Schemes and Syllabus

(For academic session 2021-22 & onwards)

Master of Computer Application (MCA)

IEC School of Computer science and Applications

Atal Shiksha Nagar (Kallujhanda), P.O.

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Table of Content

SECTION 1

Program Outcomes and Program Specific Outcomes

Program Outcomes

Program Outcomes

PO1: Professional Knowledge: Apply knowledge of computing fundamentals, computing specialisation, mathematics, and domain knowledge appropriate for the computing specialisation to the abstraction and conceptualisation of computing models from defined problems and requirements.

PO2: Research/Project Orientation: Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO3: Entrepreneurship Capability: Identify a timely opportunity and using innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

PO4: Conformist: This course enables the students to carrying out Ability to devise and conduct experiments, interpret data and provide well informed conclusions.

PO5: Critical Thinking Mindset: Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.

PO6: Leadership and Teamwork: Ability to work as a member or leader in diverse teams in multidisciplinary environment. The student is capable of contributing meaningfully to team ethos and goals and also leadership quality.

PO7: Professional Ethics: Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practices.

PO8: Professional Empowerment: MCA students also hold the opportunity to explore the industrial, research oriented environment with industrial collaboration that motivates them to innovate and explore.

PO9: Communication: A MCA Student Communicate effectively with the computing community, and with society at large, about complex computing activities by being able to comprehend and write effective reports, make effective presentations, design documentation, and give and understand clear instructions.

PO10: Social Responsibility and Environmental Conservation: Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practices.

PO11: Modern Analytical Knowledge: A MCA Student Create selects, adapt and apply appropriate techniques, resources, and modern computing tools to complex computing activities, with an understanding of the limitations.

PO12: Life Long Skills: Recognise the need, and have the ability, to engage in independent learning for continual development as a computing professional.

Program Specific Outcomes

PSO1 Apply the knowledge of computer application to find solutions for real-life application.

PSO2 Ability to analyze, design, develops and maintains the software application with latest technologies.

PSO3 Utilize skills and knowledge for computing practice with commitment on social, ethical, cyber and legal values.

PSO4 Inculcate employability and entrepreneur skills among students who can develop customized solutions for small to large Enterprises.

SECTION 2

Semester wise Scheme

MCA 1st Year / 1st Semester

Course			Period			Evaluation Scheme					Course Total	
Sr. No.	Code	Title	L	T	P	Sessional Marks				Exam Marks	Max. Marks Credits	
						MSE	CA	P	Total	ESE	Marks	Credits
Theory												
1	MCA-101	Elements of digital electronics and Computer Organization	4	1	0	40	20	0	60	40	100	4.5
4	MCA-102	Programming in 'C++' & Data Structure	3	0	0	30	15	0	45	30	75	3
3	MCA-103	Database Systems	4	0	0	40	20	0	60	40	100	4
2	MCA-104	Discrete Mathematical Structure	3	1	0	40	20	0	60	40	100	3.5
5	ENG-701	Business Communication	3	0	0	30	15	0	45	30	75	3
PRACTICAL												
1	MCA-102P	Programming in 'C++' & Data Structure	0	0	4			15	15	10	25	2
2	ENG-701P	Business Communication	0	0	2			15	15	10	25	1
Total Credits												21

MCA 1st Year / 2nd Semester

Course			Period			Evaluation Scheme					Course Total	
Sr. No.	Code	Title	L	T	P	Sessional Marks				Exam Marks	Max. Marks Credits	
						MSE	CA	P	Total	ESE	Marks	Credits
Theory												
1	MCA-201	Operating System & Linux	4	0	0	40	20	0	60	40	100	4
4	MCA-202/206	Elective*	3	0	0	30	15	0	45	30	75	3
2	MCA-203	Advanced Java	3	0	0	30	15	0	45	30	75	3
3	MCA-204	E-Commerce	3	1	0	40	20	0	60	40	100	3.5
4	MCA-205	Software Engineering	3	1	0	40	20	0	60	40	100	3.5
PRACTICAL												
2	MCA-202P/206P	Elective*	0	0	4			15	15	10	25	2
2	MCA-203P	Advanced Java	0	0	4			15	15	10	25	2
Total Credits												21

Elective Subjects List

Course			Period			Evaluation Scheme					Course Total	
Sr. No.	Code	Title	L	T	P	Sessional Marks				Exam Marks	Max. Marks Credits	
						MSE	CA	P	Total	ESE	Marks	Credits
Theory												
1	MCA-202	Computer Networks	3	0	0	30	15	0	45	30	75	3
	MCA-206	Cryptography & Network Security	3	0	0	30	15	0	45	30	75	3

MCA 2nd Year / 3rd Semester

Course			Period			Evaluation Scheme					Course Total	
Sr. No.	Code	Title	L	T	P	Sessional Marks				Exam Marks	Max. Marks Credits	
						MSE	CA	P	Total	ESE	Marks	Credits
Theory												
1	MCA-301	Design & Analysis of Algorithms	4	0	0	40	20	0	60	40	100	4
2	MCA-302	Programming in Python	3	0	0	30	15	0	45	30	75	3
3	MCA-303	ERP Systems	4	0	0	40	20	0	60	40	100	4
4	MCA-304/306	Elective	3	0	0	30	15	0	45	30	75	3
5	MCA-305	Mobile Computing	4	0	0	40	20	0	60	40	100	4
PRACTICAL												
1	MCA-304P/306P	Elective 1	0	0	4			15	15	10	25	2
2	MCA-302P	Programming in Python	0	0	4			15	15	10	25	2
Total Credits												22

Elective Subjects List

Course			Period			Evaluation Scheme					Course Total	
Sr. No.	Code	Title	L	T	P	Sessional Marks				Exam Marks	Max. Marks Credits	
						MSE	CA	P	Total	ESE	Marks	Credits
Theory												
1 (Elective-1)	MCA-304	Dot Net Framework & C#	3	0	0	30	15	0	45	30	75	3
	MCA-306	Data Compression	3	0	0	30	15	0	45	30	75	3

MCA 2nd Year / 4th Semester

Course			Period			Evaluation Scheme					Course Total	
Sr. No.	Code	Title	L	T	P	Sessional Marks				Exam Marks	Max. Marks Credits	
						MSE	CA	P	Total	ESE	Marks	Credits
Theory												
1	MCA-401	Artificial Intelligence	4	1	0	40	20	0	60	40	100	4.5
2	MCA-402	Simulation and Modeling	4	1	0	40	20	0	60	40	100	4.5
3	MCA - 403	WEB Technology	3	0	0	30	15	0	45	30	75	3
4	MCA-404/406	Elective-1	3	0	0	30	15	0	45	30	75	3
5	MCA-405/407	Elective-2	4	0	0	40	20	0	60	40	100	4

PRACTICAL												
1	MCA-451P	Mini Project	0	0	40			360	360	240	600	20
2	MCA - 403P	WEB Technology	0	0	2			15	15	10	25	1
3	MCA-404P/406P	Elective-1	0	0	2			15	15	10	25	1
Total Credits												23

Elective Subjects List

Course			Period			Evaluation Scheme					Course Total	
Sr. No.	Code	Title	L	T	P	Sessional Marks				Exam Marks	Max. Marks Credits	
						MSE	CA	P	Total	ESE	Marks	Credits
Theory												
2 Elective-1)	MCA-404	Advance Database Management Systems	3	0	0	30	15	0	45	30	75	3
	MCA-406	Programming in PHP	3	0	0	30	15	0	45	30	75	3
3 Elective-2)	MCA-405	Computer Graphics & Animation	4	0	0	40	20	0	60	40	100	4
	MCA-407	Compiler Design	4	0	0	40	20	0	60	40	100	4

SECTION 3

Semester wise Syllabus

Program: MCA					**Semester:** 1st		
Course Title: Elements of digital electronics and Computer Organization					**Course Code:** MCA-101		
L	T	P	CH	CP	Int. A	ESE	Total
4	1	-	4	4.5	60	40	100

Course Description: The purpose of the course is to teach principles of digital electronics. The material covers a variety of topics including Boolean algebra, basic gates, logic circuits, flip-flops, registers, arithmetic circuits, counters, interfacing with analog devices, and computer memory.

Course Outcomes

CO1: Verify and analyze the input/output data of each logic gate and circuits such as adders, counters, coders, etc,
CO2: Analyze the basic operation of memory cell and its limitations in circuit designing.
CO3: Apply the digital circuit design concept in developing basic component of computer organization, projects or experiments.
CO4: Identify the elements of modern instructions sets, hardware components and their impact on processor design.

Theory **4 Hrs**

Unit	Topic	Hours
1	Information Representation: Number systems, BCD codes, Character codes – ASCII, EBCDIC, Unicode, Error Detecting and Correcting codes, Fixed-point and Floating-point representation of numbers. Binary arithmetic. Binary Logic: Boolean algebra, Boolean functions, truth tables, canonical and standard forms, simplification of Boolean functions, Digital logic gates.	12 Hours
2	Combinational Logic: Design procedure, Adders, Subtractors, Code Conversion, Analysis procedure, Multilevel NAND & NOR Circuits, XOR & XNOR functions Encoders, Decoders, Multiplexers, Demultiplexers and Comparators, Binary Parallel Adder, BCD Adder.	10 Hours
3	Sequential Logic: Flip-flops, Shift registers and Counters. Memory System: Memory parameters, Semiconductor RAMs, ROMs, Magnetic and Optical storage devices, Flash memory.	10 Hours
4	CPU Organization: Processor organization, Machine instructions, instruction cycles, instruction formats and addressing modes, microprogramming concepts, and micro program sequencer.	05Hours
5	I/O Organization: I/O interface, Interrupt structure, transfer of information between CPU/memory and I/O devices, and IOPs.	05 Hours

TEXT BOOKS

1. Mano, M. Morris Digital Logic and Computer Design, Prentice Hall of India Pvt. Ltd.
2. Rajaraman, V., Radhakrishanan,T., An Introduction To Digital Computer Design, Prentice Hall of India Pvt. Ltd.

REFERENCE BOOKS

1. Hayes, J.P., Computer Architecture and Organization, McGraw Hill
2. Tanebaum A.S., Structured Computer Organization, Prentice Hall of India Pvt. Ltd.
3. Stallings W., Computer Organization and Architecture, Prentice Hall of India Pvt. Ltd.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

(1) Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**3**	**2**	**-**	**-**	**2**	**-**	**-**	**3**	**-**	**-**	**2**	**-**	**3**	**2**	**-**	**-**
CO2	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**		**2**	**1**	**-**	**-**
CO3	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**		**2**	**1**	**-**	**-**
CO4	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**		**2**	**1**	**-**	**-**

Program: MCA					**Semester:** 1st		
Course Title: DATA STRUCTURES USING C++					**Course Code:** MCA-102		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: This course covers fundamental data structures and their use in programming. This includes both class design and features of the C++ programming language. Much of our discussion will be built around the design and use of the C++ standard library (STL). By using the standard library, students will be able to write reasonably sophisticated programs quickly.

Course Outcomes

CO1: Apply C++ features to program design and implementation.
CO2: Use C++ to demonstrate practical experience in developing object-oriented solutions.
CO3: Implement an achievable practical application and analyze issues related to object-oriented techniques in the C++ programming language.
CO4: Analyze the performance of algorithms and data structures.

Theory **3 Hrs /Week**

Unit	Topic	Hours
1	Introduction to OOP, C++ Class Overview- Class Definition, Objects, Class Members, Access Control, Class Scope, Constructors and destructors, parameter passing methods, Inline functions, static class members, this pointer, friend functions, dynamic memory allocation and de allocation (new and delete), exception handling.	10 Hours
2	Functions Overloading, Operator Overloading, Generic Programming- Function and class templates, Inheritance basics, base and derived classes, inheritance types, base class access control, runtime polymorphism using virtual functions, abstract classes, streams I/O.	10 Hours
3	Review of basic data structures - the list ADT, stack ADT, queue ADT, implementation using template classes in C++, Dictionary- Hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing.	10 Hours
4	Trees : Binary search trees, definition, ADT, implementation, operations-searching, insertion and deletion, Tree Traversals, Balanced search trees- AVL trees, definition, height of an AVL tree, representation, operations-insertion, deletion and searching, B-Trees-B-Tree of order m, height of a B-Tree, insertion, deletion and searching	08 Hours
5	Graphs : Representation of Graphs, Topological Sort, Shortest Path Algorithms-Dijkstra's Algorithms, Depth First Search and Breadth First Search, Minimum spanning trees-Prim's and Kruskal's Algorithms.	05 Hours

Textbooks

1. Data Structures and Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education, 2ndedition.
2. Object Oriented Programming with C++, E Balagurusamy, Mcgraw Hill Higher Education, 2nd edition

Reference books

1. Object Oriented Programming with C++, Subhash K U, Pearson.

2. Data structures and Algorithms in C++, Michael T.Goodrich, R.Tamassia and D.Mount, 7thEdition Wiley student edition, John Wiley and Sons.
3. Data Structures and Algorithms in C++, 3rdEdition, Adam Drozdek, Thomson, C++, The Complete Reference, 4th Edition, Herbert Schildt, TMH.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	**3**	**3**	**2**	**2**	**3**	**3**	**0**	**3**	**0**	**2**	**2**	**1**	**3**	**3**	**0**	**2**
CO2	**3**	**3**	**2**	**2**	**3**	**3**	**0**	**3**	**0**	**2**	**2**	**1**	**3**	**3**	**0**	**2**
CO3	**3**	**3**	**2**	**2**	**3**	**3**	**0**	**3**	**0**	**2**	**2**	**1**	**3**	**3**	**0**	**2**
CO4	**3**	**3**	**2**	**2**	**3**	**3**	**0**	**3**	**0**	**2**	**2**	**1**	**3**	**3**	**0**	**2**

Program: MCA					Semester: 1st		
Course Title: DATA STRUCTURES USING C++ Lab					Course Code: MCA-102P		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	2	4	2	15	10	25

Course Description: This Course exemplifies the active learning experience. With a dynamic learn-by-doing focus, this laboratory manual encourages students to explore data structures by implementing them, a process through which students discover how data structures work and Continued development of programming style using abstract data structures and top-down design. Debugging and testing of large programs. Emphasis on algorithm development. List processing. Recursion. (Stacks, trees, searching and sorting.)

