

TUMKUR



UNIVERSITY

Board of Studies in Computer Science

Department of Studies and Research in Computer Applications

Master of Computer Applications (MCA)

Choice Based Credit System

Curriculum Structure and Syllabus for I, II, III and IV Semesters

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2024 - 25 onwards

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ತುಮಕೂರು ವಿಶ್ವವಿದ್ಯಾನಿಲಯ
ತುಮಕೂರು.

BOS in Computer Science Committee Members

1.	Dr. Kusuma Kumari B.M MCA Coordinator & Assistant Professor Department of Studies and Research in Computer Applications Tumkur University, Tumakuru	Chairperson
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10	Dr. Sumathi R Gowda Assistant Professor Department of Computer Science, Karnataka State Open University, Muktha Gangotri, Mysore.	Member
11.	Dr. Haridas S. Associate Professor Department of Computer Science Government First Grade College, Tumkur.	Member

SEMESTER – I

Sl. No	Paper Code	Title of the Paper	Instruc tion Hrs. per Week	No. of Credits	Duratio n of the Exam.	Marks		
						Internal Assessment	Semester End Exam.	Total
1.	MCACPT 1.1	Foundations of Mathematics and Statistics for Computer Applications	4	4	3 Hrs.	30	70	100
2.	MCACPT 1.2	Advanced Data Structures Using C	4	4	3 Hrs.	30	70	100
3.	MCACPT 1.3	Python Programming	4	4	3 Hrs.	30	70	100
4.	MCACPT 1.4	Linux Programming	4	4	3 Hrs.	30	70	100
5.	MCACPT 1.5	Relational Database Management Systems	4	4	3 Hrs.	30	70	100
6.	MCACPP 1.6	Advanced Data Structures Using C Lab	4	2	3 Hrs.	15	35	50
7.	MCACPP 1.7	Python Programming Lab	4	2	3 Hrs.	15	35	50
8.	MCACPP 1.8	Relational Database Management Systems Lab	4	2	3 Hrs.	15	35	50
TOTAL				26				650

NOTE: Theory: 1 Hr. = 1 Credit

CPT: Core Paper Theory

CPP: Core Paper Practical

Practical: 2 Hrs. = 1 Credit

SPT: Special Paper Theory

SPP: Special Paper Practical

SEMESTER – II

Sl. No	Paper Code	Title of the Paper	Instruction Hrs. per week	No. of Credits	Duration of the Exam.	Marks		
						Internal Assessment	Semester End Exam.	Total
1.	MCACPT 2.1	Artificial Intelligence	4	4	3 Hrs.	30	70	100
2.	MCACPT 2.2	Advanced Java Programming	4	4	3 Hrs.	30	70	100
3.	MCACPT 2.3	Data Communication and Computer Networks	4	4	3 Hrs.	30	70	100
4.	MCASPT 2.4	ELECTIVE - 1	4	4	3 Hrs.	30	70	100
5.	MCAOET 2.5	Office Automation	4	4	3 Hrs.	30	70	100
6.	MCACPP 2.6	Artificial Intelligence Lab	4	2	3 Hrs.	15	35	50
7.	MCACPP 2.7	Advanced Java Programming Lab	4	2	3 Hrs.	15	35	50
8.	MCAOEP 2.8	Office Automation Lab	4	2	3 Hrs.	15	35	50
TOTAL				26				650

ELECTIVE – 1	
SL. No	Title of the Paper
1	Statistics Using R Programming
2	Cryptography and Network Security
3	Cloud Computing
4	Block Chain Technology
5	Design and Analysis of Algorithms

NOTE: Theory: 1 Hr. =1Credit;

Practical: 2 Hrs. =1Credit

CPT: Core Paper Theory

CPP: Core Paper Practical

SPT: Special Paper Theory

SPP: Special Paper Practical

OET: Open Elective Paper

OEP: Open Elective practical

SEMESTER – III

Sl. No	Paper Code	Title of the Paper	Instruction Hrs. per week	No. of Credits	Duration of the Exam.	Marks		
						Internal Assessment	Semester End Exam	Total
1.	MCACPT 3.1	Machine Learning	4	4	3 Hrs.	30	70	100
2.	MCACPT 3.2	Software Engineering and Agile Concepts	4	4	3 Hrs.	30	70	100
3.	MCACPT 3.3	Natural Language Processing	4	4	3 Hrs.	30	70	100
4.	MCASPT 3.4	ELECTIVE – 2	4	4	3 Hrs.	30	70	100
5.	MCAOET 3.5	Internet and Web Technologies	4	4	3 Hrs.	30	70	100
6.	MCACPP 3.6	Machine Learning Lab	4	2	3 Hrs.	15	35	50
7.	MCACPP 3.7	Minor Project	4	2	3 Hrs.	15	35	50
8.	MCAOEP 3.8	Internet and Web Technologies Lab	4	2	3 Hrs.	15	35	50
TOTAL				26				650

ELECTIVE – 2	
SL. No	Title of the Paper
1	Big Data Analytics
2	Internet of Things
3	Ethical Hacking
4	Mobile Application Development
5	Software Testing And Quality Assurance

NOTE: Theory: 1 Hr. =1Credit;

Practical: 2 Hrs. =1Credit

CPT: Core Paper Theory

CPP: Core Paper Practical

SPT: Special Paper Theory

SPP: Special Paper Practical

OET: Open Elective Paper

OEP: Open Elective Practical

SEMESTER – IV

Sl. No	Paper Code	Title of the Paper	Instruction Hrs. per Week	No. of Credits	Duration of the Exam.	Marks		
						Internal Assessment	Semester End Exam.	Total
1	MCACPT 4.1	Research Methodology and IPR	4	4	3 Hrs.	30	70	100
2	MCACPP 4.2	Major Project/ Dissertation		12	3 Hrs.	100	200	300
TOTAL				16				400

NOTE: Theory: 1 Hr. = 1 Credit; Practical: 2 Hrs. = 1 Credit

CPT: Core Paper Theory

CPP: Core Paper Practical

Internal Assessment Marks for Theory and Practical:

Internal Assessment Marks Allotment for Theory	
Internal Test	15 Marks
Seminar	5 Marks
Assignment	5 Marks
Attendance	3 Marks
Classroom Exercise	2 Marks
Total:	30 Marks

Internal Assessment Marks Allotment for Practical	
Internal Test	10 Marks
Records and Attendance	5 Marks
Total:	15 Marks

First Semester			
Title of the Paper: Foundations of Mathematics and Statistics for Computer Applications			
Paper Code:	MCACPT 1.1	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- Introduce and build a foundational understanding of key concepts in discrete mathematics.
- Strengthen students' grasp of mathematical logic and its application in set theory, teaching them to construct rigorous proofs.
- Develop a comprehensive understanding of fundamental counting principles, relations, and probability.
- Equip students with a solid foundation in discrete mathematics, preparing them for more advanced studies in computer science, mathematics, and related fields.

COURSE OUTCOMES:

On successful completion of this course; the student will be able to:

- Verify the correctness of an argument using propositional and predicate logic and truth tables.
- Solve problems on Sets, Relations and functions.
- Construct the proofs by using proof by mathematical induction, principles of counting and application of permutation and combination
- Demonstrate the ability to solve problems using operations of matrices and determinants.
- Understand graphs, how to build them, how to manipulate them, and how to use them.
- Understand practical implications of algorithms.

Unit	Description	Hours
1.	<p>Logic: Fundamentals of logic, propositional logic, logical connectives and truth tables, logic equivalence, predicates and quantifiers, nested quantifiers, rules of inference, validity of arguments, introduction to proofs. Methods of proof.</p> <p>Sets: Fundamentals of set theory, set operations and the laws of set theory, counting and Venn diagrams, Cartesian products. Mathematical induction, the well ordering principle, recursive definitions, structural induction, recursive algorithms.</p>	10

2.	Combinatorics: Review of permutation and combination, binomial coefficients, mathematical induction, pigeon hole principle, principle of inclusion and exclusion, generating function, recurrence relations, modelling with recurrence relations with examples of Fibonacci numbers and the tower of Hanoi problem. Divide and conquer relations, homogeneous and non-homogeneous recurrences and their solutions, solving recurrences using generating functions.	10
3.	Relation: Introduction to relations, operations of relations, functions, types of relations, representing relations using matrices and digraphs, equivalence relation, fundamental theorem of equivalence relation (no proof), partial orderings, Hasse diagrams, maximal and minimal elements, lattices.	10
4.	Graph Theory Graphs: Introduction to graph theory, types of graphs, subgraphs, distance, standard graphs, bipartite graph, regular graph, complement of a graph, graph isomorphism, graph operations. Eulerian and Hamiltonian graphs, planar graphs. Trees: Introduction, applications of trees, tree traversal, rooted trees, binary trees, spanning trees, minimum spanning trees, Prim's and Kruskal's algorithms. Directed graphs: Fundamentals of digraphs, computer recognition - zero-one matrices and directed graphs, out-degree, in-degree, connectivity, orientation, Eulerian and Hamilton directed graphs, tournaments.	10
5.	Probability: The concepts of probability, axiomatic definition of probability, properties of probability, conditional probability, Bayes' formula, random variable and distribution functions, discrete random variables, continuous random variables, probability mass function and probability density function, expectation and variance, functions of random variables, some important probability Probability Distributions: Discrete- Bernoulli trials and binomial distribution, geometric distribution and Poisson distribution, continuous - uniform distribution, normal distribution and exponential distribution.	12
TEXT BOOKS: <ol style="list-style-type: none"> 1. Ralph P. Grimaldi, Discrete and Combinatorial Mathematics, 5th Edition, Pearson Education, 2004. 2. C. L. Liu, Elements of Discrete Mathematics, Tata McGraw-Hill, 2000. 		

