4493- 9357-1.

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Type	Code	Project Management	L-T-P	Credits
OE	MC-T-OE-306		1-0-0	1

COURSE OUTCOMES:

Students will be able to

CO.1	To enable student to understand the Project evaluation.
CO.2	To understand the techniques involved in deciding to select a project.
CO.3	Acquire knowledge to understand the concepts which underlie the appraisal of investment of projects.
CO.4	Understand the ultimate outcome of a public or a private investment that closely links the financial and economic analysis.
CO.5	Identifies the distribution of benefits and costs over the various interest groups.
CO.6	Develop practical skills to implement the advantages and drawbacks of each of the main approaches used (namely cost benefit analysis, multi criteria analysis and other important concepts).

Module-#	Topics	Hours
Module-1	**Project Identification:** Project characteristics, Taxonomy of projects, Attributes of a Good Project Manager, Project Identification,.	4 Hours
Module-2	**Project Formulation:** Project formulation, screening of Project Ideas. Tax Incentives and Tax Planning for project investment decisions, Zero based project formulation, Project objectives, establishing the Project, UNI DO manuals, detailed feasibility Study report	4 Hours
Module-3	**Project Cost Estimation :** Cost of project, Components of capital cost of a project, order of magnitude estimate	4 Hours
Module-4	**Project Appraisal:** technical appraisal, Commercial appraisal, Economic appraisal, Financial Appraisal, Management appraisal, Govt. projects and social projects, Social Cost benefit analysis. Environmental Appraisal.	4 Hours
Module-5	**Project Financing and** Sources of financing, Role of Financial institutions in project financing, covenants attached to lending	4 Hours

Module-6	**Risk Analysis:** Project Risk Analysis, Techniques of Risk Analysis, Project Organization. Infrastructure projects- characteristics and issues related to infrastructure projects, state of infrastructure in India, New Approaches for infrastructure, PPP. Government support and regulation. Project evaluation objectives, evaluation methods, Project monitoring and control, Various types of Project Termination	4 Hours
	Total	**24 Hours**

Reference Books	
1	Project Appraisal and Financing- Lath, Prasar-1-limalaya, ISBN-13: 978-8196378998.
2	Project Management- K. Nagarajan- New Age International, ISBN-13: 978-8122437720.
3	Project Management and Appraisal-S.Khatua-Oxford, ISBN-13: 9780198066903.
4	Project Management-Pinto-Pearson, ISBN-13: 978-9389552034.
5	Project Management and Control-N.Singh-HPH, ISBN-13: 978-9352023707.

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Type	Code	Research Methodology	L-T-P	Credits
OE	MC-T-OE-306		1-0-0	1

COURSE OUTCOMES:

Students will be able to

CO.1	To understand Research and Research Process
CO.2	To acquaint students with identifying problems for research and develop research strategies
CO.3	To familiarize students with the techniques of data collection, analysis of data and interpretation
CO.4	Prepare a preliminary research design for projects in their subject matter areas
CO.5	Accurately collect, analyze and report data
CO.6	Review and analyze research findings Get the knowledge of objectives and types of research

Module-#	Topics	Hours
Module-1	**Research Methodology:** Introduction, Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, and Problems Encountered by Researchers in India. **Defining the Research Problem:** Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration.	10 Hours
Module-2	**Research Design:** Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Important Experimental Designs. Design of Sample Surveys: Introduction, Sample Design, Sampling and Non-sampling Errors, Sample Survey versus Census Survey, Types of Sampling Designs	10 Hours
	Total	**20 Hours**

Reference Books	
1	Research Methodology: Methods and Techniques, C.R. Kothari, Gaurav Garg New Age International 4th Edition, 2018, ISBN: 9789386649225.
2	Research Methodology a step-by- step guide for beginners, ISBN-13: 978-9351501336.

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Type	Code	Intellectual Property Right	L-T-P	Credits
OE	MC-T-OE-306		1-0-0	1

COURSE OUTCOMES:

Students will be able to

CO.1	Understand the basic concepts and various kinds of intellectual property rights.
CO.2	To become familiar with fundamentals of patent registration, trademark, design and IT Act.
CO.3	To provide the knowledge on the different rules and aspects of types of Intellectual Property Rights.
CO.4	Understand the concepts and different types of copyrights.
CO.5	To impart the knowledge on Intellectual Property Rights protection to novelty in research
CO.6	To impart the knowledge on recent advances of Intellectual property rights in E-Commerce and Cybercrimes.