Course Outcomes:

CO1: Conceptualize the class and member concepts as to implement them use different access modifiers.
CO2: Implement programs using mathematical operator overloading.
CO3: Implement different file handling operations and pointers manipulation programs.
CO4: Implement templates and Exception handling concept

Practical **2 Hrs /Week**

Sr No.	Experiment Title
1	Write a program to take two numbers as input and print their sum and average.
2	Write a program to swap two numbers without using a third Variable.
3	Write a program to print the largest number among three numbers given by the user.
4	Write a single program that provides the sum, difference, multiplication and division of two numbers.
5	Write a program to print Fibonacci Series (0, 1, 1, 2, 3, 5, 8, 13, 21,...)
6	Write a program to demonstrate the use of class and object.
7	Write a program to demonstrate the use of constructor in a class.
8	Write a program to demonstrate the use of static variable and static function.
9	Write a program to demonstrate the use of static function and variable.
10	Write a program to get and print student data using inheritance.
11	Write a program to overload a sum function.
12	Write a Template based C++ program for implements Merge sort algorithm for sorting a given list of integers in ascending order.
13	Write a C++ program to implement all the functions of a dictionary (ADT) using hashing.
14	Write a C++ program that uses functions to perform the following: a) Create a singly linked list of integers. b) Delete a given integer from the above linked list. c) Display the contents of the above list after deletion.
15	Write a C++ program that uses functions to perform the following: a) Create a binary search tree of integers. b) Traverse the above Binary search tree non recursively in in order.
16	Write a C++ program that uses functions to perform the following: a) Create a binary search tree of integers. b) Search for an integer key in the above binary search tree non recursively. c) Search for an integer key in the above binary search tree recursively.

Textbooks

1. Gottfried, Byron S., Programming with C, Tata McGraw Hill
2. Balagurusamy, E., Programming in ANSI C, 4E, Tata McGraw-Hill

Reference books

1. Jeri R. Hanly & Elliot P. Koffman, Problem Solving and Program Design in C, Addison Wesley.
2. Yashwant Kanetker, Let us C, BPB.
3. Rajaraman, V., Computer Programming in C, PHI.
4. Yashwant Kanetker, Working with C, BPB.

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	2	1	-	-	-	-	-	2	-	1	2	2	-
CO2	1	1	-	2	1	-	-	-	-	-	2	-	1	2	2	-
CO3	1	1	-	3	1	-	-	-	-	-	2	-	1	2	2	-
CO4	1	1	-	2	1	-	-	-	-	-	2	-	1	2	2	-

Program: MCA					**Semester:** 1st		
Course Title: DATABASE SYSTEMS					**Course Code:** MCA-103		
L	T	P	CH	CP	Int. A	ESE	Total
4	-	-	4	4	60	40	100

Course Description: It provides a study of data models, data description languages, and query facilities including relational algebra and SQL, data normalization, transactions and their properties, physical data organization and indexing, security issues and object databases.

Course Outcomes:

CO1: Demonstrate the fundamentals of data models and conceptualize and depict a database system and Make use of ER diagram in developing ER Model
CO2: Summarize the SQL and relational database design.
CO3: Illustrate transaction processing, concurrency control techniques and recovery
CO4: Inference the database design in the real world entities

Theory **4**

Hrs /Week

Unit	Topic	Hours
1	Basic Concepts: File Systems vs. DMBS, Characteristics of the Data Base Approach, Abstraction and Data Integration, Database users, Advantages and Disadvantages of a DBMS. Data Base Systems Concepts and Architecture: Data Models, Schema and Instances, DBMS architecture and Data Independence, Data Base languages and Interfaces, DBMS functions and component modules. Entity Relationship Model: Entity Types, Entity Sets, Attributes & keys, Relationships, Relationships Types, Roles and Structural Constraints, Design issues, E-R Diagrams, Design of an E-R Database Schema, Reduction of an E-R schema to Tables. Relational Data Model: Relational model concepts, Integrity constraints over Relations, Relational Algebra – Basic Operations	12 Hours
2	SQL: DDL, DML, and DCL, views& Queries in SQL, Specifying Constraints & Indexes in SQL. Conventional Data Models: An overview of Network and Hierarchical Data Models.	08 Hours
3	Relational Data Base Design: Functional Dependencies, Decomposition, Normal forms based on primary keys (1 NF, 2 NF, 3 NF, & BCNF), Multi-valued Dependencies, 4 NF, Join dependencies, 5 NF, Domain key normal form.	10 Hours
4	Transaction Processing Concepts: Introduction to Transaction Processing, Transaction & System Concepts, Properties of Transaction, Schedules and Recoverability, Serializability of Schedules.	05 Hours
5	Concurrency Control Techniques: Locking Techniques, Time stamp ordering, Multi-version Techniques, Optimistic Techniques, Granularity of Data items. Recovery Techniques: Recovery concepts, Recovery Techniques in centralized DBMS. Data Base Security: Introduction to Data base Security issues.	08 Hours

Text Books:

1. Elmasri & Navathe: Fundamentals of Database systems, 5th edition, Pearson Education.
2. Thomas Connolly Carolyn Begg: Database Systems, 3/e, Pearson Education.

Reference Books:

1. Korth & Silberschatz: Database System Concept, 4th Edition, McGraw Hill International Edition.
2. Database Systems: A practical Approach to Design, Implementation and Management, Pearson Education- 3e
3. C.J. Date: An Introduction to Data Bases Systems 7th Edition, Addison Wesley N. Delhi.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	2	1	1	1	-	-	-	2	-	1	2	2	1
CO2	1	1	-	2	1	1	1	-	-	-	2	-	1	2	2	1
CO3	1	1	-	3	1	1	1	-	-	-	2	-	1	2	2	1
CO4	1	1	-	2	1	1	1	-	-	-	2	-	1	2	2	1

Program: MCA					**Semester:** 1st		
Course Title: Discrete Mathematical Structure					**Course Code:** MCA-104		
L	T	P	CH	CP	Int. A	ESE	Total
3	1	-	4	3.5	60	40	100

Course Description: The purpose of this course is to understand and use (abstract) discrete structures that are backbones of computer science. In particular, this class is meant to introduce logic, proofs, sets, relations, functions, counting, and probability, with an emphasis on applications in computer science.

Course Outcomes

CO1: Prepare to develop mathematical logic essentially required in
CO2: Complex programming. Able to learn and apply set theory, algebraic structures, lattices
CO3: Boolean algebra, graph theory. Able to troubleshoot fault detection in combinational switching
CO4: Circuits. Understand and able to apply learns to analyse algorithms for generating a fault matrix

Theory **3**

Hrs /Week

Unit	Topic	Hours
1	Sets: Definition, Representation of Set, Types of Sets, Set operations, Subset and Super Sets, Cardinality of Set, Cartesian Products of Two Sets, Principle of Mathematical Induction. Relations: Binary Relation, Domain of Relation, Representation of Relation, Equivalence Relations, Functions: Definition, Domain of Function, Co-Domain of a Function, Properties of Functions, Types of functions, Countable & Uncountable Sets, Pigeon-hole Principle, Composition of Functions.	12 Hours
2	Graph Theory: Graphs – Directed, Undirected, Simple. Adjacency & Incidence. Degree of Vertex, Sub graph, Complete graph, Cycle & Wheel Graph, Bipartite & Complete Bipartite Graph, Weighed Graph, and Union of Simple Graphs. Complete Graphs. Isomorphic Graphs, Path, Cycles & Circuits Euclerian & Hamiltonian Graphs. Planar Graph: Kuratowski's Two Graphs, Euler's Formula, Trees: Spanning trees, Finding Spanning Tree, Complexity of Graph, and Minimal Spanning Tree.	10 Hours
3	Latices and boolean algebra: Permutations and Combinations, Principle of Inclusion and Exclusion, Mathematical Logic, Partial Order Set, Bounding Elements, Lattices, Principle of Duality, Bounded, Distributed, and Complemented Lattices, Proposition and Propositional Calculus.	10 Hours
4	Group: Definitions and Properties, Coset & Subgroup, Normal subgroup, Homomorphism of groups, Cyclic Group, Permutation Group.	05 Hours
5	Language of Logic: Proposition, Compound Proposition, Conjunction, Disjunction, Implication, Converse, Bi-conditional Statements, tautology, Contradiction & Contingency, Logical Equivalences, Quantifiers, Arguments.	05 Hours

Text Books:

1. Discrete Mathematical Structures with applications to Computer Science Author: J.P. Jrencbla and R. Manohar Publisher, Tata Mc-Graw Hill
2. Discrete Maths and its application, Author: Bhupinder singh Publisher, Tata Mc-GrawHill

Reference Books:

1. Olympia Nicodemy, " Discrete Mathematics ", Cbs Publisher, Delhi
2. C. L. Liu, "Elements of Discrete Mathematics", Tata Mcgrraw- Hill Publishing Company Limited, New Delhi.
3. Bernard Kolman And Robert C. Busby, "Discrete Mathematical Structures For Computer Science", rentice- Hall Of India Pvt. Ltd., New Delhi.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	1	1	2	-	-	-	-	-	2	2	2	2	2	1
CO2	2	1	-	1	2	-	-	-	-	-	2	2	2	2	2	1
CO3	2	1	1	1	2	-	-	-	-	-	2	2	2	2	2	1
CO4	2	1	1	1	2	-	-	-	-	-	2	2	2	2	2	1

Program: MCA					**Semester:** 1st		
Course Title: Business Communication					**Course Code:** ENG-701		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: Application of business communication principles through creation of effective business documents and oral presentations. Includes study and application of team communication and use of technology to facilitate the communication process.

Course Outcomes

CO1: Apply business communication theory to solve workplace communication issues.
CO2: Demonstrate the communication skills required in the workplace.
CO3: Understand complex ideas in written and spoken formats.
CO4: Express complex ideas accurately in written and spoken formats.

Theory **3**

Hrs /Week

Unit	Topic	Hours
1	INTRODUCTION : Introduction and Principles of Communication: Meaning and Process, Barriers and Gateway in communication. Models of Communication: Linear and Non-Linear models, Murphy model, Thill and Bovee models and Berol's model.	10 Hours
2	WRITTEN COMMUNICATION : Guidelines for Technical writing, Report writing, Preparation of Bibliography, Glossaries, Appendixes and Index. Proposal, Technical Articles, Memos, Advertisements, Editing and Proof Reading, Business Correspondence- types and layout.	10 Hours
3	PRESENTATION SKILLS : Elements of Presentation, designing a presentation, types of Visual aids, Appearance and Posture, Time Management, Practicing delivery of Presentation.	10 Hours
4	EMPLOYMENT COMMUNICATION : Resume Writing, Job Application Letter, Job Interview- Process, Stages, Types, Desirable Qualities and Tips. Negotiation Skill. Case Method: Understanding the case method, Types, Overcoming the difficulties of the case study. Communication Network: Internet, E-mail, Tele Conferencing, Video Conferencing.	05 Hours
5	GROUP COMMUNICATION : Public Speaking: Choosing an appropriate Pattern, selecting an appropriate method. Meeting: Objectives, Planning, timing, venue of meeting. Media Management: Press Release, Press Conference, Seminars , Workshop.	05 Hours

Text Books:
1. M.K. Sehgal & V. Khetrapal – Business Communication (Excel Books).
2. Rajendra Pal – Business Communication (Sultanchand & Sons Publication).

Reference Books:
1. P.D. Chaturvedi – Busines Communication (Pearson Education, 1st Edition 2006).
2. Lesikar RV & Pettit Jr. JD – Basic Business Communication : Theory & Application (Tata Mc Grow Hill, 10th Edition).