3. Sheldon M Ross, Introduction to Probability Models, 12th edition, Academic Press, 2019.
4. S. C. Gupta, V. K. Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand & Sons Educational Publishers, New Delhi, 2020.
5. F. Harary, Graph Theory, Addison Wesley, D.B. West, 1969.

REFERENCE BOOKS:

1. Kenneth H Rosen: “Discrete Mathematics and its Applications”, McGraw Hill publications, 7th edition, 2007.
2. J. P. Tremblay and R.P. Manohar: Discrete Mathematical Structures with applications to Computer Science, Mc Graw Hill Ed. Inc. 2002.
3. Sheldon M Ross: Introduction to Probability and Statistics for Engineers and Scientists, 6th edition, Academic Press, 2020.
4. Michael Baron: Probability and Statistics for Computer Scientists, 3rd Edition, CRC, 2019

Web Resources:

1. <https://www.my-mooc.com/en/categorie/mathematics>
2. <http://www.nptelvideos.in/2012/11/discrete-mathematical-structures.html>
3. <https://ocw.mit.edu/courses/mathematics/>

First Semester			
Title of the Paper: Advanced Data Structures Using C			
Paper Code:	MCACPT 1.2	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- To familiarize students with the concepts and implementation of essential data structures.
- To enable students to analyze problems and design algorithms using data structures.
- To provide practical experience in coding and debugging C programs with data structures.

COURSE OUTCOMES:

- Apply advanced C programming techniques structures, union and files to illustrate and
- Develop solution for a given problem.
- Implement different linear data structures stacks and queues using static memory allocation
- Differentiate different types of linked lists and its implementation.
- Differentiate non-linear data structures trees and graphs; implement binary trees using dynamic memory allocation.

Unit	Description	Hours
1.	Introduction: Primitive and non-primitive data types. Structures and Unions: Defining a Structure, array of Structures, array within Structure, pointers and structures, Unions. File management in C: Defining and Opening a file, Closing a file, Input/Output operations on files - getc(), putc(), getw(), putw(), fscanf(), fprintf(), Error handling during I/O operations - feof(), ferror(), Random access to files - ftell(), rewind(), fseek(), Command line arguments.	12
2.	The Stack: Definition and Examples, representing Stacks in C using static memory allocation, Applications of stack: conversion of infix to postfix, evaluation of postfix expression, Recursion: Binary search and Fibonacci series. Queues: Types of Queues: Linear, Circular, Priority and Double Ended Queues. Linear and circular queue implementation using static memory allocation.	10

3.	Dynamic memory allocation: malloc(), calloc(), realloc(), free(). Singly Linked lists, Primitive operations on singly linked list: insertion, deletion, and search. Singly linked implementation of stacks, linear queue, and priority queues with integer data.	10
4.	Doubly and Circular linked list: Doubly linked lists, Primitive operations on doubly linked list: insertion, deletion, search. Stack and queues implementation using doubly linked list. Circular lists, Primitive operations on singly circular linked list: Insertions, deletion and search. Stack as a singly Circular list, queue as a singly Circular list.	10
5.	Nonlinear data structures: Linear and nonlinear data structures. Binary trees, Operations on Binary Trees, Applications of Binary Trees, types of Binary Tree: complete binary tree, strictly binary trees, expression trees, threaded binary trees, binary search trees. Memory Representations of binary trees, Binary Tree Traversals. Memory representations of binary search trees, basic operation on BST: insertion, deletion, find minimum, find maximum node, tree traversals. Introduction to Graph, graph memory representation, graph traversal: DFS and BFS.	10

TEXT BOOKS:

1. Yediyah Langsam, Moshe J. Augenstein, Aaron M. Tenenbaum Data structures using C and C++, PHI/Pearson, 2nd Edition, ,2015
2. Dr.Asha Gowda Karegowda, Bhargavi K, “Fundamentals of C and Data structures ” ,CBS Publications, July 2022, ISBN: 978-93-5466-123-5

REFERENCE BOOKS:

1. Horowitz, Sahni and Anderson-Freed Fundamentals of Data Structures in C, 2nd Edition, UniversitiesPress Pvt. Ltd., 2011
2. Jean- Paul Tremblay Paul G. Sorenson An Introduction to Data Structures with Applications, 2ndedition, McGraw-Hill International, 2007
3. Goodrich & Tamassia, Data Structures and Algorithms in C++, 2nd Edition, John Wiley & Sons, 2011.

First Semester			
Title of the Paper: Python Programming			
Paper Code:	MCACPT 1.3	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- Learn the syntax and semantics of Python Programming Language.
- Write Python functions to facilitate code reuse and manipulate strings.
- Illustrate the process of structuring the data using lists, tuples and dictionaries.
- Demonstrate the use of built-in functions to navigate the file system.
- Appraise the need for working on web scraping.

COURSE OUTCOMES:

- Understand Python language fundamentals.
- Exhibit object oriented concepts in Python
- Demonstrate file handling & exceptions handling using Python
- Demonstrate data base handling and Data Visualization using Python

Unit	Description	Hours
1.	<p>Fundamentals of Python Programming: Data types in Python, Operators in Python, Input and Output Statements, Control Statements.</p> <p>Functions: built-in Functions: Lambda, MAP, Filters and User defined Functions</p> <p>Data Types: Strings Characters: Creating, Indexing, Slicing, Repeating and Concatenation, Comparing, removing spaces, Finding sub strings in String</p>	10
2.	<p>Lists: Creating List using range () function, Updating the elements of a list, Concatenation of two list, Repetition of lists, Membership in lists, Aliasing, Sorting list elements, Nested lists.</p> <p>Tuples: Creating and Accessing Tuple Elements, Basic Operation on Tuples, Nested Tuples.</p> <p>Dictionaries: Operation on Dictionaries, Dictionary Methods, Sorting Elements of a Dictionary, Converting Lists in to Dictionary.</p> <p>Sets: operations and methods on sets.</p>	11

3.	<p>Classes and Objects: Creating Class, The Self Variable, Constructor, Types of data members, Namespaces, Types of Methods, Passing members between classes, Inner Classes.</p> <p>Inheritance and Polymorphism: Constructor in Inheritance, Overriding Super Class Constructors and Methods, The super () Method, Types of Inheritance, Method Resolution Order (MRO), Polymorphism, Operator and Method Overloading and Method Overriding.</p>	11
4.	<p>Reading and Writing Files- Introduction to File operation, opening a File, Techniques for Reading Files, Writing Files.</p> <p>Error and Exceptions: Introduction to exceptions in python, detecting and handling exceptions, exceptions as strings, raising exceptions, assertions, standard exceptions.</p>	10
5.	<p>Fundamental concepts of database: Retrieving All Rows from a table, Inserting Rows in a Table, Updating Rows in a Table, Deleting Rows in a Table, Creating Database Tables through python.</p> <p>Data Visualization: Creation of Bar graph, Histogram, Pie chart, Line Graph.</p>	10

TEXT BOOKS:

1. Y Daniel Liang, "Introduction to Programming using Python", Pearson, First Impression, 2017
2. Wes McKinney, "Python for Data Analysis", O'Reilly Media, 2017, Second Edition.

REFERENCE BOOKS:

1. Allen Downey, "Think Python: How to Think Like a Computer Scientist", Shroff/O'Reilly; Second edition (1 January 2016)
2. Charles Dierbach, "Introduction to Computer Science Using Python", 1st Edition, Wiley India Pvt Ltd. ISBN-13: 978-8126556014.
3. Charles R. Severance, "Python for Everybody: Exploring Data Using Python 3", 1 st Edition, Shroff Publishers, 2017. ISBN: 978-9352136278.