Module-#	Topics	Hours
Module-1	**Introduction -** Meaning of property, Origin, Nature, Meaning of Intellectual Property Rights, Provision of IPR under TRIPS and WTO. **Kinds of Intellectual property rights-** Copy Right, Patent, Trade Mark, Trade Secret and trade dress, Design, Layout Design, Geographical Indication. **Copyright-** Definition & Types of Copy Right, Registration procedure, Assignment & license, Terms of Copy Right, Infringement, Remedies, Copy rights with special reference to software.	10 Hours
Module-2	**Patent Rights -** Origin, Meaning of Patent, Types, Inventions which are not patentable, Registration Procedure, Rights and Duties of Patentee, Assignment and license, Restoration of lapsed Patents, Surrender and Revocation of Patents, Infringement, Remedies & Penalties. **Trademarks-**Meaning & Nature of Trade Marks, Types, Registration of Trade Marks, Infringement & Remedies, Offences relating to Trade Marks, Passing Off, Penalties.	10 Hours
	Total	**20 Hours**

Reference Books	
1	Dr. G.B. Reddy, Intellectual Property Rights and the Law, Gogia Law Agency, ISBN-13: 9788194227281.
2	Dr. B.L. Wadehra, Law relating to Intellectual Property, Universal Law Publishing Co, ISBN-13: 978-8175345881.

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Type	Code	Software Engineering Lab	L-T-P	Credits
PC	MC-P-PC-303		0-0-2	2

COURSE OUTCOMES:

Students will be able to

CO.1	Understand and describe basic concept of UML, design, implementation of test cases and OOP concepts using java.
CO.2	Discuss and Analyses how to develop software requirements specifications for a given problem.
CO.3	Explain and build DFD models.
CO.4	Understand and develop various structure and behavior UML diagrams.
CO.5	Explain the knowledge of project management tool Demonstrate how to manage file using Project Libre project management tool.

Module-#	Topics	Hours
Experiment-1	Software requirements specification (SRS)	2 Hours
Experiment-2	Data flow diagram	2 Hours
Experiment-3	Entity relationship diagram	2 Hours
Experiment-4	UML use case diagram	2 Hours
Experiment-5	Interaction diagram	2 Hours
Experiment-6	Activity diagram	2 Hours
Experiment-7	Class diagram	2 Hours
Experiment-8	Object diagram	2 Hours
Experiment-9	Control flow diagram	2 Hours
Experiment-10	Design test cases for Black box testing	2 Hours
Experiment-11	Design test cases for Unit testing	2 Hours

Text Book

1. Pressman, R.S. (2010) Software Engineering: A Practitioner's Approach. 7th Edition, McGraw Hill, New York, ISBN-13: 978-0071267823.
2. Sommerville, I. (2016) Software Engineering. 10th Edition, Pearson Education Limited, Boston, ISBN-13. 978-0133943030
3. Rajib Mall (2014) Fundamentals of Software Engineering, Prentice-Hall of India Pvt. Ltd, ISBN-13: 9788120348981.

Reference Books	
1	Bernd Bruegge, Alan H Dutoit, "Object-Oriented Software Engineering" Second edition, Pearson Education, 2004, ISBN-13: 9788177587685.
2	Craig Larman, "Applying UML and Patterns" Third edition, Pearson Education, 2005, ISBN-13: 978-0131489066.
3	Stephen Schach, "Software Engineering" Seventh edition, McGraw-Hill, 2007, ISBN-13: 978-0070647770.
4	Ivar Jacobson, Grandy Booch, James Rumbaugh, "The Unified Software Development Process", Pearson Education, 1999, ISBN-13: 978-8177583151.
5	Alistair Cockburn, "Agile Software Development" Second edition, Pearson Education, 2007, ISBN-13: 9780321482754.

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1	2	1	1	2	3							3			
CO.2	2	2	2	2	3		3	3		3		3			
CO.3	2	2	2	2	3		3					3		3	
CO.4		3	2	3								3	3	2	3
CO.5	2	2	2	2	2									3	2
CO.6	2			2	3						3	3		3	2

Type	Code	**Machine Learning Using Python Lab**	L-T-P	Credits
PC	MC-P-PC-304		0-0-2	2

COURSE OUTCOMES:

Students will be able to

CO.1	Use appropriate knowledge for problem solving using Python.
CO.2	Apply reasoning under uncertainty.
CO.3	Build supervised learning models.
CO.4	Build ensemble and unsupervised models.
CO.5	Build deep learning neural network models.

Module-#	Topics	Hours
Experiment-1	Basic implementation using Python Programming language.	2 Hours
Experiment-2	Coding simple programs in Python. a) Read your name and print Hello message with name b) Read two numbers and print their sum, difference, product and division. Word and character count of a given string. d) Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input.	2 Hours
Experiment-3	Write a program to implement BFS And DFS.	2 Hours
Experiment-4	Write a program to implement Min-Max Search.	2 Hours
Experiment-5	Importing different packages and demonstrating the usability towards problem solving.	2 Hours
Experiment-6	Implement KNN algorithm.	2 Hours
Experiment-7	Implement K-Means algorithm.	2 Hours
Experiment-8	Build simple NN models.	2 Hours
Experiment 9	Build CNN Model.	2 Hours
Experiment-10	Build SVM Model.	2 Hours

Text Book
1. Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", Fourth Edition, Pearson Education, 2021, ISBN-13: 978-0134610993.
2. Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Fourth Edition, 2020, ISBN-13: 9780262043798.