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Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	1	-	-	-	-	2	-	2	2	2	2	2	1
CO2	2	1	-	1	-	-	-	-	2	-	2	2	2	2	2	1
CO3	2	1	-	1	-	-	-	-	2	-	2	2	2	2	2	1
CO4	2	1	-	1	-	-	-	-	2	-	2	2	2	2	2	1

Program: MCA					**Semester:** 1st		
Course Title: Professional Communication LAB					**Course Code:** ENG-701P		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	1	2	1	15	10	25

Course Description: Business and Professional Speech Communication, is a course which provides students the opportunity to develop skills and understandings useful in the career environment. A variety of communication situations may be analyzed, including: problem solving; discussion groups; organizational networks; interviewing; and, conference planning and speaking. This course emphasizes the theory and practice of communication as it relates particularly to business and professional settings. Readings and discussions focus upon the philosophies and practice of organizational communication. Basic concepts of effective speech communication are presented, which students can apply in their career environments.

Course Outcomes

CO1: Effective business writing
CO2: Effective business communications
CO3: Research approaches and information collection
CO4: Developing and delivering effective presentations & effective interpersonal communications skills that maximise team effectiveness. Good time management & effective problem solving

Theory **2 Hrs/Week**

Sr No.	Experiment Title
1	Group Discussion
2	Just a minutes session: Speaking Extempore for one minutes on given topics
3	Reading aloud of newspaper headlines and important articles.
4	Improving pronunciation through tongue twisters.
5	Mannerism or Etiquette.
6	Mock Interview

Text Books:
1. M.K. Sehgal & V. Khetrapal – Business Communication (Excel Books).
2. Rajendra Pal – Business Communication (Sultanchand & Sons Publication).

Reference Books:
1. P.D. Chaturvedi – Busines Communication (Pearson Education, 1st Edition 2006).
2. Lesikar RV & Pettit Jr. JD – Basic Business Communication : Theory & Application (Tata Mc Grow Hill, 10th Edition).

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1

81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	1	-	-	-	-	2	-	2	2	2	2	2	1
CO2	2	1	-	1	-	-	-	-	2	-	2	2	2	2	2	1
CO3	2	1	-	1	-	-	-	-	2	-	2	2	2	2	2	1
CO4	2	1	-	1	-	-	-	-	2	-	2	2	2	2	2	1

Program: MCA					**Semester:** 2nd		
Course Title: OPERATING SYSTEM & LINUX					**Course Code:** MCA-201		
L	T	P	CH	CP	Int. A	ESE	Total
4	-	-	4	4	60	40	100

MCA 1st Year / 2nd Semester

Course Description: This course provided students with the fundamental concepts of Linux/UNIX operating systems. The course covers such topics as the Linux/UNIX file system, commands, utilities, text editing, shell programming and text processing utilities. Students learn command line syntax and features of the popular Linux/UNIX shells, including filename generation, redirection, pipes and quoting mechanisms. The course is designed to help students prepare for professional careers in the information and communication technology (ICT) field. It also helps prepare individuals seeking to pass the CompTIA Linux+ (powered by the Linux Professional Institute (LPI)) certification exam. While directed towards cyber security concepts, this class is appropriate for Web Designers, Network Technicians, Game Developers and general Computer Technicians. Individuals possessing a Linux+ certification or equivalent may apply for waiver for this class.

Course Outcomes

CO1: Demonstrate a basic knowledge of working with Linux
CO2: Demonstrate navigation between directories to access and manipulate files
CO3: Demonstrate the creation of multiple partitions allowing a computer to "dual boot"
CO4: Use a common scripting language in Linux to perform various cyber security network scanning techniques

Theory **4 Hrs/Week**

Unit	Topic	Hours
1	Introduction: Definition and types of operating systems, Batch Systems, multi programming, time–sharing parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls, system programs, Virtual machines.	05 Hours
2	Process Management: Process concept, Process scheduling, Cooperating processes, Threads, Interprocess communication, CPU scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real-time scheduling and Algorithm evaluation.	06 Hours
3	Process Synchronization and Deadlocks: The Critical-Section problem, synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, Monitors, Deadlocks-System model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock, Combined approach to deadlock handling.	09 Hours
4	Storage management: Memory Management-Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with paging in MULTICS and Intel 386, Virtual Memory, Demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrasing, Page Size and other considerations, Demand segmentation, File systems, secondary Storage Structure, File concept, access methods, directory implementation, Efficiency and performance, recovery, Disk structure, Disk scheduling methods, Disk management, Recovery, Disk structure, disk scheduling methods, Disk	10 Hours

	management, Swap-Space management, Disk reliability.	
5	Security & Case Study: Protection and Security-Goals of protection, Domain of protection, Access matrix, Implementation of access Matrix, Revocation of Access Rights, language based protection, The Security problem, Authentication, One Time passwords, Program threats, System threats, Threat Monitoring, Encryption. Windows NT- Design principles, System components, Environmental subsystems, File system, Networking and program interface, Linux system - design principles, Kernel Modules, Process Management, Scheduling, Memory management, File Systems, Input and Output, Inter process communication, Network structure, security.	12 Hours

Text Books:

1. Abraham Siberschatz and Peter Baer Galvin, “Operating System Concepts”, Fifth Edition, Addison-Wesley
2. Milan Milankovic, “Operating Systems, Concepts and Design”, McGraw-Hill.

Reference Books:

1. Harvey M Deital, "Operating Systems", Addison Wesley
2. Richard Peterson, “Linux: The Complete Reference”, Osborne McGraw-Hill.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	2	1	1	1	1	-	-	2	-	1	2	2	1
CO2	1	1	-	2	1	1	1	1	-	-	2	-	1	2	2	1
CO3	1	1	1	3	1	1	1	1	-	-	2	1	1	2	2	1
CO4	1	1	1	2	1	1	1	1	-	-	2	2	1	2	2	1

Program: MCA					**Semester:** 2nd		
Course Title: COMPUTER NETWORKS					**Course Code:** MCA-202(Elective)*		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: This course provides an introduction to computer networks, with a special focus on the Internet architecture and protocols. Topics include layered network architectures, addressing, naming, forwarding, routing, communication reliability, the client-server model, web and email protocols. Besides the theoretical foundations, students acquire practical experience by programming reduced versions of real Internet protocols.

Course Outcomes

CO1: Understand and describe the layered protocol model.
CO2: Program network communication services for client/server and other application layouts.
CO3: Describe, analyses and evaluate various related technical, administrative and social aspects of specific computer network protocols from standards documents and other primary materials found through research.
CO4: Design, analyses, and evaluates networks and services for homes, data centers, IoT/IoE, LANs and WANs.

Theory **3 Hrs/Week**

Unit	Topic	Hours
1	Introductory Concepts: Goals and Applications of Networks, Network structure and architecture, the OSI reference model, services, networks topology, Physical Layer- transmission, switching methods, Integrated services digital networks, terminal handling.	08 Hours
2	Medium access sub layer: Channel allocations, LAN protocols, ALOHA Protocols- Pure ALOHA, slotted ALOHA, Carrier Sense Multiple Access Protocols, CSMA with Collision Detection, Collision free Protocols, IEEE standards, Ethernet, FDDI,Data Link Layer- basic design issues, error correction & detection algorithms, elementary data link layer protocols, sliding window protocols, error handling, High Level Data Link Control.	10 Hours
3	Network Layer: Point-to Point networks, concept of virtual circuit and LAN, routing algorithms, congestion control algorithms, internetworking, TCP/IP protocol, IP addresses, IPv6.	06 Hours
4	Transport Layer: Design issues, connection management, Internet Transport Protocol (UDP), Ethernet transport Protocol, Transmission Control Protocol. (TCP).	06 Hours
5	Application Layer: Domain Name System, Simple Network Management Protocol, Electronic mail, File Transfer Protocol, Hyper Text Transfer Protocol, Introduction to Cryptography and Network Security (DES, RSA algorithms), Communication Security (IPSec, Firewalls), Authentication protocols such as authentication based on shared key (Diffie Helleman Key exchanger), Introduction to multimedia and compression Techniques.	10 Hours

Text Books:

1. Computer Networks by A. S Tanenbaum, 4thEdition", Pearson education

Reference Books:

1. Data and Computer Communication by W. Stallings, Macmillan Press
2. Computer Networks & Internet with Internet Applications by Comer Pearson Education
3. Internetworking with TCP/IP by PHI

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	2	1	1	1	-	-	-	2	-	1	2	2	1
CO2	1	1	1	2	1	1	1	-	-	-	2	-	1	2	2	1
CO3	1	1	1	3	1	1	1	-	-	2	2	-	1	2	2	1
CO4	1	1	2	2	1	1	1	-	-	2	2	-	1	2	2	1

Program: MCA					**Semester:** 2nd		
Course Title: COMPUTER NETWORKS Lab					**Course Code:** MCA-202P(Elective)*		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	2	4	2	15	10	25

Course Description: The objective of this lab course is to get practical knowledge of working principles of various communication protocols. Analyse structure and formats of TCP/IP layer protocols using network tools such as Wireshark and network simulators. Implementing various network algorithms such as error control, error detection, routing, and security related algorithms.

Course Outcomes

CO1: Understand the practical approach to network communication protocols.
CO2: Understand network layers, structure/format and role of each network layer.
CO3: Able to design and implement various network application such as data transmission between client and server, file transfer, real-time multimedia transmission.
CO4: Understand the various Routing Protocols/Algorithms and Internetworking.

Practical **2 Hrs/Week**

Sr No.	Experiment Title
1	Study of different types of Network cables and Practically implement the cross-wired cable and straight through cable using clamping tool.
2	Study of Network Devices in Detail.
3	Study of network IP.
4	Connect the computers in Local Area Network.
5	Study of basic network command and Network configuration commands.
6	Performing an Initial Switch Configuration
7	Troubleshooting a Switched Network
8	Performing an Initial Router Configuration
9	Configuring and Connecting a Switch
10	Configuring WEP on a Wireless Router
11	Using the Cisco IOS Show Commands
12	Examining WAN Connections
13	Interpreting Ping and Traceroute Output
14	Demonstrating Distribution Layer Functions
15	Placing ACLs 16 Exploring Different LAN Switch Options
16	Implementing an IP Addressing Scheme

Textbooks

1. Computer Networking: A Top-Down Approach.
2. Computer Networks.

Reference books

1. Network Warrior.
2. Networking All-in-One For Dummies.

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	2	1	1	1	1	-	-	2	-	1	2	2	1
CO2	1	1	-	2	1	1	1	1	-	-	2	-	1	2	2	1
CO3	1	1	1	3	1	1	1	1	-	-	2	1	1	2	2	1
CO4	1	1	1	2	1	1	1	1	-	-	2	2	1	2	2	1

Program: MCA					**Semester:** 2nd		
Course Title: Advance JAVA PROGRAMMING					**Course Code:** MCA-203		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: A study of the Java programming language to design advanced graphical user interfaces and Web- enabled applications. Topics include JavaBeans, internationalization, Java GUI design, APIs and advanced Java database programming, Java Servlets, JavaServer Pages and JavaServer Faces.

Course Outcomes

CO1: Learn the Internet Programming, using Java Applets
CO2: Create a full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) & Swings
CO3: Apply event handling on AWT and Swing components. Create dynamic web pages, using Servlets and JSP.
CO4: Learn to access database through Java programs, using Java Data Base Connectivity (JDBC) Make a resusable software component, using Java Bean. Invoke the remote methods in an application using Remote Method Invocation (RMI)

Theory **3 Hrs/Week**

Unit	Topic	Hours
1	Core Java: Introduction, Operator, Data type, Variable, Arrays, Control Statements, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, Java Applet, String handling, Networking, Event handling, Introduction to AWT, AWT controls, Layout managers, Menus, Images, Graphics.	10 Hours
2	Java Swing: Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and feel, Labels, Text fields, Buttons, Toggle buttons, Checkboxes, Radio Buttons, View ports, Scroll Panes, Scroll Bars, Lists, Combo box, Progress Bar, Menus and Toolbars, Layered Panes, Tabbed Panes, Split Panes, Layouts, Windows, Dialog Boxes, Inner frame. JDBC: The connectivity Model, JDBC/ODBC Bridge, java.sql package, connectivity to remote database, navigating through multiple rows retrieved from a database	10 Hours
3	Java Beans: Application Builder tools, The bean developer kit(BDK), JAR files, Introspection, Developing a simple bean, using Bound properties, The Java Beans API, Session Beans, Entity Beans, Introduction to Enterprise Java beans (EJB), Introduction to RMI (Remote Method Invocation): A simple client-server application using RMI.	10 Hours
4	Database Programming using JDBC: Database Programming using JDBC Introduction to JDBC, JDBC Drivers & Architecture, CURD operation Using JDBC, Connecting to non-conventional Databases. Java Servlets: Servlet basics, Servlet API basic, Life cycle of a Servlet, Running Servlet, Debugging Servlets, Thread-safe Servlets, HTTP Redirects, Cookies, Introduction to Java Server pages (JSP).	10 Hours

Text Books:

1. Margaret Levine Young, “The Complete Reference Internet”, TMH
2. Naughton, Schildt, “The Complete Reference JAVA2”, TMH

Reference Books:
1. Balagurusamy E, “Programming in JAVA”, TMH
2. Dustin R. Callway, “Inside Servlets”, Addison Wesley
3. Mark Wutica, “Java Enterprise Edition”, QUE

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1
CO2	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1
CO3	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1
CO4	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1

Program: MCA					**Semester:** 2nd		
Course Title: Advance JAVA PROGRAMMING Lab					**Course Code:** MCA-203P		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	2	4	2	15	10	25

Course Description: The Advanced Java Programming Learning Path is your one-stop guide to mastering recent Java platform updates. It contains detailed explanations of the latest programming advancements and language features introduced from Java 9 onwards. By taking this Leaning Path, you'll acquire practical guidance on how to apply many of these new features. As you progress through the Learning Path, you'll discover the key features to help you become more productive.