First Semester			
Title of the Paper: Linux Programming			
Paper Code:	MCACPT 1.4	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- Understanding the basics of operating systems and their functions
- Learning the scheduling policies of different operating systems
- Learning the memory management and disk management of an operating systems
- Understanding Linux: Students learn about the Linux operating system (OS) and its basic components.
- Writing shell scripts: Students learn to write shell scripts to solve problems and enhance the usefulness of computers.

COURSE OUTCOMES:

- Explain the structure of OS and process management
- Describe memory and disk management techniques in OS
- Execute Linux commands
- Install packages and manage user accounts in Linux
- Implement basic scripts in shell

Unit	Description	Hours
1.	<p>Introduction: Definitions, functions and types of operating system, System components, Operating system Structure, System Calls.</p> <p>Process Management: Process Concepts, Process states & Process Control Block.</p> <p>Process Scheduling: Scheduling Criteria, Scheduling Algorithms (Preemptive & Non Preemptive) -FCFS, SJF, RR, Priority, Multilevel Feedback Queue Scheduling.</p> <p>Process Synchronization: Critical Section Problem, Semaphores, Classical Problems of Synchronization and their Solutions, Deadlock Characterizations, Method for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock.</p>	12
2.	Memory Management: Introduction, Address Binding, Logical versus	8

	Physical Address Space, Swapping, Contiguous & Non-Contiguous Allocation, Fragmentation (Internal & External), Compaction, Paging, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms. Disk Management: Disk Scheduling Algorithms (FCFS, SSTF, SCAN, C-SCAN, LOOK), Swap Space Management.	
3.	Linux Basics: Introduction to Linux: History, GNU Movement, System Organization (Kernel and Shell), Difference between CLI OS & GUI OS, Windows v/s Linux, Importance of Linux Kernel, Files and Directories. Concept of Open-Source Software, Linux, Linux Architecture, Linux File System. Types of user-Root user(#) and normal user(\$), Multiple logins at same time(Ctrl + Alt + F1,F2..F6), Help: whatis, -- help, man command, init and run levels. Linux Installation, touch, ls, Is -l, Is -la, mkdir, rm, rm -rf, cat. cat > file, cat >> file, cp, move, rename, nm, who. Use of /, all directories under /, absolute path & relative path. Basic calculator, date utilities. Vi Editor Command mode & Insert mode, cut, yank, undo.	12
4.	Linux Administration: Managing multiple processes, changing process priority with nice, cron commands, kill, ps. Filter Commands: tr, head, tail, last, grep. sort, piping. Find Command with various options. Managing user accounts- Sudo, users: useradd, usermod & userdel, passwd, Group creation: Primary & Secondary Group, chgrp, chown, permissions: adding and removing permissions. Package installation through GUI/ aptget/yum/dnf. Process, Swap, Partition, fdisk.	12
5.	Shell Programming: Types of Shells, Shell Meta Characters - \$#, \$*, \$?, Shell Variables, Shell Scripts. Debugging scripts, echo, read, operators, and keywords, Integer Arithmetic and String Manipulation, Decision Making: if-else-elif-fi, case-esac. Loop Control; while, for, until, break & continue Functions, I/O Redirection and Piping, Exception Handling. Creating shell programs for automating tasks, file handling, trapping signals etc.	8
<p>TEXT BOOKS:</p> <ol style="list-style-type: none"> 1. Operating System Concepts, 9th Edition, Peter B Galvin, Wiley Publishing, 2018 2. Fundamentals of Linux, 1 st Edition, Maidsani D, Firewall Media, 2010 <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. Linux Administration Handbook, 2 nd Edition, Evi Nemeth, Pearson Publications, 2007 2. Linux Bible, 10th Edition, Christopher Negus, Wiley Publications, 2020 3. Unix Concepts and Applications, 4 th Edition, Sumitabha Das, Tata McGraw Hill Publication, 2017 4. Shell Scripting: Expert Recipes for Linux, Bash and more, Steve Parker, Wrox 		

Publication, 2011

5. Linux Command Line and Shell Scripting Bible, 3 rd Edition, Richard Blum, Christine Breshnahan, Wiley Publications, 2015

First Semester			
Title of the Paper: Relational Database Management Systems			
Paper Code:	MCACPT 1.5	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- To understand the fundamental concepts of Database Management Systems.
- To understand the concepts necessary for designing, using and implementing database systems and applications
- To enable the students to apply advance database concepts to create secured, distributed databases.
- Understand the relational database design principles.

COURSE OUTCOMES:

On the successful completion of the course, student will be able to:

- Understood the basic principles of database management systems, parallel & distributed databases
- Gained knowledge over various database models, schemas and SQL statements
- Construct Logical database design
- Apply normalization and functional dependency in database design with security concern
- Design and build a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS

Unit	Description	Hours
1.	Database System: Overview of database systems: Managing data- A historical perspective – File systems versus a DBMS - Advantages of a DBMS- Describing and storing Data in a DBMS - Queries in a DBMS - Transaction management – Structure of a DBMS. Database design & ER diagrams – Entities, Attributes, and Entity Sets – Relationships and Relationship Sets- Additional feature of the ER model- conceptual Database design with the ER model.	12
2.	Relational Model: Integrity constraints over relations – Enforcing integrity constraints – Querying relational data – Logical database design: ER to Relational –Introduction to Views – Destroying / Altering Tables	10

	& Views. Relational Algebra and Calculus: Relational Algebra – Relational Calculus	
3.	<p>SQL: SQL: Queries, Programming, Triggers: The form of a basic SQL Query – UNION, INTERSECT and EXCEPT – Nested Queries – Aggregate operators – Null values –Complex integrity constraints in SQL - Triggers & Active data bases. Transaction Management</p> <p>Overview: The ACID Properties - Transactions & Schedules – Concurrent execution of Transactions – Lock-based concurrency control – Performance of Locking –Transaction support in SQL.</p>	10
4.	<p>Normal Forms and Security: Schema Refinement and Normal forms: Introduction to Schema refinement – Functional dependencies – Reasoning about functional dependencies – Normal forms –Properties of Decompositions – Normalization – Schema Refinement in data base design – other kinds of dependencies. Security: Introduction to Database security -Access control – Discretionary Access control – Mandatory Access control – Additional issues to security. Concurrency control: 2PL, serializability and Recoverability – Introduction to Lock Management - Lock Conversions –Specialized Locking techniques - Concurrency control without locking.</p>	10
5.	<p>Distributed Database: Parallel & Distributed databases: Introduction – Architecture for parallel databases – Parallel Query evaluation – Parallelizing individual operations –Parallel Query Optimization – Introduction to distributed Databases – Distributed DBMS architecture sorting data in a distributed DBMS. Object Database Systems: Motivation Example – Structured data types – Operation on structured data types – Encapsulation & ADTS – Inheritance - Objects, OIDS and Reference Types - Database design for and ORDBMS – OODBMS – Comparing RDBMS, OODBMS and ORDBMS.</p>	10

TEXT BOOKS:

1. Raghu Ramakrishnan, Johannes Gehrke –“Database Management Systems”, Third Edition, McGraw-Hill Higher Education.
2. Silberschatry, Korth, Sundarshan, “Database system Concepts”, Fourth Edition, Mc GrawHill Higher Education

REFERENCES BOOKS:

1. Elmasri, Navathe, “Fundamentals of Database Systems”, Third Edition, Pearson Education Asia
2. S.S. Khandare, “Database Management and Oracle Programming”, First Edition, 2004, S.Chand and Company Ltd.
3. Nilesh Shah, “Database Systems using Oracle”, 2002, Prentice Hall of India.
4. Rajesh Narang, “Database Management Systems”, 2004, Prentice Hall of India

5. Raghu Ramakrishnan and J Gehrke," Database Management Systems", 3rd Edition, 2014.
6. C.J.Date, AKannan, S..Swamynathan ,"An Introduction to Database System", 8th Edition,2004.

First Semester			
Title of the Paper: Advanced Data Structures Using C Lab			
Paper Code:	MCACPT 1.6	CIE Marks	15
No of Hours/Week:	4	SEE Marks	35
Total Hours:	52	Credits	02

LIST OF PRACTICAL PROGRAMS:**PART A:**

1. Develop a C program to create a sequential file for storing employee records with each record having following information: EmpId, EmpName, Salary, Department and Gender
 - (a) Display the details of a given EmpId. In case if the required record is not found, suitable message should be displayed.
 - (b) Display all the records in the file.
2. Develop a C program to implement Stack operations push, pop and display operations.
3. Develop a C program to implement binary search using recursion
4. Develop a C program to convert a valid infix expression to postfix.
5. Develop a C program to evaluate the given postfix expression.
6. Develop a C program to implement Linear Queue operations: insertion, deletion and display operations.
7. Develop a C program to implement Circular Queue operations: insertion, deletion and display operations.
8. Define a structure to represent a node in a Singly Linked List. Each node must contain the following information: *Student name, USN*. Develop a C program using functions to perform the following operations:
 - a. Insertion of new node at first position
 - b. Display all nodes
 - c. Search key

PART B:

1. Develop a C program to implement basic operations of linear queue with singly linked list.
2. Develop a C program to implement basic operations of linear queue with doubly linked list.
3. Develop a C program to implement basic operations of Priority queue with singly linked list
4. Develop a C program to implement basic operations of stacks using singly linked list.
5. Develop a C program to implement basic operations of stacks using doubly linked list.