Reference Books	
1	Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", Pearson Education, 2007, ISBN-13: 9780134829289.
2	Kevin Night, Elaine Rich, and Nair B., "Artificial Intelligence", McGraw Hill, 2008, ISBN-13: 978-0070087705.
3	Deepak Khemani, "Artificial Intelligence", Tata McGraw Hill Education, 2013, ISBN-13: 978-1259029981.
4	Patrick H. Winston, "Artificial Intelligence", Third Edition, Pearson Education, 2006, ISBN-13: 978-0201533774.

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Type	Code	Internet Of Things Lab	L-T-P	Credits
PC	MC-P-PC-305		0-0-2	2

COURSE OUTCOMES:

Students will be able to

CO.1	Remember basic understanding of computer and basic concepts of running programs.
CO.2	Understand the concepts how to use python-based ide) for the raspberry pi
CO.3	Learn to concise and precise on implementing pseudo code using python
CO.4	Illustrate the usages of raspberry pi
CO.5	Illustrate the usages of Arduino board
CO.6	Develop projects using raspberry pi and Arduino board and develop smart products.

Module-#	Topics	Hours
Experiment-1	Getting started with Raspberry Pi, Install Raspian on your SD card	2 Hours
Experiment-2	Linux basic commands. :ls, cd, touch, mv, rm, man, mkdir, rmdir, tar, gzip, cat, more, less, ps, sudo, cron, chown, chgrp, ping etc	2 Hours
Experiment-3	Coding simple programs in Python. a) Read your name and print Hello message with name b) Read two numbers and print their sum, difference, product and division. Word and character count of a given string. d) Area of a given shape (rectangle, triangle and circle) reading shape and appropriate values from standard input.	2 Hours
Experiment-4	How to use Python-based IDE (integrated development environments) for the Raspberry Pi and how to trace and debug Python code on the device	2 Hours
Experiment-5	How to have your Raspberry Pi interact with online services through the use of public APIs and SDKs.	2 Hours
Experiment-6	Arduino basic setup, how to install it and use it, shields to extend the functionality of an Arduino based system	2 Hours
Experiment-7	Designing of automated obstacle detection system.	2 Hours
Experiment-8	Designing of automated alcohol detection system.	2 Hours
Experiment-9	Designing of automated plant watering system.	2 Hours
Experiment-10	Designing of traffic light system.	2 Hours

Experiment-11	a) Light an LED through Python program b) Get input from two switches and switch on corresponding LEDs	2 Hours
Experiment-12	c) Flash an LED at a given on time and off time cycle, where the two times are taken from a file. 5. a) Flash an LED based on cron output (acts as an alarm) Switch on a relay at a given time using cron, where the relay's contact terminals are connected to a load.	2 Hours

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Type	Code	Project-III	L-T-P	Credits
PS	MC-P-PS-307		0-0-2	2

COURSE OUTCOMES:

Students will be able to

CO.1	Apply fundamental and disciplinary concepts and methods in ways appropriate to their principal areas of study.
CO.2	Demonstrate skill and knowledge of current information and technological tools and techniques specific to the professional field of study.
CO.3	Use effectively oral, written and visual communication.
CO.4	Identify, analyze, and solve problems creatively through sustained critical investigation.
CO.5	Integrate information from multiple sources.
CO.6	Demonstrate an awareness and application of appropriate personal, societal, and professional ethical standards.

Mapping of COs to POs and PSOs (1: Low, 2: Medium, 3: High):

COURSE CODE	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1		3	3	3								3	3	2	1
CO.2		3	3	3								3	2	3	2
CO.3		2	3	2								2	2	3	2
CO.4		3	2	3								3	3	2	3
CO.5	3	3	3	3								3	3	3	3
CO.6	2	3	3	3								3	3	3	3

Detailed Syllabus For
FOURTH SEMESTER

Type	Code	Elective-I	L-T-P	Credits
00	MC-T-OO-401		3-0-0	3

SL NO	Group - 1
1	Software Testing (12weeks)
2	Computer Vision (12weeks)
3	Cyber Security and Privacy (12 weeks)
4	Introduction To Industry 4.0 And Industrial Internet Of Things (12 weeks)
5	Computer Graphics (8 Weeks)

Note: HOD can be changed According to the availability subject in Swayam Portal

Type	Code	Elective-II	L-T-P	Credits

00	MC-T-OO-402		3-0-0	3

Note: HOD can be changed According to the availability subject in Swayam Portal

SL NO	Group - 2
1	Social Networks (IIT Ropar)(12 weeks)
2	Deep Learning (IIT Kgp) (12 weeks)
3	Ethical Hacking (12 weeks)
4	Business Analytics & Text Mining Modelling Using Python (8weeks)
5	Big Data Computing (8 Weeks)