Course Outcomes

CO1: Solve simple problems using the fundamental syntax and semantics of Java
CO2: Analyze and design Java programs using object-oriented principles
CO3: Develop simple GUI interfaces with event handling capabilities
CO4: Develop and debug java programs using an IDE

Practical **2 Hrs/Week**

Sr No.	Experiment Title
1	Write a Java Program to define a class, describe its constructor, overload the Constructors and instantiate its object
2	Write a Java Program to define a class, define instance methods for setting and Retrieving values of instance variables and instantiate its object.
3	Write a Java Program to define a class, define instance methods and overload them and use them for dynamic method invocation.
4	Write a Java Program to demonstrate use of sub class
5	Write a Java Program to demonstrate use of nested class.
6	Write a Java Program to implement array of objects.
7	Write a Java program to practice using String class and its methods.
8	Write a Java program to practice using String Buffer class and its methods.
9	Write a Java Program to implement Vector class and its methods.
10	Write a Java Program to implement inheritance and demonstrate use of method overriding.
11	Write a Java Program to implement multilevel inheritance by applying various access controls to its data members and methods.
12	Write a Java program to implement the concept of importing classes from user defined package and creating packages.
13	Write a program to implement the concept of Exception Handling using
14	Write a program using Applet to display a message in the Applet.
15	Write a program using Applet For configuring Applets by passing parameters.
16	Write a Java Program to demonstrate Keyboard event
17	Write a Java Program to demonstrate Mouse events
18	Write a JAVA Program to insert data into Student DATA BASE and retrieve info based on particular queries (For example update, delete, search etc…).
19	Write a JAVA Servlet Program to implement a dynamic HTML using Servlet (user name and Password should be accepted using HTML and displayed using a Servlet).
20	Write a JAVA Servlet Program to implement and demonstrate GET and POST

	methods (Using HTTP Servlet Class).

Text Books:

1. Margaret Levine Young, "The Complete Reference Internet", TMH
2. Naughton, Schildt, "The Complete Reference JAVA2", TMH

Reference Books:

1. Balagurusamy E, "Programming in JAVA", TMH
2. Dustin R. Callway, "Inside Servlets", Addison Wesley
3. Mark Wutica, "Java Enterprise Edition", QUE

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1
CO2	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1
CO3	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1
CO4	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1

Program: MCA					**Semester:** 2nd		
Course Title: E-COMMERCE					**Course Code:**MCA-204		
L	T	P	CH	CP	Int. A	ESE	Total
3	1	-	4	3.5	60	40	100

Course Description: This course provides an introduction to information systems for business and management. It is designed to familiarize students with organizational and managerial foundations of systems, the technical foundation for understanding information systems

Course Outcomes

CO1: Understand the basic concepts and technologies used in the field of management information systems.
CO2: Have the knowledge of the different types of management information systems.
CO3: Understand the processes of developing and implementing information systems.
CO4: Be aware of the ethical, social, and security issues of information systems

Theory **3 Hrs/Week**

Unit	Topic	Hours
1	Introduction: Electronic Commerce - Technology and Prospects, Definition of E-Commerce, Economic potential of electronic commerce, Incentives for engaging in electronic commerce, forces behind E-Commerce, Advantages and Disadvantages, Architectural framework, Impact of E-commerce on business. Network Infrastructure for E-Commerce: Internet and Intranet based E-commerce- Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, and FRAME RELAY).	10 Hours
2	Mobile Commerce: Introduction, Wireless Application Protocol, WAP technology, Mobile Information device, Mobile Computing Applications.	05 Hours
3	Web Security: Security Issues on web, Importance of Firewall, components of Firewall, Transaction security, Emerging client server, Security Threats, Network Security, Factors to consider in Firewall design, Limitation of Firewalls.	05 Hours
4	Encryption: Encryption techniques, Symmetric Encryption- Keys and data encryption standard, Triple encryption, Asymmetric encryption- Secret key encryption, public and private pair key encryption, Digital Signatures, Virtual Private Network.	10 Hours
5	Electronic Payments: Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking. EDI Application in business, E- Commerce Law, Forms of Agreement, Govt. policies and Agenda.	10 Hours

Text Books:
Ravi Kalakota, Andrew Winston, “Frontiers of Electronic Commerce”, Addison Wesley.
Bajaj and Nag, “E-Commerce the cutting edge of Business”, TMH
Reference Books:
P. Loshin, John Vacca, “Electronic commerce”, Firewall Media, New Delhi

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	-	-	2	2	1	-	-	1	-	1	-	1	-
CO2	1	1	-	-	-	2	2	1	-	-	1	-	1	-	1	-
CO3	1	1	-	-	-	2	1	1	-	-	1	-	1	-	1	-
CO4	1	1	-	-	-	2	3	1	-	-	1	-	1	-	1	-

Program: MCA					**Semester:** 2nd		
Course Title: SOFTWARE ENGINEERING					**Course Code:** MCA-205		
L	T	P	CH	CP	Int. A	ESE	Total
3	1	-	4	3.5	60	40	100

Course Description: This course covers the basic principles and concepts of software engineering; system requirements; secure programming in the large; modeling and testing; object oriented analysis and design using the UML; design patterns; frameworks and APIs; client-server architecture; user interface technology; and the analysis, design and programming of extensible software systems.

Course Outcomes

CO1: Learn the theory and foundations of software engineering.
CO2: Learn the different process models and chooses the best model for their project
CO3: Be able to construct requirement models
CO4: Be able to create test cases and implement different testing strategies

Theory **3 Hrs/Week**

Unit	Topic	Hours
1	Introduction: Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.	08 Hours
2	Software Requirement Specifications (SRS): Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS.Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software QualityFrameworks, ISO 9000 Models, SEI-CMM Model.	08 Hours
3	Software Design: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Halestead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.	09 Hours
4	Software Testing:Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing. Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.	09 Hours
5	Software Maintenance and Software Project Management : Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An	09 Hours

	Overview of CASE Tools. Estimation of Various. Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.	

Text Books:

1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.

Rajib Mall, Fundamentals of Software Engineering, PHI Publication.

2. K. K. Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.

Reference Books:

1. Carlo Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication.
2. Ian Sommerville, Software Engineering, Addison Wesley.
3. Pfleeger, Software Engineering, Macmillan Publication.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	-	1	1	2	1	-	2	-	1	-	1	1	1	-
CO2	3	3	-	1	1	2	1	-	2	-	1	-	1	1	1	-
CO3	3	3	-	1	1	2	1	-	2	-	1	-	1	1	1	-
CO4	3	3	-	1	1	2	1	-	2	-	1	-	1	1	1	-

Program: MCA					**Semester:** 2nd		
Course Title: CRYPTOGRAPHY AND NETWORK SECURITY					**Course Code:** MCA-206(Elective)*		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: This Course focuses towards the introduction of network security using various cryptographic algorithms. Underlying network security applications. It also focuses on the practical applications that have been implemented and are in use to provide email and web security.

Course Outcomes

CO1: Understand the most common type of cryptographic algorithm ·
CO2: Understand the Public-Key Infrastructure · Understand security protocols for protecting data on networks ·
CO3: Understand vulnerability assessments and the weakness of using passwords for authentication
CO4: Be able to configure simple firewall architectures · Understand Virtual Private Networks

Theory **3 Hrs/Week**

Unit	Topic	Hours
1	Introduction to Cryptography: Introduction To Security: Attacks, Services & Mechanisms, Security,Attacks, And Security Services. Conventional Encryption: Classical Techniques, Conventional Encryption Model, and Steganography, Classical Encryption Techniques. Modern Techniques: Simplified DES, Block Cipher Principles, DES Standard, DES Strength, Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operation.	10 Hours
2	Conventional Encryption Algorithms: Triples DES, Blowfish, International Data Encryption Algorithm,RCS, CAST-128, RC2 Placement & Encryption Function, Key Distribution, Random Number Generation, Placement Of Encryption Function.	05 Hours
3	Public Key Encryption: Public-Key Cryptography: Principles Of Public-Key Cryptosystems, RSAAlgorithm, Key Management, Fermat's & Euler's Theorm, Primality, The Chinese Remainder Theorem.	05 Hours
4	Hash Functions: Message Authentication & Hash Functions: Authentication Requirements,Authentication Functions, Message Authentication Codes, Hash Functions, Birthday Attacks, Security Of Hash Function & MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signatures: Digital Signatures, Authentication Protocol, Digital Signature Standard (DSS), Proof Of Digital Signature Algorithm.	10 Hours
5	Network & System Security: Authentication Applications: Kerberos X.509, Directory AuthenticationService, Electronic Mail Security, Pretty Good Privacy (PGP), S / Mime, Security: Architecture, Authentication Header, Encapsulating Security Payloads, Combining Security Associations, Key Management.Web Security: Secure Socket Layer & Transport Layer Security, Secure Electronic Transaction (Set), System Security: Intruders, Viruses, Firewall Design Principles, Trusted Systems.	10 Hours

Text Books:

1. William Stallings, “Cryptography and Network Security: Principles and Practice”, Prentice Hall, New Jersey

Reference Books:

1.Johannes A. Buchmann, “Introduction to cryptography”, Springer- Verlag.

2 Atul Kahate, “Cryptography and Network Security”, TMH

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	2	2	1	3	1	-	1	-	-	3	-	1	2	2	1
CO2	3	2	2	1	3	1	3	1	-	-	3	-	1	2	2	1
CO3	3	2	2	1	3	1	-	1	-	-	3	-	1	2	2	1
CO4	3	2	2	1	3	1	1	1	-	-	3	-	1	2	2	1

Program: MCA					**Semester:** 2nd		
Course Title: CRYPTOGRAPHY AND NETWORK SECURITY					**Course Code:** MCA-206P(Elective)*		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	2	4	2	15	10	25

Course Description: The aim of this course is to introduce the student to the areas of cryptography and cryptanalysis. This course develops a basic understanding of the algorithms used to protect users online and to understand some of the design choices behind these algorithms.

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Course Outcomes:

CO1: To understand basics of Cryptography and Network Security.
CO2: To be able to secure a message over insecure channel by various means.
CO3: To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
CO4: To understand various protocols for network security to protect against the threats in the networks.

Theory **2 Hrs/Week**

Sr No.	Experiment Title
1	Implement Caesar Cipher & perform brute force attack on Caesar cipher.
2	Implementation of Playfair and Vigenere Cipher.
3	Implementation of Hill cipher.
4	Implementation of RC4 algorithm.
5	Implementation of S-DES.
6	Implementation of S-AES
7	Implementation of RSA.
8	Implementation of Diffie-Hellman key exchange technique.
9	Implementation of ECC.
10	Implement Hash algorithm.
11	Implementation of packet sniffer.
12	Study of the features of firewall in providing network security and to set Firewall Security in windows.
13	Steps to ensure Security of any one web browser (Mozilla Firefox/Google Chrome)
14	Study of different types of vulnerabilities for hacking a websites / Web Applications.
15	Analysis the Security Vulnerabilities of E-commerce services.
16	Analysis the security vulnerabilities of E-Mail Application

Textbooks

3. Computer Networking: A Top-Down Approach.
4. Computer Networks.

Reference books

3. Network Warrior.
4. Networking All-in-One For Dummies.

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	1	-	2	1	1	1	1	-	-	2	-	1	2	2	1
CO2	1	1	-	2	1	1	1	1	-	-	2	-	1	2	2	1
CO3	1	1	1	3	1	1	1	1	-	-	2	1	1	2	2	1
CO4	1	1	1	2	1	1	1	1	-	-	2	2	1	2	2	1

MCA 2nd Year / 3rd Semester

Program: MCA					**Semester:** 3rd		
Course Title: DESIGN AND ANALYSIS OF ALGORITHMS					**Course Code:** MCA-301		
L	T	P	CH	CP	Int. A	ESE	Total
4	-	-	4	4	60	40	100

Course Description: Algorithms are the soul of computing. Algorithmic thinking, unlike the very young electronic machinery it brings alive, is rooted in ancient mathematics. It can be roughly described as creating "recipes" (well defined sequences of computational steps) for getting "things" (computational problems specifying an input-output relation) "successfully" (correctly) "done" (in finite steps and time). This course introduces basic methods for the design and analysis of efficient algorithms emphasizing methods useful in practice. Different algorithms for a given computational task are presented and their relative merits evaluated based on performance measures. The following important computational problems will be discussed: sorting, searching, elements of dynamic programming and greedy algorithms, advanced data structures, graph algorithms (shortest path, spanning trees, tree traversals), string matching, elements of computational geometry, NP completeness.