6. Develop a C program to perform the following operations:
 - a. Construct a binary search tree of integers
 - b. Traverse the tree in Inorder/preorder/postorder.
7. Develop C program for DFS graph traversal.
8. Develop C program for BFS graph traversal.

First Semester			
Title of the Paper: Python Programming Lab			
Paper Code:	MCACPT 1.7	CIE Marks	15
No of Hours/Week:	4	SEE Marks	35
Total Hours:	52	Credits	02

LIST OF PRACTICAL PROGRAMS

PART A:

1. Implement 10 operations on string and Tuple
2. Implement 10 operations on sets
3. Implement 10 operations on lists
4. Implement 10 operations on string
5. Demonstrate dictionary concepts for a given scenario
6. Python program to demonstrate use of break and continue statement.
7. Python program for recursion.
8. Python program on built in functions : lambda, MAP, Filters
9. Python Program to Print all Prime Numbers in an Interval
10. Python program to demonstrate concept of class and object.

PART B:

1. Demonstrate concept of different types of parameter passing techniques for user defined function
2. Program to Implement any Inheritance
3. Implement overloading concept
4. Implement overriding concept
5. Demonstrate exception handling mechanism
6. Program on File handling to perform read and write contents
7. Python program to copy contents of one file to another.
8. Python program to count number of words, characters, vowels in file.
9. Write a python program to Insert, Search, and Retrieve data into Employee DATABASE
10. Program on Data Visualization for Bar graph, Histogram, Pie chart, Line Graph.

First Semester			
Title of the Paper: Relational Database Management Systems Lab			
Paper Code:	MCACPT 1.8	CIE Marks	15
No of Hours/Week:	4	SEE Marks	35
Total Hours:	52	Credits	02

LIST OF PRACTICAL PROGRAMS

PART A:

1. Consider the following schema for a Student Database

- **Student** (snum: integer, sname: string, major: string, level: string, age: integer)
- **Class** (name: string, meets at: string, room: string, d: integer)
- **Enrolled** (snum: integer, cname: string)
- **Faculty** (fid: integer, fname: string, deptid: integer)

The meaning of these relations is straightforward; for example, Enrolled has one record per student class pair such that the student is enrolled in the class. Level is a two character code with 4 different values (example: Junior: JR etc)

Write queries to

- The tables will be created using CREATE, DESC and tuples will be inserted using INSERT commands and displayed using SELECT Commands.
- Find the names of all Juniors (level = JR) who are enrolled in a class taught by Prof. XYZ
- Find the names of all classes that either meet in room R128 or have five or more Students enrolled.
- Find the names of all students who are enrolled in two classes that meet at the same time
- Find the names of faculty members who teach in every room in which some class is taught
- Find the names of faculty members for whom the combined enrollment of the courses that they teach is less than five.

2. Consider the following schema for a Airline Flight Database

- **Flights** (no: int, from: string, to: string, distance: int, Departs: time, arrives: time, price:real)
- **Aircraft** (aid: integer, aname: string, cruisingrange: integer)
- **Certified** (eid: integer, aid: integer)

- **Employees** (eid: integer, ename: string, salary: integer)

Note that the Employees relation describes pilots and other kinds of employees as well; certified for some aircraft, and only pilots are certified to fly.

Write queries to

- The tables will be created using CREATE, DESC and tuples will be inserted using INSERT commands and displayed using SELECT Commands.
- Find the names of aircraft such that all pilots certified
- Find the names of aircraft such that all pilots certified to operate have salaries more than Rs.80,000.
- For each pilot who is certified for more than three aircrafts, find the eid and the maximum cruising range of the aircraft for which she or he is certified
- Find the names of pilots whose salary is less than the price of the cheapest route from Bengaluru to Frankfurt.
- For all aircraft with cruising range over 1000 Kms, .find the name of the aircraft and the average salary of all pilots certified for this aircraft.
- Find the names of pilots certified for some Boeing aircraft
- Find the aids of all aircraft that can be used on routes from Bengaluru to New Delhi.

3. Consider the following schema for a Student Enrollment Database

Consider the following relations of student enrollment in courses & books adopted for each course:

- **STUDENT** (regno: string, name: string, major: string, bdate:date)
- **COURSE** (course #:int, cname:string, dept:string)
- **ENROLL** (regno:string, course#:int, sem:int, marks:int)
- **BOOK_ ADOPTION** (course# :int, sem:int, book-ISBN:int)
- **TEXT** (book-ISBN:int, book-title:string, publisher:string, author:string)

Write queries to

- Create the above tables by properly specifying the primary keys and the foreign keys.
- Enter at least five tuples for each relation. Demonstrate how you add a new text book to the database and make this book be adopted by some Department.
- Produce a list of TEXT BOOKS (include Course #, Book-ISBN, Book-title) in the alphabetical order for Courses offered by the ‘CS’ department that use more than two books.
- List any department that has all its adopted books published by a specific publisher.

4. Consider the following schema for a Banking Database

- **BRANCH** (branch name: varchar , City : Varchar , Asset : Varchar)
- **ACCOUNT** (account Number : Varchar, Branch name : Varchar, balance: float)
- **CUSTOMER** (customer name : Varchar, Street : Varchar , City : Varchar)

- **DEPOSITOR** (customer name : varchar, account number : varchar)
- **LOAN** (loan number : varchar, branch name : varchar, amount : integer)
- **BORROWER** (customer name : varchar, loan number : varchar)

Write queries to

- The tables will be created using CREATE, DESC and tuples will be inserted using INSERT commands and displayed using SELECT Commands.
- List the loan number from loan having amount 10000 with a specific branch name.
- List the loan number with amount between 1000 and 10000.
- List the cname with substring.
- List the number of tuples in customer.
- List customer name, loan num and amount with specific branch name.
- Various Aggregate functions will be used to retrieve the data from the above constructed databases.
- Various Comparison operators will be used to retrieve the data from the above constructed databases
- Various Logical operators will be used to retrieve the data from the above constructed databases

5. Consider the following schema for a Accessories Database

- **PRODUCT** (maker: varchar, model : varchar, type: varchar)
- **PC** (model : varchar , speed : varchar, ram : varchar, hdd: varchar , removable disk : int , price : int)
- **LAPTOP** (model : varchar , speed : varchar, ram : varchar, hdd: varchar , screen: varchar, price : int)
- **PRINTER** (model: varchar, color : blob , type : varchar, price : int)

Write queries to

- The tables will be created using CREATE, DESC and tuples will be inserted using INSERT commands and displayed using SELECT Commands.
- Find the model, speed, RAM,HDD for all pc's, whose price is under 35000.
- Rename the speed column to MHz and HDD column to GB in pc.
- Find all manufactures of laptop.
- Find all the tuples in printer for color.
- Various Aggregate functions will be used to retrieve the data from the above constructed databases.
- Various Comparison operators will be used to retrieve the data from the above constructed databases

- Various Logical operators will be used to retrieve the data from the above constructed databases.

6. Consider the following schema for a Order Processing Database

- **CUSTOMER** (Cust id : varchar, cust name : varchar, city : varchar)
- **ORDER** (Order num : varchar, order date : date, cust id : varchar , order amount : int)
- **ITEM** (item id : varchar , unit price : int)
- **ORDERITEM** (order num: varchar, item id: varchar, quantity : int)
- **WAREHOUSE** (warehouse id : varchar, city: varchar)
- **SHIPMENT** (order num: varchar, warehouse id : varchar, shipdate : date)

Write queries to

- The tables will be created using CREATE, DESC and tuples will be inserted using INSERT commands and displayed using SELECT Commands.
- Produce a list in customer name, number of orders, average order amount where the middle column is total number of order by the customers and the last column is average order amount for third column.
- List the order number for order that were shipped from all the ware houses that the company asked in specific city.
- Various Aggregate functions will be used to retrieve the data from the above constructed databases.
- Various Comparison operators will be used to retrieve the data from the above constructed databases
- Various Logical operators will be used to retrieve the data from the above constructed databases.

PART B:**1. Consider the following schema for a Supplier Database**

- **SUPPLIER** (Supplier id : varchar, name : varchar , address : varchar)
- **PART** (part id : varchar, partname : varchar, color : tinyblob)
- **CATALOG** (supplier id : varchar, part id : varchar, cost : int)

Write queries to

- The tables will be created using CREATE, DESC and tuples will be inserted using INSERT commands and displayed using SELECT Commands.
- Find the names of suppliers who supply only red parts.