Course Outcomes:

CO1: Argue the correctness of algorithms using inductive proofs and invariants.
CO2: Analyze worst-case running times of algorithms using asymptotic analysis.
CO3: Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide-and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
CO4: Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize dynamic-programming algorithms, and analyze them.

Theory **4 Hrs/Week**

Unit	Topic	Hours
1	Introduction: Algorithms, Analysis of Algorithms, Design of Algorithms, Complexity of Algorithms, Asymptotic Notations, Growth of function, Recurrences and their solution methods. Sorting in polynomial Time: Insertion sort, Merge sort, Heap sort, and Quick sort. Sorting in Linear Time: Counting sort, Radix Sort, Bucket Sort, Medians and order statistics.	10 Hours
2	Advanced Data Structure: Red Black Trees, Augmenting Data Structure, Binomial Heap, B-Tree, Fibonacci Heap, and Data Structure for Disjoint Sets, All kinds of Algorithms on these data structures, Dictionaries and priority Queues, mergeable heaps, concatenable queues.	09 Hours
3	Advanced Design and Analysis Techniques: Dynamic programming, Greedy Algorithm, Backtracking, Branch-and-Bound, Amortized Analysis.	06 Hours
4	Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single Source Shortest Path, All pair Shortest Path, Maximum flow and Traveling Salesman Problem.	06 Hours

5	Randomized Algorithms, String Matching, NP-Hard and NP-Completeness, Approximation Algorithms, Sorting Network, Matrix Operations, Polynomials and FFT, Number Theoretic Algorithms.	09 Hours

Text Books:

1. Design and Analysis of Computer Algorithms, Aho, Pearson Education Pub.
2. Fundamentals of Computer Algorithms by Horowitz and Sahani, Galgotia
3. Introduction to Algorithms by Thomas H Cormen Leiserson et al, PHI
4. Computer Algorithms: Introduction to Design and Analysis by Sara Baase and Allen Van Gelder, Pearson Education

Reference Books:

1. Algorithm Design by Jon Kleinberg and Eva Tardos, Pearson Education
2. Fundamental of Algorithms by Brassard Bratley, PHI
3. Algorithms Design by M T Goodrich et al, John Wiley
4. The Design and analysis of Algorithms by A V Aho et al, Pearson Education

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	-	-	2	2	1	-	-	-	-	2	-	1	2	1	-
CO2	3	-	-	2	2	1	-	-	-	-	2	-	1	2	1	-
CO3	3	-	-	2	2	1	-	-	-	-	2	-	1	2	1	-
CO4	3	-	-	2	2	1	-	-	-	-	2	-	1	2	1	-

Program: MCA					**Semester:** 3rd		
Course Title: Programming in Python					**Course Code:** MCA-302		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: This course provides an introduction to programming and the Python language. Students are introduced to core programming concepts like data structures, conditionals, loops, variables, and functions. This course includes an overview of the various tools available for writing and running Python, and gets students coding quickly. It also provides hands-on coding exercises using commonly used data structures, writing custom functions, and reading and writing to files. This course may be more robust than some other introductory python courses, as it delves deeper into certain essential programming topics.

Course Outcomes

CO1: Read, write, and execute simple Python programs.
CO2: Write simple Python programs for solving problems.
CO3: Decompose a Python program into functions, lists etc.
CO4: Read and write data from/to files in Python Programs

Theory **3 Hrs/Week**

Unit	Topic	Hours
1	Introduction: History, Features, Setting up path, working with Python, Basic Syntax, Variable and Data Types, Operator	05 Hours
2	Conditional Statements: If, If- else, Nested if-else Looping: For, While, Nested loops Control Statements: Break, Continue, Pass String Manipulation: Accessing Strings, Basic Operations, String slices, Function and Methods	12 Hours
3	Lists: Introduction, Accessing list, Operations, Working with lists, Function and Methods Tuple: Introduction, Accessing tuples, Operations, Working, Functions and Methods Dictionaries: Introduction, Accessing values in dictionaries, Working with dictionaries Properties, Functions	10 Hours
4	Functions: Defining a function, calling a function, Types of functions, Function Arguments, Anonymous functions, Global and local variables Modules: Importing module, Math module, Random module, Packages, Composition	07 Hours
5	Input-Output: Printing on screen, Reading data from keyboard, Opening and closing file, Reading and writing files, Functions Exception Handling: Exception, Exception Handling, except clause, Try? Finally clause, User Defined Exceptions	06 Hours

Text Books:
1. Seymour Lipschutz, “Data Structure”, Tata-McGraw-Hill

2. Horowitz, Sahni & Anderson-Freed, “Fundamentals of Data Structures in C”, Orientlongman.

Reference Books:
1. Head First Programming: A Learner's Guide to Programming Using the Python”, David Griffiths, Paul Barry
Think Python, Allen Downey

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1
CO2	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1
CO3	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1
CO4	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1

Program: MCA					**Semester:** 3rd		
Course Title: Programming in Python Lab					**Course Code:** MCA-302P		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	2	4	2	15	10	25

Course Description: Introduction to programming basics (what it is and how it works), binary computation, problem-solving methods and algorithm development. Includes procedural and data abstractions, program design, debugging, testing, and documentation. Covers data types, control structures, functions, parameter passing, library functions, arrays, inheritance and object oriented design. Laboratory exercises in Python.

Course Outcomes

CO1: Practice the Python programming language from its scratch: its syntax, idioms, patterns and styles
CO2: Illustrate the essentials of the Python library, and learn how to learn about other parts of the library when you need them
CO3: Demonstrate simple python programming using Databases
CO4: Recognize the IDE Jupyter

Practical **2 Hrs/Week**

Sr No.	Experiment Title
1	Write a program to demonstrate different number data types in Python.
2	Write a program to perform different Arithmetic Operations on numbers in Python.
3	Write a program to create, concatenate and print a string and accessing sub-string from a given string.
4	Write a python script to print the current date in the following format Sun May 29 02:26:23 IST 2017
5	Write a program to create, append, and remove lists in python.
6	Write a program to demonstrate working with tuples in python.
7	Write a program to demonstrate working with dictionaries in python.
8	Write a python program to find largest of three numbers.
9	Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [Formula : c/5 = f-32/9]
10	Write a Python script that prints prime numbers less than
11	Write a python program to find factorial of a number using Recursion.
12	Write a python program to define a module to find Fibonacci Numbers and import

	the module to another program.
13	Write a python program to define a module and import a specific function in that module to another program.
14	Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.
15	Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
16	Write a Python class to convert an integer to a roman numeral.
17	Write a Python class to implement pow(x, n)
18	Write a Python class to reverse a string word by word.

Text Books:

1. Seymour Lipschutz, "Data Structure", Tata-McGraw-Hill
2. Horowitz, Sahni & Anderson-Freed, "Fundamentals of Data Structures in C", Orientlongman.

Reference Books:

1. Head First Programming: A Learner's Guide to Programming Using the Python", David Griffiths, Paul Barry
2. Think Python, Allen Downey

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1
CO2	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1
CO3	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1
CO4	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1

Program: MCA					**Semester:** 3rd		
Course Title: ERP SYSTEMS					**Course Code:** MCA-303		
L	T	P	CH	CP	Int. A	ESE	Total
4	-	-	4	4	60	40	100

Course Description: This course examines the evolution of enterprise systems and the types of issues that managers will need to consider in implementing cross-functional integrated enterprise systems. We will examine the general nature of enterprise computing, re-engineering principles and the foundations of enterprise information architectures. The course provides an overview of the planning and control systems used by manufacturing companies to manage their supply chains within a context of an ERP system. The Lab course provides fundamentals of enterprise resource planning (ERP) systems concepts, and the importance of integrated information systems in an organization. The focus of this course is on illustrating procurement, production, and sales business processes using ERP software. Use of SAP as an example ERP system.

Course Outcomes

CO1: Identify the important business functions provided by typical business software such as enterprise resource planning and customer relationship management.
CO2: Describe basic concepts of ERP systems for manufacturing or service companies.
CO 3: Analyze the technical aspect of telecommunication systems, internet and their roles in business environment.
CO4: Develop skills necessary for building and managing relationships with customers, and stakeholders.

Theory **3 Hrs/Week**

Unit	Topic	Hours
1	Enterprise wide information system, Custom built and packaged approaches, Needs and Evolution of ERP Systems, Common myths and evolving realities, ERP and Related Technologies, Business Process Reengineering and Information Technology, Supply Chain Management, Relevance to Data Warehousing, Data Mining and OLAP, ERP Drivers, Decision support system.	10 Hours
2	ERP Domain, ERP Benefits classification, Present global and Indian market scenario, milestones and pitfalls, Forecast, Market players and profiles, Evaluation criterion for ERP product, ERP Life Cycle: Adoption decision, Acquisition, Implementation, Use & Maintenance, Evolution and Retirement phases, ERP Modules.	10 Hours
3	Framework for evaluating ERP acquisition, Analytical Hierarchy Processes (AHP), Applications of AHP in evaluating ERP, Selection of Weights, Role of consultants, vendors and users in ERP implementation; Implementation vendors evaluation criterion, ERP Implementation approaches and methodology, ERP implementation strategies, ERP Customization, ERP-A manufacturing Perspective.	10 Hours
4	Critical success and failure factors for implementation, Model for improving ERP effectiveness, ROI of ERP implementation, Hidden costs, ERP success inhibitors and accelerators, Management concern for ERP success, Strategic Grid: Useful guidelines for ERP Implementations.	05 Hours

5	Technologies in ERP Systems and Extended ERP, Case Studies Development and Analysis of ERP Implementations in focusing the various issues discussed in above units through Soft System approaches or qualitative Analysis tools, Learning and Emerging Issues, ERP and E-Commerce.	05 Hours

Text Books:

1. Lexis Leon, "Enterprise Resource Planning", TMH

Reference Books:

1. Brady, Manu, Wegner, " Enterprise Resource Planning", TMH

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	1	1	1	1	-	1	-	-	1	-	1	1	1	1
CO2	1	-	1	1	1	1	-	1	-	-	1	-	1	1	1	1
CO3	2	2	-	1	2	1	-	1	-	-	2	-	2	2	2	-
CO4	1	-	1	1	1	1	-	1	-	-	1	-	1	1	1	1

Program: MCA					**Semester:** 3rd		
Course Title: DOT NET FRAMEWORK AND C#					**Course Code:** MCA-304(Elective)*		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: This course will cover the practical aspects of multi-tier application development using the .NET framework. The goal of this course is to introduce the students to the basics of distributed application development. We will introduce the students to Web Service development and .NET remoting. Technologies covered include the Common Language Runtime (CLR), .NET framework classes, C#, ASP.NET, and ADO.NET. We will also cover service oriented architecture, design, performance, security, content managements systems and deployment issues encountered in building multi-tier distributed applications.

Course Outcomes

CO1: Understand the concepts of .NET Frame work
CO2: Understand the decision making statements and user interfacing controls
CO3: Understand the concept of class, constructor and access modifiers
CO4: Realize the exception handling mechanism

Theory **3 Hrs/week**

Unit	Topic	Hours
1	The .Net framework: Introduction, The Origin of .Net Technology, Common Language Runtime (CLR), Common Type System (CTS), Common Language Specification (CLS), Microsoft Intermediate Language (MSIL), Just-In –Time Compilation, Framework Base Classes.	10 Hours
2	C -Sharp Language (C#): Introduction, Data Types, Identifiers, Variables, Constants, Literals, Array and Strings, Object and Classes, Inheritance and Polymorphism, Operator Overloading, Interfaces, Delegates and Events. Type conversion.	10 Hours
3	C# Using Libraries: Namespace- System, Input-Output, Multi-Threading, Networking and sockets, Managing Console I/O Operations, Windows Forms, Error Handling.	05 Hours
4	Advanced Features Using C#: Web Services, Window Services, Asp.net Web Form Controls, ADO.Net. Distributed Application in C#, Unsafe Mode, Graphical Device interface with C#.	10 Hours
5	.Net Assemblies and Attribute: .Net Assemblies features and structure, private and share assemblies, Built-In attribute and custom attribute. Introduction about generic.	05 Hours

Text Books:

1. Wiley," Beginning Visual C# 2008",Wrox
2. Fergal Grimes," Microsoft .Net for Programmers". (SPI)
3. Balagurusamy," Programming with C#", (TMH)

Reference Books:

1. Mark Michaelis, "Essential C# 3.0: For .NET Framework 3.5, 2/e, Pearson Education
2. Shibi Parikkar, " C# with .Net Frame Work" , Firewall Media.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
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CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
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CO2	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1
CO3	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1
CO4	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1

Program: MCA					**Semester:** 3rd		
Course Title: DOT NET FRAMEWORK AND C# Lab					**Course Code:** MCA-304P(Elective)*		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	2	4	2	15	10	25

Course Description: This course will teach, the fundamentals of creating Windows applications using C# (C Sharp) language. In this course, you will learn to create, compile, and run object-oriented C# programs using Visual Studio. Also, you will learn to leverage the major namespaces and classes of the .NET Framework. In addition to this, you will also learn to access databases using Language Integrated Query (LINQ). It also has questions for hands-on practice. So, this makes it altogether a complete package. This course provides you an understanding of the basic C# language constructs and semantics. The course covers the introduction to the dot net framework with the important concepts of C# which predominantly are the OOPS concepts such as Inheritance, Polymorphism, Encapsulation, Abstraction, etc. Other important topics include Events and delegates which are very important while learning C#. So, this course is a comprehensive package for you, if you are interested in learning dot net technology.

Course Outcomes

CO1. Handle the various controls for user interfacing
CO2. Validate the field elements using validator control
CO3. Make database connection using proper controls
CO4. View the data in grid view control

Practical **2 Hrs/Week**

Sr No.	Experiment Title
1	Program to display the addition, subtraction, multiplication and division of two number using console application.
2	Program to display the first 10 natural numbers and their sum using console application.
3	Program to display the addition using the windows application.
4	Write a program to convert input string from lower to upper and upper to lower case.
5	Write a program to simple calculator using windows application.
6	Write a program working with Page using ASP.Net.
7	Write a program working with forms using ASP.NET.
8	Write a program to connectivity with Oracle database.
9	Write a program to access data source through ADO.NET.
10	Write a program to manage the session.

Text Books:

1. J. Schiller, Mobile Communications, Addison Wesley.
2. Charles Perkins, Mobile IP, Addison Wesley.

Reference Books:

1. Charles Perkins, Ad hoc Networks, Addison Wesley.
2. Upadhyaya, "Mobile Computing", Springer

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1
CO2	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1
CO3	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1
CO4	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	1

Program: MCA					**Semester:** 3rd		
Course Title: MOBILE COMPUTING					**Course Code:** MCA-305		
L	T	P	CH	CP	Int. A	ESE	Total
4	-	-	4	4	60	40	100

Course Description: This course covers software mobile application development, its architecture and lifecycle, as well as its inherent design considerations. Students will learn about mobile resources, activities, views, layouts, and intents in addition to interacting with the location based services, messaging services, multimedia interfaces, and sensors available on the mobile device. The applications developed will manage data input from and output to files, databases and content providers. After developing applications in an emulation environment, students will install them on individual mobile devices as well as prepare them for marketplace distribution.

Course Outcomes

CO1 Explain the basics of mobile Computing
CO2 Describe the functionality of Mobile IP and Transport Layer
CO3 Classify different types of mobile telecommunication systems
CO4 Demonstrate the Adhoc networks concepts and its routing protocols

Theory **4 Hrs/Week**

Unit	Topic	Hours
1	Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM: air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.	08 Hours
2	Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.	10 Hours
3	Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.	06 Hours
4	Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.	06 Hours
5	Adhoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.	10 Hours

Text Books:

1. J. Schiller, Mobile Communications, Addison Wesley.
2. Charles Perkins, Mobile IP, Addison Wesley.

Reference Books:

1. Charles Perkins, Ad hoc Networks, Addison Wesley.
2. Upadhyaya, “Mobile Computing”, Springer

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	1	1	-	-	-	-	-	1	-	1	1	1	-
CO2	2	1	2	2	2	-	-	-	-	-	2	-	2	2	2	-
CO3	2	1	2	2	2	-	-	-	-	-	2	-	2	2	2	-
CO4	2	1	2	2	2	-	-	-	-	-	2	-	2	2	2	-

Program: MCA					**Semester:** 3rd		
Course Title: DATA COMPRESSION					**Course Code:** MCA-306(Elective)*		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: The course covers the theory of quantization and basic concepts in source coding and applications of the theory and concepts to systems that convert analog or high-rate digital signals into low-rate digital representations with or without loss of fidelity. The con-cept of source coding is extended to general descriptions of a statistical information source where various data modeling techniques find useful applications.

Course Outcomes

CO1 Program, analyze Hoffman coding: Loss less image compression, Text compression, Audio Compression
CO2 Program and analyze various Image compression and dictionary based techniques like static Dictionary, Diagram Coding, Adaptive Dictionary
CO3 Understand the statistical basis and performance metrics for lossless compression
CO4 Understand the conceptual basis for commonly used lossless compression techniques, and understands how to use and evaluate several readily available implementations of those techniques
And understand the structural basis for and performance metrics for commonly used lossy compression techniques and conceptual basis for commonly used lossy compression techniques.

. **Theory** **3 Hrs/Week**

Unit	Topic	Hours
1	Introduction: Compression Techniques: Loss less compression, Lossy compression, Measures ofperformance, Modeling and coding. Mathematical Preliminaries for Lossless compression: A brief introduction to information theory: -Models: -Physical models, Probability models, Markov models, composite source model, Coding? - Uniquely decodable codes, Prefix codes.	10 Hours
2	Huffman coding: The Huffman coding algorithm, minimum variance Huffman codes, length of Huffmancodes, extended Huffman codes, non binary Huffman codes, Adaptive Huffman codes: Update procedure, Encoding procedure, decoding procedure, Golomb codes, Rice codes, Tunstall codes, Applications: loss less image compression, Text compression and Audio compression.	10 Hours
3	Arithmetic coding: Coding a sequence, generating a binary code, Comparison of Huffman andArithmetic coding, Application: Bi –level image compression -The JBIG standard, JBIG2 Image compression, Dictionary Techniques:-Introduction, Static Dictionary: Diagram Coding, Adaptive dictionary: The LZ77 Approach, The LZ78 approach, Applications: File Compression-UNIX compress, Image compression: - The Graphics interchange Format (GIF), Predictive Coding: - Prediction with partial match (PPM): The basic algorithms, The ESCAPE SYMBOL, length of context, The Exclusion Principle, The Burrows-Wheeler	10 Hours

	Transform: Move-to-front coding, CALIC, JPEG-LS, Multiresolution Approaches, facsimile Encoding, Dynamic Markov Compression.	
4	Mathematical Preliminaries for Lossy Coding: -Distortion criteria, Models. Scalar Quantization, the Quantization problem, Uniform Quantization, adaptive Quantization, Non uniform Quantization.	06 Hours
5	Vector Quantization: Advantages of Vector Quantization over Scalar Quantization, The linde-Buzo-Gray algorithm, Tree stuctured Vector quantzers, Structured Vector Quantizers.	06 Hours

Text Books:

1. Khalid Sayood, "Introduction to Data Compression", Morgan Kaufmann Publications

Reference Books:

1. Ralf Steinmetx and Klara Nahrstedt, “Multimedia Computing and communication and applications”, Prentice Hall

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	-
CO2	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	-
CO3	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	-
CO4	3	3	3	1	3	1	1	2	-	-	2	-	3	3	2	-

Program: MCA					**Semester:** 3rd		
Course Title: DATA COMPRESSION Lab					**Course Code:** MCA-306P(Elective)*		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	2	4	2	15	10	25

Course Description: This course covers the essential information that every serious programmer needs to know about every aspect of computer and communications technology with space optimization and the algorithmic aspects of the efficiency we struggle to achieve.

Course Outcomes

CO1 Student will understand the important issues in data compression.
CO2 Student will have knowledge of variety of data compression techniques.
CO3 Student will be able to apply techniques for compression of binary programmes, data, sound and image.
CO4 Student will learn techniques for modelling data and the issues relating to modelling.

Practical **2 Hrs/Week**

Sr No.	Experiment Title
1	To implement Huffman coding
2	To implement Arithmetic Coding.
3	To implement law encoding
4	Write a program for image enhancement
5	Write a program for image compression
6	Write a program for color image processing
7	Write a program for image segmentation
8	Write a program for image morphology
9	Image Restoration & Edge detection

Text Books:

2. Khalid Sayood, "Introduction to Data Compression", Morgan Kaufmann Publications

Reference Books:

2. Ralf Steinmetx and Klara Nahrstedt, “Multimedia Computing and communication and applications”, Prentice Hall

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	1	3	1	1	2	-	-	2	2	3	3	2	-
CO2	3	3	3	1	3	1	1	2	-	-	2	2	3	3	2	-
CO3	3	3	3	1	3	1	1	2	-	-	2	2	3	3	2	-
CO4	3	3	3	1	3	1	1	2	-	-	2	2	3	3	2	-

MCA 2nd Year / 4th Semester

Program: MCA					**Semester:** 4th		
Course Title: ARTIFICIAL INTELLIGENCE					**Course Code:** MCA-401		
L	T	P	CH	CP	Int. A	ESE	Total
4	1	-	5	4.5	60	40	100

Course Description: Course Description: This course will examine the area of wireless networking and mobile computing, looking at the unique network protocol challenges and opportunities presented by wireless communications and host or router mobility. The course will give a brief overview of fundamental concepts in mobile wireless systems and mobile computing, it will then cover system and standards issues including wireless LANs, mobile IP, ad-hoc networks, sensor networks, as well as issues associated with small handheld portable devices and new applications that can exploit mobility and location information. This is followed by several topical studies around recent research publications in mobile computing and wireless networking field.

Course Outcomes

CO1 Exhibit strong familiarity with a number of important AI techniques, including in particular search, knowledge representation, planning and constraint management.
CO2. Interpret the modern view of AI as the study of agents that receive precepts from the environment and perform actions.
CO3. Build awareness of AI facing major challenges and the complexity of typical problems within the field.
CO4. Develop self-learning and research skills to tackle a topic of interest on his/her own or as part of a team.

Theory **4 Hrs/Week**

Unit	Topic	Hours
1	Introduction : Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Possessing.	10 Hours
2	Introduction to Search : Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.	08 Hours
3	Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.	06 Hours
4	Machine Learning : Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data – EM algorithm, Reinforcement learning.	06 Hours

5	Pattern Recognition : Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.	10 Hours

Text Books:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", McGraw-Hill

Reference Books:

1. E Charniak and D McDermott, "Introduction to Artificial Intelligence", Pearson Education
2. Dan W. Patterson, "Artificial Intelligence and Expert Systems", Prentice Hall of India

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	1	2	2	1	-	1	-	-	2	1	3	3	2	-
CO2	3	3	1	2	2	1	-	1	-	-	2	1	3	3	2	-
CO3	3	3	1	2	2	1	-	1	-	-	2	1	3	3	2	-
CO4	3	3	1	2	2	2	-	1	-	-	2	1	3	3	2	-

Program: MCA					**Semester:** 4th		
Course Title: SIMULATION AND MODELING					**Course Code:** MCA-402		
L	T	P	CH	CP	Int. A	ESE	Total
4	1	-	5	4.5	60	40	100

Course Description: The course will introduce the basic concepts of computation through modeling and simulation that are increasingly being used by architects, planners, and engineers to shorten design cycles, innovate new products, and evaluate designs and simulate the impacts of alternative approaches. They will then undertake a final project that analyzes one of a variety of scientific problems by designing a representative model, implementing the model, completing a verification and validation process of the model, reporting on the model in oral and written form, and changing the model to reflect corrections, improvements and enhancements.

Course Outcomes

CO1 Define the basics of simulation modeling and replicating the practical situations in organizations Generate random numbers and random variates using different techniques.
CO2 Develop simulation model using heuristic methods.
CO3 Analysis of Simulation models using input analyzer, and output analyzer
CO4 Explain Verification and Validation of simulation model

Theory **4 Hrs/Week**

Unit	Topic	Hours
1	System definition and components, stochastic activities, continuous and discrete systems, system modeling, types of models, static and dynamic physical models, static and dynamic mathematical models, full corporate model, types of system study.	06 Hours
2	System simulation, why & when to simulate, nature and techniques of simulation, comparison of simulation and analytical methods, types of system simulation, real time simulation, hybrid simulation, simulation of pure-pursuit problem, single-server queuing system and an inventory problem, Monte-Carlo simulation, Distributed Lag models, Cobweb model.	10 Hours
3	Simulation of continuous systems, analog vs. digital Simulation, Simulation of water reservoir system, Simulation of a servo system, simulation of an autopilot, Discrete system simulation, fixed time-step vs. even to even model, generation of random numbers, test for randomness, Monte-Carlo computation vs. stochastic simulation.	06 Hours
4	System dynamics, exponential growth models, exponential decay models, modified exponential growth models, logistic curves, generalization of growth models, system dynamic diagrams Introduction to SIMSCRIPT: Program, system concepts, origination, and statements, defining the telephone system model.	08 Hours

5	Simulation of PERT Networks, critical path computation, uncertainties in activity duration , resource allocation and consideration. Simulation languages and software, continuous and discrete simulation languages, expression based languages, object oriented simulation, general purpose vs. application - oriented simulation packages, CSMP-III, MODSIM-III.	10 Hours

Text Books:

1. Geoftrey Gordon, " System Simulation", PHI
2. Jerry Banks, John S. C Barry L. Nelson David M. Nicol, "Discrete Event System Simulation", Pearson Education

Reference Books:

1. V P Singh, "System Modeling and simulation", New Age International.
2. Averill M. Law, W. David Kelton, "System Modeling and simulation and Analysis", TMH

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	1	-	-	1	1	-	-	-	-	-	1	-	1	1	1	-
CO2	2	2	-	2	2	1	-	-	-	-	2	1	2	2	2	-
CO3	2	2	-	2	2	1	-	-	-	-	2	1	2	2	2	-
CO4	2	2	-	2	2	1	-	-	-	-	2	1	2	2	2	-

Program: MCA					**Semester:** 4th		
Course Title: WEB TECHNOLOGY					**Course Code:** MCA-403		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: Building on the basic Web Technologies unit in the CSI course, students will learn to create more dynamic and interactive websites using JavaScript. Advanced HTML, CSS, and basic JavaScript enhance the client-side webpages and students will learn to use these technologies for their specific purposes. Students begin working with server-side scripting and web applications development using PHP and MySQL in the second quarter. This will allow students to create websites that store, access, and use data stored in the database tables and it allows them to perform simple SQL queries to produce the desired results.