- Find supplierid of suppliers who supply red and green parts.
- Find the supplierid of supplier who supplies some red part OR whose address is 'TUMKUR'.
- Find the supplierid of suppliers who supply some red and some green parts.
- Find the supplierid of suppliers who supply every parts.

2. Consider the following schema for a University Database

- **CLASSROOM** (building varchar(30), roomno varchar(30) primary key, capacity int)
- **DEPARTMENT** (deptname varchar(30) primary key, building varchar(30), budget decimal(10,2))
- **COURSE**(courseid varchar(30) primary key, title varchar(30), deptname varchar(30), credits int) **INSTRUCTOR**(iid varchar(30) primary key, name varchar(30), deptname varchar(30), salary int)
- **STUDENT**(stdid varchar(30) primary key, name varchar(30), deptname varchar(30), totalcredit int)
- **TEACHES**(iid varchar(30), courseid varchar(30), secid varchar(30), sem varchar(30), year varchar(30))
- **SECTION** (courseid varchar(30), secid varchar(30) primary key, sem varchar(30), year varchar(30), building varchar(30), roomno varchar(30), timeid varchar(30))
- **TIMESLOT**(timeid varchar(30) primary key, day varchar(30), starttime time, endtime time); **PREREQUIST** (courseid varchar(30), preid varchar(30))
- **ADVISOR** (stdid varchar(30), iid varchar(30))
- **TEXT**(iid varchar(30), courseid varchar(30), secid varchar(30), sem varchar(30), year varchar(30), grade varchar(30))

Write queries to

- The tables will be created using CREATE, DESC and tuples will be inserted using INSERT commands and displayed using SELECT Commands.
- Retrieve the names of the instructors and order them by the departmental name.
- retrieve whose salary is between 10000-20000
- Find the average salary of instructor for a particular department.
- Find the minimum salary of instructor for a particular department
- Find the average salary of the instructor group by them department wise where average salary should be greater than 50000
- Display the name of the instructor who takes class in building-golden jubilee block.
- Retrieve the total number of students in each department section wise.

3. Consider the following schema for a Library Database:

- **BOOK**(Book_id, Title, Publisher_Name, Pub_Year)
- **BOOK_AUTHORS**(Book_id, Author_Name)
- **PUBLISHER**(Name, Address, Phone)
- **BOOK_COPIES**(Book_id, Programme_id, No-of_Copies)
- **BOOK_LENDING**(Book_id, Programme_id, Card_No, Date_Out, Due_Date)
- **LIBRARY_PROGRAMME**(Programme_id, Programme_Name, Address)

Write queries to

- Retrieve details of all books in the library – id, title, name of publisher, authors, number of copies in each Programme, etc.
- Get the particulars of borrowers who have borrowed more than 3 books, but from Jan 2017 to Jun 2017.
- Delete a book in BOOK table. Update the contents of other tables to reflect this data manipulation operation.
- Partition the BOOK table based on year of publication. Demonstrate its working with a simple query.
- Create a view of all books and its number of copies that are currently available in the Library

4. Consider the schema for Movie Database:

- **ACTOR**(Act_id, Act_Name, Act_Gender) **DIRECTOR**(Dir_id, Dir_Name, Dir_Phone)
- **MOVIES**(Mov_id, Mov_Title, Mov_Year, Mov_Lang, Dir_id)
- **MOVIE_CAST**(Act_id, Mov_id, Role)
- **RATING**(Mov_id, Rev_Stars)

Write queries to

- List the titles of all movies directed by ‘Hitchcock’.
- Find the movie names where one or more actors acted in two or more movies.
- List all actors who acted in a movie before 2000 and in a movie after 2015 (use JOIN operation).
- Find the title of movies and number of stars for each movie that has at least one rating and find the highest number of stars that movie received. Sort the result by movie title.
- Update rating of all movies directed by ‘Steven Spielberg’ to 5.

5. Consider the schema for Company Database:

- **EMPLOYEE**(SSN, Name, Address, Sex, Salary, SuperSSN, DNo)
- **DEPARTMENT**(DNo, DName, MgrSSN, MgrStartDate)
- **DLOCATION**(DNo, DLoc) **PROJECT**(PNo, PName, PLocation, DNo)
- **WORKS_ON**(SSN, PNo, Hours)

Write queries to

- Make a list of all project numbers for projects that involve an employee whose last name is 'Scott', either as a worker or as a manager of the department that controls the project.
- Show the resulting salaries if every employee working on the 'IoT' project is given a 10 percent raise. Find the sum of the salaries of all employees of the 'Accounts' department, as well as the maximum salary, the minimum salary, and the average salary in this department.
- Retrieve the name of each employee who works on all the projects controlled by department number 5 (use NOT EXISTS operator).
- For each department that has more than five employees, retrieve the department number and the number of its employees who are making more than Rs. 6,00,000

6. Consider the schema for College Database:

- **STUDENT**(USN, SName, Address, Phone, Gender)
- **SEMSEC**(SSID, Sem, Sec)
- **CLASS**(USN, SSID) **COURSE**(Subcode, Title, Sem, Credits)
- **IAMARKS**(USN, Subcode, SSID, Test1, Test2, Test3, FinalIA)

Write queries to

- List all the student details studying in fourth semester 'C' section.
- Compute the total number of male and female students in each semester and in each section.
- Create a view of Test1 marks of student USN '1BI15CS101' in all Courses.
- Calculate the FinalIA (average of best two test marks) and update the corresponding table for all students.
- Categorize students based on the following criterion:
 - If FinalIA = 17 to 20 then CAT = 'Outstanding'
 - If FinalIA = 12 to 16 then CAT = 'Average'
 - If FinalIA < 12 then CAT = 'Weak'Give these details only for 4th semester A, B, and C section students.

Second Semester			
Title of the Paper: Artificial Intelligence			
Paper Code:	MCACPT 2.1	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- Provide a strong foundation in the fundamental concepts of AI
- Expose students to the latest developments in AI and its applications in industry and research
- Provide students with the basic knowledge and practical skills needed to succeed in the field
- Learn to apply the basic principles of AI to problem solving
- Learn to apply AI techniques to applications that involve perception, reasoning, and learning

COURSE OUTCOMES:

Upon successful completion of this course the students would be able:

- To understand the basic idea of artificial intelligence and its application areas.
- To apply basic principles of AI in solutions that requires problem solving, inference, perception, knowledge representation, and learning.
- To demonstrate awareness and a fundamental understanding of various applications of AI techniques.
- To understand about Logic programming and about Reasoning related to AI.
- To know about the different representational techniques in AI.

Unit	Description	Hours
1.	Artificial Intelligence and Intelligent Agents Artificial Intelligence: - Introduction, what is artificial intelligence, Application of artificial intelligence, History of artificial intelligence, Types of artificial intelligence, Artificial intelligence technique. Intelligent Agent: - Agents and Environment, Structure of Agents, Types of Agents, Multi Agent System, Agent communication, Agent development tools.	10
2.	Problem Solving and Adversarial Search Search algorithms, Uninformed search strategies, Hill climbing	10

	algorithms, Min max search, Heuristic search techniques, Alpha beta pruning. Adversarial Search: - Games, Optimal decisions in game, Optimal strategies, Minmax algorithms, Optimal decisions in multiplayer games.	
3.	<p>Knowledge Representations and Expert System Definition, Approaches to knowledge representation, Technique for knowledge representation, Handling uncertain knowledge and reasoning, Advanced knowledge representation technique, Frames, Semantic network, Conceptual graphs, Conceptual dependencies, Script.</p> <p>Expert systems:- Introduction, basic concepts, structure of expert systems, the human element in expert systems how expert systems works, problem areas addressed by expert systems, expert systems success factors, types of expert systems, expert systems and the internet interacts web, knowledge engineering, scope of knowledge, difficulties, in knowledge acquisition methods of knowledge acquisition, machine learning, intelligent agents, selecting an appropriate knowledge acquisition method, societal impacts reasoning in artificial intelligence, inference with rules, with frames: model based reasoning, case based reasoning, explanation & meta knowledge inference with uncertainty representing uncertainty.</p>	12
4.	<p>Fuzzy Logic System and Genetic Algorithms: Introduction, Crisp sets, Fuzzy sets, Fuzzy logic control, Sugano style of fuzzy inference processing, Planning. Genetic Algorithms:-Introduction, Search space, Operators of genetic algorithms, Application of Genetic algorithm, Genetic algorithm cycle, Problem solving using genetic algorithm.</p>	10
5.	<p>Artificial Neural Network History of neural network, Neuron model for artificial neural network, feed forward and feedback artificial neural network, neural processing, Learning processing, Single layer and Multi-layer perception.</p>	10

TEXT BOOKS:

1. Artificial Intelligence- A modern approach, second edition by STUART RUSSEL PETER NORVING
2. Artificial Intelligence- Third Edition by Elain Rich, Kevin Knight, Shivashankar B Nair.