Course Outcomes

CO1 Students are able to develop a dynamic webpage by the use of java script and Students will be able to connect a java program to a DBMS and perform insert.
CO2 Students will be able to write a well formed / valid XML document.
CO3 update and delete operations on DBMS table. Students will be able to write a server side java application called JSP to catch form
CO4 form data sent from client process it and store it on database. Data sent from client and store it on database.

Theory **3 Hrs/Week**

Unit	Topic	Hours
1	Introduction: Introduction to web, protocols governing the web, web development strategies, Web applications, web project, web team.	06 Hours
2	Web Page Designing: HTML: list, table, images, frames, forms, CSS; XML: DTD, XML schemes, presenting and using XML.	06 Hours
3	Scripting: Java script: Introduction, documents, forms, statements, functions, objects; event and event handling; introduction to AJAX, VB Script.	08 Hours
4	Server Site Programming: Introduction to active server pages (ASP),ASP.NET, java server pages (JSP), JSP application design, tomcat server, JSP objects, declaring variables, and methods, debugging, sharing data between JSP pages, Session, Application: data base action , development of java beans in JSP, introduction to COM/DCOM.	10 Hours
5	PHP (Hypertext Preprocessor): Introduction, syntax, variables, strings, operators, if-else, loop, switch, array, function, form ,mail, file upload, session, error, exception, filter, PHP-ODBC.	10 Hours

Text Books:

1. Xavier, C, " Web Technology and Design" , New Age International
2. Ivan Bayross," HTML, DHTML, Java Script, Perl & CGI", BPB Publication.

Reference Books:

1. Ramesh Bangia, "Internet and Web Design" , New Age International
2. Bhave, "Programming with Java", Pearson Education

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Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	1	2	2	1	-	1	-	-	2	2	3	3	2	1
CO2	3	3	1	2	2	1	-	1	-	-	2	2	3	3	2	1
CO3	3	3	1	2	2	1	-	1	-	-	2	2	3	3	2	1
CO4	3	3	1	2	2	2	-	1	-	-	2	2	3	3	2	1

Program: MCA					**Semester:** 4th		
Course Title: WEB TECHNOLOGY Lab					**Course Code:** MCA-403P		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	2	4	2	15	10	25

Course Description: This course is intended to teach the basics involved in publishing content on the World Wide Web. This includes the 'language of the Web' – HTML, the fundamentals of how the Internet and the Web function, a basic understanding of graphic production with a specific stress on creating graphics for the Web, and a general grounding introduction to more advanced topics such as programming and scripting. This will also expose students to the basic tools and applications used in Web publishing.

Course Outcomes

CO1 Students are able to develop a dynamic webpage by the use of java script and DHTML. · Students will be able to write a well formed / valid XML document.
CO2 Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table.
CO3 Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database.
CO4 Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database.

Practical **2 Hrs/Week**

Sr No.	Experiment Title
1	Home page Development static pages (using Only HTML) of an online Book store.
2	Validate the Registration, user login and payment by credit card pages using JavaScript
3	To write a program, which takes user id as input and displays the user details by taking the user information from the XML document.
4	Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient
5	Write a JavaScript that calculates the squares and cubes of the numbers from 0 to 10 and outputs HTML text that displays the resulting values in an HTML table format.
6	Write a JavaScript code that displays text "TEXT-GROWING" with increasing font size in the interval of 100ms in RED COLOR, when the font size reaches 50pt it displays "TEXT-SHRINKING" in BLUE color. Then the font size decreases to 5pt.
7	Write a PHP program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings.
8	Write the PHP programs to do the following: a. Implement simple calculator

	operations. b. Find the transpose of a matrix. c. Multiplication of two matrices. d. Addition of two matrices.
9	Create dynamic web pages using JavaScript
10	Develop JSP applications implementing Session management and Data base Connectivity.

Text Books:

1. Introduction to C# using .NET By Robert J. Oberg, PHI, 2002.
2. Programming in C# By E. Balaguruswamy, Tata McGraw Hill

Reference Books:

1. The Complete Guide to C# Programming by V. P. Jain

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	1	2	2	1	-	1	-	-	2	2	3	3	2	1
CO2	3	3	1	2	2	1	-	1	-	-	2	2	3	3	2	1
CO3	3	3	1	2	2	1	-	1	-	-	2	2	3	3	2	1
CO4	3	3	1	2	2	2	-	1	-	-	2	2	3	3	2	1

Program: MCA					**Semester:** 4th		
Course Title: ADVANCED DATABASE MANAGEMENT SYSTEMS					**Course Code:** MCA-404(Elective-1)*		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: The course presupposes a basic knowledge of conceptual modelling for data base systems and implementation using relational DBMS and SQL. The course aims to a more profound understanding of database theories, models, and methods and an ability to use these in different situations.

Course Outcomes

CO1 Describe the fundamental elements of relational database management systems
CO2 Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
CO3 Design ER-models to represent simple database application scenarios
CO4 Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.

Theory **3 Hrs/Week**

Unit	Topic	Hours
1	Transaction and schedules, Concurrent Execution of transaction, Conflict and View Serializability, Testing for Serializability, Concepts in Recoverable and Cascadeless schedules.	08 Hours
2	Lock based protocols, time stamp based protocols, Multiple Granularity and Multiversion Techniques, Enforcing serializablity by Locks, Locking system with multiple lock modes, architecture for Locking scheduler.	06 Hours
3	Distributed Transactions Management, Data Distribution, Fragmentation and Replication Techniques, Distributed Commit, Distributed Locking schemes, Long duration transactions, Moss Concurrency protocol.	06 Hours
4	Issues of Recovery and atomicity in Distributed Databases, Traditional recovery techniques, Log based recovery, Recovery with Concurrent Transactions, Recovery in Message passing systems, Checkpoints, Algorithms for recovery line, Concepts in Orphan and Inconsistent Messages.	10 Hours
5	Distributed Query Processing, Multiway Joins, Semi joins, Cost based query optimization for distributed database, Updating replicated data, protocols for Distributed Deadlock Detection, Eager and Lazy Replication Techniques.	10 Hours

Text Books:

1. Silberschatz, Korth and Sudershan, Database System Concept', Mc Graw Hill
2. Ramakrishna and Gehrke,' Database Management System, Mc Graw Hill
3. Garcia-Molina, Ullman,Widom,' Database System Implementation' Pearson Education

Reference Books:

1. Ceei and Pelagatti,'Distributed Database', TMH
2. Singhal and Shivratri, 'Advance Concepts in Operating Systems' MC Graw Hill

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	1	2	2	1	-	1	-	-	2	2	3	3	2	1
CO2	3	3	1	2	2	1	-	1	-	-	2	2	3	3	2	1
CO3	3	3	1	2	2	1	-	1	-	-	2	2	3	3	2	1
CO4	3	3	1	2	2	2	-	1	-	-	2	2	3	3	2	1

Program: MCA					**Semester:** 4th		
Course Title: ADVANCED DATABASE MANAGEMENT SYSTEMS Lab					**Course Code:** MCA-404P(Elective-1)*		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	2	4	2	15	10	25

Course Description: The objective of this lab course is to understand the practical applicability of database management system concepts. Working on existing database systems, designing of database, creating relational database, analysis of table design. The lab course also provides practical knowledge to understand advanced database concepts such as Data mining and Big Data Analysis.

Course Outcomes

CO1 Students get practical knowledge on designing and creating relational database systems.
CO2 Understand various advanced queries execution such as relational constraints, joins, set operations, aggregate functions, triggers, views and embedded SQL.
CO3 Use of various software to design and build ER Diagrams, UML, Flow chart for related database systems.
CO4 Students will be able to design and implement database applications

Practical **2 Hrs/Week**

Sr No.	Experiment Title
1	Perform the following: a. Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)
2	Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, Backing up / Restoring a Database
3	Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, Backing up / Restoring a Database
4	For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate functions (group by and having clause), Queries involving- Date Functions, String Functions , Math Functions Join Queries- Inner Join, Outer Join Subqueries- With IN clause, With EXISTS clause
5	For a given set of relation tables perform the following a. Creating Views (with and without check option), Dropping views, Selecting from a view
6	Write a Pl/SQL program using FOR loop to insert ten rows into a database table.
7	Given the table EMPLOYEE (EmpNo, Name, Salary, Designation, DeptID) write a cursor to select the five highest paid employees from the table.
8	Given an integer i, write a PL/SQL procedure to insert the tuple (i, 'xxx') into a given relation.

Text Books:

1. Silberschatz, Korth and Sudershan, Database System Concept', Mc Graw Hill
2. Ramakrishna and Gehrke,' Database Management System, Mc Graw Hill
3. Garcia-Molina, Ullman,Widom,' Database System Implementation' Pearson Education

Reference Books:

1. Ceei and Pelagatti,'Distributed Database', TMH
2. Singhal and Shivratri, 'Advance Concepts in Operating Systems' MC Graw Hill

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	1	2	2	1	-	1	-	-	2	2	3	3	2	1
CO2	3	3	1	2	2	1	-	1	-	-	2	2	3	3	2	1
CO3	3	3	1	2	2	1	-	1	-	-	2	2	3	3	2	1
CO4	3	3	1	2	2	2	-	1	-	-	2	2	3	3	2	1

Program: MCA					**Semester:** 4th		
Course Title: COMPUTER GRAPHICS AND ANIMATION					**Course Code**: MCA-405(Elective-2)*		
L	T	P	CH	CP	Int. A	ESE	Total
4	-	-	4	4	60	40	100

Course Description: Computer Graphics is an art of creating pictures and films using specially developed hardware and software graphics. Computer Graphics are created using 2D, 3D designs and Animation designs. Computer Graphics Courses teach the students about 2D. 3D designs, web designs, animation design, image processing etc.

Course Outcomes

CO1 Core Concepts of computer graphics. To comprehend the concept of geometric & mathematical.
CO2 Algorithmic concepts necessary for understanding computer graphics. To understand the comprehension of windows, clipping
CO3 view-ports object representation in relation to images displayed on screen. To understand the concepts of Output primitives, 2Dtransformations, 2D-Viewing, Structural input methods, To understand the concept of 3D, object representation in 3D
CO4 3D Transformation & Viewing. To familiarize the students with graphics concepts like Clipping, splines, objects modeling, visible surface detection.

Theory **4 Hrs/Week**

Unit	Topic	Hours
1	Introduction and Line Generation: Types of computer graphics, Graphic Displays- Random scan displays, Raster scan displays, Frame buffer and video controller, Points and lines, Line drawing algorithms, Circle generating algorithms, Midpoint circle generating algorithm, and parallel version of these algorithms	09 Hours
2	Transformations: Basic transformation, Matrix representations and homogenous coordinates, Composite transformations, Reflections and shearing. Windowing and Clipping: Viewing pipeline, Viewing transformations, 2-D Clipping algorithms- Line clipping algorithms such as Cohen Sutherland line clipping algorithm, Liang Barsky algorithm, Line clipping against non rectangular clip windows; Polygon clipping –Sutherland Hodgeman polygon clipping, Weiler and Atherton polygon clipping, Curve clipping, Text clipping.	12 Hours
3	Three Dimensional: 3-D geometric primitives, 3-D Object representation, 3-D Transformation, 3-D viewing, projections, 3-D Clipping.	05 Hours
4	Curves and Surfaces: Quadric surfaces, Spheres, Ellipsoid, Blobby objects, introductory concepts of Spline, Bspline and Bezier curves and surfaces.	10 Hours

	Hidden Lines and Surfaces: Back Face Detection algorithm, Depth buffer method, A- buffer method, Scan line method, basic illumination models – Ambient light, Diffuse reflection, Specular reflection and Phong model, Combined approach, Warn model, Intensity Attenuation, Color consideration, Transparency and Shadows.	
5	Computer Animations : Conventional and computer assisted animation, design of animation sequences, interpolation, simple animation effects, animation languages (Key Frame System, Parameterized systems), motion specifications, methods of controlling animation.	06 Hours

Text Books:

1. Donald Hearn and M Pauline Baker, "Computer Graphics C Version", Pearson Education Amrendra N Sinha and Arun D Udai," Computer Graphics", TMH
2. Donald Hearn and M Pauline Baker, " Computer Graphics with OpenGL", Pearson education

Reference Books:

1. Steven Harrington, "Computer Graphics: A Programming Approach", PHI or TMH
2. James D Foley, A V Dam, S K Feiner and John f Hughes, "Computer Graphics Principles and Practice" 2nd Ed. in C.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	-	1	2	1	-	-	1	-	-	1	2	2	2	2	1
CO2	2	-	1	2	1	-	-	1	-	-	1	2	2	2	2	1
CO3	2	-	1	2	1	-	-	1	-	-	1	2	2	2	2	1
CO4	2	-	1	2	1	-	-	1	-	-	1	2	2	2	2	1

Program: MCA					**Semester:** 4th		
Course Title: Programming in PHP					**Course Code:** MCA-406(Elective-1)*		
L	T	P	CH	CP	Int. A	ESE	Total
3	-	-	3	3	45	30	75

Course Description: Introduction to the open source Web scripting language PHP. Build dynamic Web applications. Semantics and syntax of the PHP language, including discussion on the practical problems that PHP solves. Write server-side cross-platform HTML-embedded scripts to implement dynamic Web pages that interact with databases and files.