REFERENCE BOOKS:

1. Artificial Intelligence – ELA Kumar
2. Neural Network –Second Edition by SIMON HAYLEIN

Second Semester			
Title of the Paper: Advanced Java Programming			
Paper Code:	MCACPT 2.2	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- Explore advanced topic of Java programming for solving problems
- Be able to put into use the advanced features of the Java language to build and compile robust enterprise-grade applications
- Provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business
- Design and develop GUI applications using Swings
- Enhance knowledge to manipulate and store data
- To provide foundations on servlet and JSP

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- To learn the basic principles of object-oriented design.
- Create inheritance packages and interfaces.
- Develop multithreaded applications with synchronization.
- Learn the concept of Servlet and its life cycle.
- Understand JSP tags and its services.
- Learn the methods of building database connection.

Unit	Description	Hours
1.	<p>Fundamentals of Object-Oriented Programming: Basic Concepts of Object-Oriented Programming, Benefits and Applications of OOP, Comparison of Object-Oriented Programming Languages.</p> <p>The Genesis of Java: The Java Buzzwords, Java's lineage (Needs of C and C++ and its Comparison with java), Basic Data Types Of Java and Simple programs, Command line Arguments, The Byte code.</p> <p>Arrays, Strings and Vectors: Declaration, Creation and operations on One and Two-Dimensional Arrays. The String Classes and its</p>	10

	commonly used methods, Vectors and Wrapper Classes	
2.	<p>Introducing Classes and Objects: Class Fundamentals, Declaring Object, Assigning object reference variables, Static variables and Static Methods. Constructors-Its Characteristics and Features, Overloaded Constructors and the ‘this’ keyword.</p> <p>Inheritance: Inheritance Basics, Concepts of Sub-class and Super-class. Constructing a Sub-class with the use of the keywords extends, super and final. Method Overriding and Access Modifiers.</p> <p>Interfaces and Packages: Interfaces- Their Use in Multiple inheritance, Defining and implementing interfaces with examples. Packages- Java API Packages, Use of Import Statements and Package Creation, Defining and implementing packages with examples.</p>	12
3.	<p>Exception Handling: Fundamentals, Exception Types, Using try and catch blocks. Multiple catch clauses, Use of throw, throws and finally. Java Built-in Exceptions and Creating Own-Exception sub-classes.</p> <p>Multi-threaded Programming: Concept of Parallel and Multitasking, Creating Thread, Creating Multiple Threads, Thread Priorities and Synchronization.</p>	10
4.	<p>Introducing Swing: Introduction to swings, Differences between Swing and AWT, Components and Containers. Layout manager, The Swing Packages, A Simple Swing Application, Event Handling, Painting in Swing, Exploring Swing: JLabel and ImageIcon, Text field, Swing Buttons-JButton, JToggleButton, Check Boxes, Radio Buttons, JTree, JTable.</p> <p>Servlet: Server-side Java, Advantages Over Applets, Servlet Alternatives, advantages, Common Gateway Interface, Proprietary APIs, Active Server Pages, Server-side JavaScript, Servlet Architecture, Servlet Life Cycle, Generic Servlet, Http Servlet, First Servlet, Apache Tomcat Web Server, Building, installing and Invoking Servlet, Passing and retrieving Parameters to Servlets, Server-Side Include Cookies, Filters, Security Issues.</p>	10
5.	<p>Java Server Pages: Introduction to JSP, HTTP, JSP Engines, Tomcat. Java Web Server, WebLogic, WebSphere, JSP and Servlet, structure of JSP Page, JSP Syntax, JSP Components, Directives, Comments, Expressions, Scriptlets, Conditional processing, Declarations, Implicit Objects, Variables, Methods, and Classes Synchronization, Actions, Tag, Beans, property, Session Tracking, Cookies, Passing Control and Data. Sharing Session and Application Data.</p> <p>Java Database Connectivity: Introduction. JDBC Drivers, JDBC Architecture, JDBC Classes and Interfaces, making a Connection and</p>	10

Executing SQL Statement, Atomic Transaction, Pre-compiled Statement, SQL Statements to Call Stored Procedures, Retrieving, Result Set Metadata.

TEXT BOOKS:

1. Herbert Schildt: JAVA the Complete Reference. Twelfth Edition, Tata McGraw-Hill. Jim Keogh. The Complete Reference J2EE, Tata McGraw-Hill 2007
2. Uttam K Roy, Advanced JAVA programming, Oxford University press, 2015.

REFERENCE BOOKS:

1. Y. Daniel Liang: Introduction to JAVA Programming, 7th Edition, Pearson Education, 2007.
2. Stephanie Bodoff et al: The J2EE Tutorial, 2 Edition, Pearson Education, 2004.
3. E. Balaguruswamy, Programming with Java, A primer, 5th Edition, Tata McGraw-Hill Publications.

Second Semester			
Title of the Paper: Data Communication and Computer Networks			
Paper Code:	MCACPT 2.3	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- To introduce the fundamental various types of computer networks.
- To demonstrate the TCP/IP and OSI models with merits and demerits
- To explore the various layers of OSI Model.
- To introduce UDP and TCP Models.

COURSE OUTCOMES:

- To learn the basic principles of object-oriented design.
- Create inheritance packages and interfaces.
- Develop multithreaded applications with synchronization.
- Learn the concept of Servlet and its life cycle.
- Understand JSP tags and its services.
- Learn the methods of building database connection.

Unit	Description	Hours
1.	Data Communications –Components: Data Representation, need of network, services. Network models-peer to peer, client server, distributed. Application of network and criteria, Types of connections: Topologies-mesh, star, bus, ring, Categories of Networks -LAN, WLAN, MAN, WAN.	10
2.	Data link layer: Introduction, Framing, and Error – Detection and Correction – Parity – LRC – CRC Hamming code, Flow and Error Control, Noiseless Channels, Noisy Channels, HDLC, Point to Point Protocols. 111 Medium Access sub layer: ALOHA, CSMA/CD, LAN – Ethernet IEEE 802.3, IEEE 802.5 – IEEE 802.11, Random access, Controlled access, Channelization.	12
3.	Network layer: Logical Addressing, Internetworking, Tunnelling, Address mapping, ICMP, IGMP, Forwarding, Uni-Cast Routing Protocols, Multicast Routing Protocols.	10
4.	Transport Layer: Process to Process Delivery, UDP and TCP protocols,	10

	Data Traffic, Congestion, Congestion Control, QoS, Integrated Services, Differentiated Services, QoS in Switched Networks.	
5.	Application Layer: Domain name space, DNS in internet, electronic mail, SMTP, FTP, WWW, HTTP, SNMP. Wireless Networks Generation -Wireless Transmission Protocols- Wired Vs Wireless Networks Present Day Mobile Communication-The Cellular Fundamentals-Transmitter and Receiver Techniques	10

TEXT BOOKS:

1. Data Communications and Networking, Behrouz A. Forouzan, Fourth Edition TMH,2006.
2. Computer Networks, Andrew S Tanenbaum, 4th Edition. Pearson Education, PHI.

REFERENCES BOOKS:

1. Data communications and Computer Networks, P.C. Gupta, PHI.
2. An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition, Pearson Education.
3. Understanding communications and Networks, 3rd Edition, W.A. Shay, Cengage Learning.
4. Computer Networking: A Top-Down Approach Featuring the Internet. James F. Kurose & Keith W. Ross, 3rd Edition, Pearson Education.
5. Data and Computer Communication, William Stallings, Sixth Edition, Pearson Education, 2000.

Second Semester			
Title of the Paper: Statistics Using R Programming			
Paper Code:	MCASPT 2.4	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- The basics of statistical computing and data analysis
- How to use R for analytical programming
- How to implement data structure in R
- R loop functions and debugging tools
- Object-oriented programming concepts in R
- Data visualization in R
- How to perform error handling
- Writing custom R functions

COURSE OUTCOMES:

After the successful completion of the course, the student will be able to:

- Explore fundamentals of statistical analysis in R environment.
- Describe key terminologies, concepts and techniques employed in Statistical Analysis.
- Define Calculate, Implement Probability and Probability Distributions to solve a wide variety of problems.
- Conduct and interpret a variety of Hypothesis Tests for decision making.
- Understand, Analyse, and Interpret Correlation Probability and Regression to analyse the underlying relationships between different variables.

Unit	Description	Hours
1.	Introduction of the language, numeric, arithmetic, assignment, and vectors, Matrices and Arrays, Non-numeric Values, Lists and Data Frames, Factors Special Values in R	10
2.	Input / Output statements in R, Conditions and Loops statements, Functions, Reading and writing files, Exceptions.	10
3.	Statistics: Broad categories of data, sampling techniques: probability and non-probability sampling, Descriptive statistics: central tendency measures, dispersion measures and shape measures.	11

	Correlation: Karl Pearson, Kendal Tau rank correlation and Spearman's rank correlation Continuous Probability distributions: uniform, normal, Student's t-distribution	
4.	Discrete probability distribution: Bernoulli, binomial, Poisson distribution Common probability density functions. Statistical testing and modelling: sampling distributions, hypothesis testing: Z test, t test and chi-square test (test of independence, test of homogeneity, and goodness of fit test), Analysis of variance.	11
5.	Simple linear regression and multiple linear regressions. Data visualization : Scatter Plot, Line chart, Bar Plot or Bar Chart, Pie Chart, Histogram, Box Plot, Box Style For R Charts Using Bty Option Of Par() Function, Interactive Plots in R using plotly() package.	10

TEXT BOOKS:

1. Dr. Asha Gowda Karegowda, Dr. Prakash BR, Dr. Hanumanthappa M, Statistical Computing and R Programming, Himalaya Publishing House, ISBN: 978-93-5840-868-3, Dec 2023
2. Matloff, N. (2011). The Art of R Programming: A Tour of Statistical Software Design. Starch Press.
3. Gardener, M. (2013). Beginning R - The Statistical Programming Language. Wiley. 3
4. Verma, A. K. (2017). R Programming. Cengage Learning

REFERENCE BOOKS:

1. Statistical Methods And Use Of R, . P. G. Dixit, P. S. Kapre,, V. R. Pawgi, Isbn 13 9789351642824,2020 Publisher, Nirali Prakashan
2. Dunlop, Dorothy D., and Ajit C. Tamhane. Statistics and data analysis: from elementary to intermediate. Prentice Hall, 2000.

Second Semester			
Title of the Paper: Cryptography and Network Security			
Paper Code:	MCASPT 2.4	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

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

COURSE OUTCOMES:

After successful completion of the course, the learners would be able to

- Provide security of the data over the network.
- Do research in the emerging areas of cryptography and network security.
- Implement various networking protocols.
- Protect any network from the threats in the world.

Unit	Description	Hours
1.	Introduction: Security Goals, Cryptographic Attacks, Services and Mechanism, Techniques. Mathematics of Cryptography: Integer Arithmetic, Modular Arithmetic, Matrices, Linear Congruence.	10
2.	Symmetric-Key Ciphers: Introduction, Substitution Ciphers, Transpositional Ciphers, Stream and Block Ciphers. Data Encryption Standard (DES): Introduction, DES Structure, DES Analysis, Security of DES, Multiple DES, Examples of Block Ciphers influenced by DES. Advanced Encryption Standard: Introduction, Transformations, Key Expansion, The AES Ciphers, Examples, Analysis of AES.	10
3.	Encipherment using Modern Symmetric-Key Ciphers: Use of Modern Block Ciphers, Use of Stream Ciphers, Other Issues. Mathematics of Asymmetric-Key Cryptography: Primes, Primality Testing, Factorization, Chinese Remainder Theorem, Quadratic Congruence, Exponentiation and Logarithm. Asymmetric Key Cryptography: Introduction, RSA Cryptosystem, Rabin Cryptosystem, Elgamal	12

	Cryptosystem, Elliptic Curve Cryptosystems.	
4.	Cryptography Hash Functions: Introduction, Description of MD Hash Family, Whirlpool, SHA-512. Digital Signature: Comparison, Process, Services, Attacks on Digital Signature, Digital Signature Schemes, Variations and Applications. Key Management: Symmetric-Key Distribution, Kerberos, Symmetric-Key Agreement, Public-Key Distribution, Hijacking.	10
5.	Security at the Application Layer: PGP and S/MIME: Email, PGP, S/MIME. Security at the Transport Layer: SSL and TLS: SSL Architecture, Four Protocols, SSL Message Formats, Transport Layer Security. Security at the Network Layer: IPSec: Two modes, Two security protocols, Security association, security policy, Internet Key exchange, ISAKMP.	10

TEXT BOOKS:

1. Behrouz A. Forouzan, Debdeep Mukhopadhyay: Cryptography and Network Security, 2nd Edition, Special Indian Edition, Tata McGraw-Hill, 2011.
2. Wade Trappe, Lawrence C Washington, “Introduction to Cryptography with coding theory”, Pearson.

REFERENCE BOOKS:

1. Michael E. Whitman and Herbert J. Mattord: Principles of Information Security, 2nd Edition, Thomson, Cengage Delmar Learning India Pvt., 2012.
2. William Stallings: Network Security Essentials: Applications and Standards, 4th Edition, Pearson Education, 2012.
3. W. Mao, “Modern Cryptography – Theory and Practice”, Pearson Education.
4. Charles P. Pfleeger, Shari Lawrence Pfleeger – Security in computing – Prentice Hall of India.

RESOURCES: Video Lectures

1. <http://nptel.ac.in/courses/106105031/lecture> by Dr. Debdeep Mukhopadhyay IIT Kharagpur
2. <https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-033-computer-system-engineering-spring-2009/video-lectures/> lecture by Prof. Robert Morris and Prof. Samuel Madden MIT.

Second Semester			
Title of the Paper: Cloud Computing			
Paper Code:	MCASPT 2.4	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- To provide students with the fundamentals and essentials of Cloud Computing.
- To provide students a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.
- To enable students exploring some important cloud computing driven commercial systems and applications.
- To expose the students to frontier areas of Cloud Computing and information systems, while providing sufficient foundations to enable further study and research.

COURSE OUTCOMES:

- Articulate the main concepts, key technologies, strengths, and limitations of cloud computing and the possible applications for state-of-the-art cloud computing
- Identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.
- Explain the core issues of cloud computing such as security, privacy, and interoperability.
- Provide the appropriate cloud computing solutions and recommendations according to the applications used.

Unit	Description	Hours
1.	History of Centralized and Distributed Computing - Overview of Distributed Computing, Cluster computing, Grid computing. Technologies for Network based systems- System models for Distributed and cloud computing- Software environments for distributed systems and clouds.	10
2.	Introduction to Cloud Computing- Cloud issues and challenges - Properties - Characteristics - Service models, Deployment models. Cloud resources: Network and API - Virtual and Physical computational resources - Data-storage. Virtualization concepts - Types of	12

	Virtualization- Introduction to Various Hypervisors - High Availability (HA)/Disaster Recovery (DR) using Virtualization, Moving VMs .	
3.	Service models - Infrastructure as a Service (IaaS) - Resource Virtualization: Server, Storage, Network - Case studies. Platform as a Service (PaaS) - Cloud platform & Management: Computation, Storage - Case studies. Software as a Service (SaaS) - Web services - Web 2.0 - Web OS - Case studies – Anything as a service (XaaS).	10
4.	Cloud Programming and Software Environments – Parallel and Distributed Programming paradigms – Programming on Amazon AWS and Microsoft Azure – Programming support of Google App Engine – Emerging Cloud software Environment	10
5.	Cloud Access: authentication, authorization and accounting - Cloud Provenance and meta-data - Cloud Reliability and fault-tolerance - Cloud Security, privacy, policy and compliance- Cloud federation, interoperability and standards.	10

TEXT BOOKS:

1. Kai Hwang, Geoffrey C. Fox and Jack J. Dongarra, “Distributed and cloud computing from Parallel Processing to the Internet of Things”, Morgan Kaufmann, Elsevier – 2012
2. Borko Furht. Armando Escalante, “Handbook of Cloud Computing”, Springer

REFERENCE BOOKS:

1. Barrie Sosinsky, “ Cloud Computing Bible” John Wiley & Sons, 2010
2. Tim Mather, Subra Kumaraswamy, and Shahed Latif, Cloud Security and Privacy An Enterprise Perspective on Risks and Compliance, O'Reilly 2009

Second Semester			
Title of the Paper: Block Chain Technology			
Paper Code:	MCASPT 2.4	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- Understand the fundamentals of blockchain technology and its components.
- Explore different Blockchain subjects, platforms, and their unique features.
- Learn how to develop and deploy smart contracts.
- Analyse the impact of blockchain on various industries.
- Gain hands-on experience with blockchain development tools and frameworks.