Course Outcomes

CO1 Write PHP scripts to handle HTML forms.
CO2 Write regular expressions including modifiers, operators, and metacharacters.
CO3 Create PHP programs that use various PHP library functions and that manipulate files and directories.
CO4 Analyze and solve various database tasks using the PHP language.
Analyze and solve common Web application tasks by writing PHP programs.

Theory **3 Hrs/Week**

Unit	Topic	Hours
1	Introduction to PHP : Evolution of PHP & its comparison, Interfaces to External systems, Hardware and Software requirements, PHP Scripting, Web Designing Basics and WYSIWYG Editor, Receiving User Input, Repeating Code. Basic PHP Development : Working of PHP scripts, Basic PHP syntax, PHP data types, Google Caffeine, displaying type information, Testing for a specific data type, Changing type with Set type, Operators, Variable manipulation, Dynamic variables, Variable scope, Accessing variable with the global statement Static vs. Dynamic Optimization, Analytics, Analysis and ROI Concept.	10 Hours
2	Control Structures: If() and elseif() condition Statement, The switch statement, Using the ? Operator, Using the while() Loop, The do while statement, Using the for() Loop, Breaking out of loops, Nesting loops. Function : Function definition, Creation, Returning values, User-defined functions, Dynamic function, Function calls with the static statement, default arguments, Passing arguments to a function by value. String Manipulation: Formatting String for Presentation, Formatting String for Storage, Joining and Splitting String, Comparing String, Matching and replace Substring.	10 Hours

3	Array : Anatomy of an Array , Creating index based and Associative array , Accessing array Elements , Looping with Index based array , Looping with associative array using each() and foreach(), Library function. Forms : Working with Forms, Super global variables, Super global array, Importing user input, Accessing user input, Combine HTML and PHP code, Using hidden fields, Redirecting the user. Working with File and Directories: Understanding file & directory, Opening and closing a file , Coping, renaming and deleting a file , Working with directories , Building a text editor , File Uploading & Downloading. Generating Images with PHP: Basics computer Graphics, Creating Image , Manipulating Image , Using text in Image.	09 Hours
4	Database Connectivity with MySql : Introduction to RDBMS , Connection with MySql Database, Performing basic database operation(DML) (Insert, Delete, Update, Select), Setting query parameter , Executing query , Join (Cross joins, Inner joins, Outer Joins, Self joins). Cookies: Introduction of Cookies, Setting time in a cookie with PHP, Deleting a cookie, Creating session cookie, Working with the query string. Session : Starting a session, Registering Session variables, working with session variables, destroying session, passing session Ids, encoding and decoding session variables, increase session expire time, working of session without cookie.	08 Hours
5	Advance PHP techniques: Introduction about FTP/SMTP server, Math functions, File upload, File Download, E-mail with PHP, PHP configuration file, Error tackling and debugging.	05 Hours

Text Books:

1. PHP: The Complete Reference, "Steven Holzner", Tata McGraw Hill

Reference Books:

1. Programming PHP, "Kevin Tetroi", O' Reilly.

Assessment Process (Internal)

Mid-Term Exams (MSE) = 30 Marks

Continuous Assessment (CA) = 15 Marks in the form of:

Assignments=10 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	1	2	2	1	-	1	-	1	2	2	3	3	2	3
CO2	3	3	1	2	2	1	-	1	-	-	2	2	3	3	2	3
CO3	3	3	1	2	2	1	-	1	-	-	2	2	3	3	2	3
CO4	3	3	1	2	2	2	-	1	-	1	2	2	3	3	2	3

Program: MCA					**Semester:** 4th		
Course Title: Programming in PHP Lab					**Course Code:** MCA-406P(Elective-1)*		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	2	4	2	15	10	25

Course Description: PHP Programming course provides the knowledge necessary to design and develop dynamic, database-driven Web pages using PHP 7. PHP is a language written for the Web, quick to learn, easy to deploy and provides substantial functionality required for e-commerce. This course introduces the PHP framework and syntax and covers in depth the most important techniques used to build dynamic Web sites. Students learn how to connect to any modern database, and perform hands on practice with a MySQL database to create database-driven HTML forms and reports.

Course Outcomes

CO1 Analyze the construction of a web page and relate how PHP and HTML combine to produce the web page.
CO2. Compare and contrast PHP variable types, and relate the advantages and disadvantages of PHP variables with local or global scope.
CO3. Formulate, design and create PHP control structures, including selection and iterative structures
CO4 Identify appropriate techniques for accessing MySQL from the PHP programming language.

Practical **2 Hrs/Week**

Sr No.	Experiment Title
1	a. Write a program to print "Welcome to PHP" b. Write a simple PHP program using expressions and operators.
2	Write a PHP program to demonstrate the use of Decision making control structures using a. If statement b. If-else statement c. Switch statement
3	Write a PHP program to demonstrate the use of Looping structures using- a) While statement b) Do-while statement c) For statement d) Foreach statement
4	Write a PHP program for creating and manipulating- a) Indexed array b) Associative array c) Multidimensional array
5	A. Write a PHP program to- a. Calculate length ofstring. B. Count the number of words in string without using string functions. B. Write a simple PHP program to demonstrate use of various built-in string functions.
6	Write a simple PHP program to demonstrate use of simple function and parameterized function.

7	Write a PHP program to a) Inherit members of super class in subclass. b) Create constructor to initialize object of class by using object oriented concepts.
8	Write a simple PHP program on Introspection and Serialization.
9	Design a web page using following form controls: a. Text box, b. Radio button, c. Check box, d. Buttons
10	Design a web page using following form controls: a. List box, b. Combo box, c. Hidden field box
11	Develop web page with data validation
12	Write simple PHP program to – a. Set cookies and read it. b. Demonstrate session management
13	Develop a simple application to – a) Enter data into database b) Retrieve and present data from database
14	Develop a simple application to Update, Delete table data from database.

Text Books:

1. PHP: The Complete Reference, "Steven Holzner", Tata McGraw Hill

Reference Books:

1. Programming PHP, "Kevin Tetroi", O' Reilly.

Assessment Process (Internal)

Continuous Assessment (CA) = 15 Marks in the form of:

Practical file=5 Marks (2) Practical Performance=5 marks (3)Viva =5 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	1	2	2	1	-	1	-	1	2	2	3	3	2	3
CO2	3	3	1	2	2	1	-	1	-	-	2	2	3	3	2	3
CO3	3	3	1	2	2	1	-	1	-	-	2	2	3	3	2	3
CO4	3	3	1	2	2	2	-	1	-	1	2	2	3	3	2	3

Program: MCA					**Semester:** 4th		
Course Title: COMPILER DESIGN					**Course Code:** MCA-407(elective-2)*		
L	T	P	CH	CP	Int. A	ESE	Total
4	-	-	4	4	60	40	100

Course Description: Compiler Design will teach students the fundamental concepts and techniques used for building a simple compiler. Focusing on both theory and practice, we will use a sample language to explore the lexical, syntactic and semantic structures of programming languages, and learn to use those structures in implementing a demonstrative compiler. The discussion will also include the examination of intermediate code states, machine code optimisation techniques and support for advanced language features. At the end of the course, students will understand different considerations and phases of compilation, the impact of language attributes upon the compilation process, the effect of hardware feature on the generated code and the practical fundamentals of compiler implementation.

Course Outcomes

CO1 To realize basics of compiler design and apply for real time applications.
CO2 To introduce different translation languages
CO3 To understand the importance of code optimization .To know about compiler generation tools and techniques
CO4 To learn working of compiler and non compiler applications. Design a compiler for a simple programming language

Unit	Topic	Hours
1	Compiler Structure: Compilers and Translators, Various Phases of Compiler,Pass Structure of Compiler, Bootstrapping of Compiler Programming Languages: High level languages, The lexical and syntactic structure of a language, Dataelements, Data Structure, Operations, Assignments, Program unit, Data Environments, Parameter Transmission. Lexical Analysis: The role of Lexical Analyzer, A simple approach to the design of Lexical Analyzer, Regular Expressions, Transition Diagrams, Finite state Machines, Implementation of Lexical Analyzer, Lexical Analyzer Generator: LEX, Capabilities of Lexical Analyzer	10 Hours
2	The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree, Ambiguity,Capabilities of CFG. Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive Descent Parsers, PredictiveParsers, Bottom–up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers, LR parsers (SLR, Canonical LR, LALR) Syntax	10 Hours

	Analyzer Generator: YACC	
3	Intermediate Code Generation: Different Intermediate forms: three address code, Quadruples & Triples.Syntax Directed translation mechanism and attributed definition. Translation of Declaration, Assignment, Control flow, Boolean expression, Array References in arithmetic expressions, procedure calls, case statements, postfix translation.	08 Hours
4	Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocationschemes, Symbol Table management Error Detection and Recovery: Lexical phase errors, Syntactic phase errors, Semantic errors.	05 Hours
5	Code Optimization and Code Generation: Local optimization, Loop optimization, Peepholeoptimization, Basic blocks and flow graphs, DAG, Data flow analyzer, Machine Model, Order of evaluation, Register allocation and code selection	05 Hours

Text Books:

1. Alfred V Aho , Jeffrey D. Ullman, "Principles of Compiler Design", Narosa
2. A.V. Aho, R. Sethi and J.D Ullman, "Compiler: principle, Techniques and Tools", AW

Reference Books:

1. H.C. Holub "Compiler Design in C", Prentice Hall Inc.
2. Apple, "Modern Computer Implementation in C: Basic Design", Cambridge press

Assessment Process (Internal)

Mid-Term Exams (MSE) = 40 Marks

Continuous Assessment (CA) = 20 Marks in the form of:

Assignments=15 Marks (2) Attendance = 05 Marks

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	2	1	-	1	2	-	-	-	-	-	2	-	2	3	-	-
CO2	2	1	-	1	2	-	-	-	-	-	2	-	2	3	-	-
CO3	2	1	-	1	2	-	-	-	-	-	2	-	2	3	-	-
CO4	2	1	-	1	2	-	-	-	-	-	2	-	2	3	-	-

Program: MCA					**Semester:** 4th		
Course Title: Mini Project					**Course Code:** MCA-451P		
L	T	P	CH	CP	Int. A	ESE	Total
-	-	40	-	20	360	240	600

Course Description: Every student is required to carry out project work under the supervision of a faculty member of the department. However, a student may also opt to pursue his project work in a reputed industry/institution with the consent of Department/Institute. In such cases, the department must look into the suitability of the projects and assign one internal guide/supervisor.

The internal supervisor shall monitor progress of the student continuously. A candidate is required to present the progress of the project work (at least twice) during the semester at an appropriate time decided by the Department. There will a final presentation of the project work at the end of the semester.

Course Outcomes

CO1 Able to implement software engineering process models.
CO2 Able to gather and document the requirement of real world.
CO3 Able to design architecture of the application
CO4 Able to develop the data store layout and able to implement solution using programming language

Assessment Process (Internal)

Internal assessment = 60 Marks

Project Performance = 360 Marks. (Project Work =240 Marks, Viva-Voce = 120 Marks)

Attendance percentage	Marks
Below 75%	0
75%-80%	1
81%-85%	2
86%-90%	3
91%-95%	4
96%-100%	5

CO-PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	3	3	2	2	3	2	1	1	-	-	2	2	2	3	2	2
CO2	3	3	2	2	2	2	1	1	-	-	2	1	2	3	2	1
CO3	3	3	2	2	3	2	1	1	-	-	2	2	2	3	2	2
CO4	3	3	2	2	3	2	1	1	-	-	2	2	2	3	2	2