COURSE OUTCOMES:

- State the basic concepts of block chain
- Paraphrase the list of consensus and Demonstrate and Interpret working of hyper ledger Fabric
- Implement SDK composer tool and explain the Digital identity for government

Unit	Description	Hours
1.	History: Digital Money to Distributed Ledgers -Design Primitives: Protocols, Security, Consensus, Permissions, Privacy- : Block chain Architecture and Design-Basic crypto primitives: Hash, Signature Hash chain to Block chain-Basic consensus mechanisms.	12
2.	Requirements for the consensus protocols-Proof of Work (PoW)- Scalability aspects of Block chain consensus protocols: Permissioned Block chains-Design goals-Consensus protocols for Permissioned Block chains.	10
3.	Decomposing the consensus process-Hyper ledger fabric components-Chain code Design and Implementation: Hyper ledger Fabric II:-Beyond Chain code: fabric SDK and Front End-Hyper ledger composer tool.	10
4.	Block chain in Financial Software and Systems (FSS): -Settlements, -KYC, -Capital markets-Insurance Block chain in trade/supply chain: Provenance of goods, visibility, trade/supply chain finance, invoice management/discounting.	10
5.	Block chain for Government: Digital identity, land records and other kinds of record keeping between government entities, public distribution	10

	system / social welfare systems: Block chain Cryptography: Privacy and Security on Block chain.	
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TEXT BOOKS:

1. Mark Gates, “Block chain: Ultimate guide to understanding block chain, bit coin, crypto currencies, smart contracts and the future of money”, Wise Fox Publishing and Mark Gates 2017.
2. Salman Baset, Luc Desrosiers, Nitin Gaur, Petr Novotny, Anthony O'Dowd, Venkatraman Ramakrishna, “Hands-On Block chain with Hyper ledger: Building decentralized applications with Hyperledger Fabric and Composer”, 2018.
3. Bahga, Vijay Madiseti, “Block chain Applications: A Hands-On Approach”, Arshdeep Bahga, Vijay Madiseti publishers 2017.

REFERENCE BOOKS :

1. Andreas Antonopoulos, “Mastering Bitcoin: Unlocking Digital Crypto currencies”, O'Reilly Media, Inc. 2014.
2. Melanie Swa, “Block chain ”, O'Reilly Media 2014.

Second Semester			
Title of the Paper : Design and Analysis of Algorithms			
Paper Code:	MCASPT 2.4	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- The fundamental design, analysis, and implementation of basic data structures.
- Basic concepts in the specification and analysis of programs.
- Principles for good program design, especially the uses of data abstraction.
- Significance of algorithms in the computer field
- Various aspects of algorithm development
- Qualities of a good solution

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Apply asymptotic notational method to analyse the performance of the algorithms in terms of time complexity.
- Demonstrate divide & conquer approaches and decrease & conquer approaches to solve computational problems.
- Make use of transform & conquer and dynamic programming design approaches to solve the given real world or complex computational problems.
- Apply greedy and input enhancement methods to solve graph & string based computational problems.
- Analyse various classes (P, NP and NP Complete) of problems

Unit	Description	Hours
1.	INTRODUCTION: What is an Algorithm?, Fundamentals of Algorithmic Problem Solving. FUNDAMENTALS OF THE ANALYSIS OF ALGORITHM EFFICIENCY: Analysis Framework, Asymptotic Notations and Basic Efficiency Classes, Mathematical Analysis of Non recursive Algorithms, Mathematical Analysis of Recursive Algorithms.	12
2.	BRUTE FORCE APPROACHES: Selection Sort and Bubble Sort, Sequential Search and Brute Force String Matching. Exhaustive Search (Travelling Salesman problem and Knapsack Problem). DFS and BFS, DECREASE-AND-CONQUER: Insertion Sort, Topological Sorting.	10

3.	DIVIDE AND CONQUER: Merge Sort, Quick Sort, Binary Tree Traversals, Multiplication of Large Integers and Strassen's Matrix Multiplication, The Closest-Pair and Convex-Hull Problems by Divide-and-Conquer	10
4.	TRANSFORM-AND-CONQUER: Balanced Search Trees, Heaps and Heapsort. DYNAMIC PROGRAMMING: Three basic examples, The Knapsack Problem and Memory Functions, Warshall's and Floyd's Algorithms. THE GREEDY METHOD: Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffman Trees and Codes.	10
5.	LIMITATIONS OF ALGORITHMIC POWER: Decision Trees, P, NP, and NP-Complete Problems. COPING WITH LIMITATIONS OF ALGORITHMIC POWER: Backtracking (n-Queens problem, Subset-sum problem), Branch-and-Bound (Knapsack problem), Approximation algorithms for NP-Hard problems (Knapsack problem).	10
<p>TEXT BOOKS:</p> <ol style="list-style-type: none"> 1. Introduction to the Design and Analysis of Algorithms, By Anany Levitin, 3rd Edition (Indian), 2017, Pearson. 2. Design and Analysis of Algorithms, Dave and Dave, Pearson <p>REFERENCES BOOKS:</p> <ol style="list-style-type: none"> 1. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronal L. Rivest, Clifford Stein, 3rd Edition, PHI. 2. Design and Analysis of Algorithms, S. Sridhar, Oxford (Higher Education). 		

Second Semester			
Title of the Paper: Office Automation			
Paper Code:	MCAOET 2.5	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- Office tools course would enable the students in crafting professional word documents, excel spread sheets, power point presentations using the Microsoft suite of office tools.
- To familiarize the students in preparation of documents and presentations with office automation tools

COURSE OUTCOMES:

The students will be able:

- Understand concept of Word Processor and use its features.
- To use the advanced features of MS-Word to make day to day usage easier.
- To work comfortably with MS-Excel Environment.
- To create work sheets and user advanced features of Excel.
- To create presentations and inserting multimedia in them.

Unit	Description	Hours
1.	Introduction: Introduction of computer, Computer generations ,types of computers, Set of computer hardware devices I/O Devices, components of CPU, introduction on computer OS , Basic Operations, Networking Basics Security and Maintenance, Application Software, Office Suites, Web Browsers, Media Players, Security Software	10
2.	Introduction to MS Office & MS Word: MS-Word: Features of MSWord, MS-Word Window components, Customize the Quick Access Toolbar, working with formatted text, Shortcut keys (navigational, selecting text), typing modes: Insert/overwrite mode. Formatting (font, paragraph, page) and editing(cut, copy, paste, find, replace, go to(F5)), Using format painter, Header & footer, proofing text (Spell-check, Auto correct) MS Word Advanced features: Inserting various objects(like pictures from various sources, shapes, textbox, symbols, equations), Hyperlinks, Tables :various operations on tables (like creating table,	12

	inserting/deleting/merging of rows/columns/cells) Mail Merge, Macros: Purpose – Creating & running a Macro	
3.	MS-Excel: Excel Features, Spread sheets, workbooks, creating, saving & editing a workbook, Renaming sheet, cell entries(numbers, labels, and formulas), spell check, find and replace, Adding and deleting rows and columns Filling series, fill with drag, data sort, Formatting worksheet, Functions and its types, Some useful Functions in excel(SUM,AVERAGE,COUNT, MAX,MIN, IF),	10
4.	MS-Excel Advanced Features Cell referencing (Relative, Absolute, Mixed), What-if analysis, Introduction to charts: types of charts, creation of charts, printing a chart, printing worksheet – Sort – Filters – View Menu- Goal Seek –Scenarios.	8
5.	MS-PowerPoint and its Applications MS-PowerPoint: Features of Power Point, Uses, components of slide, templates and wizards, using template, choosing an auto layout, using outlines, adding subheadings, editing text, formatting text, using master slide, adding slides, changing color scheme, changing background and shading, adding header and footer, adding clip arts and auto shapes. Various presentation, Working with slide sorter view(deleting, duplicating, rearranging slides),adding transition and animations to slide show, inserting music or sound on a slide, viewing slideshow, Printing slides.	12

TEXT BOOKS:

1. Computer Fundamentals–Pradeep .K.Sinha: BPB Publications.
2. Sanjay Saxena, A First Course in Computers (Based on Windows 8 And MS Office 2013) Vikas Publishing 2015.
3. Fundamentals of Computers –Reema Thareja, Oxford University Press India

REFERENCE BOOKS:

1. Laura Acklen et al, Microsoft Office 97 Professional Essentials,EEE Que E&T, PHI (1998).
2. Jennifer fulton, Sherri Kinkoph, and Joe Kraynak, The Big Basics Book of Microsoft Office 1997, PHI, 1998.

Second Semester			
Title of the Paper: Artificial Intelligence Lab			
Paper Code:	MCACPP 2.6	CIE Marks	15
No of Hours/Week:	4	SEE Marks	35
Total Hours:	52	Credits	02

LIST OF PRACTICAL PROGRAMS

PART A:

1. Implement and Demonstrate Depth First Search Algorithm on Water Jug Problem.
2. Implement and Demonstrate Best First Search Algorithm on any AI problem
3. Implement AO* Search algorithm.
4. Solve 8-Queens Problem with suitable assumptions
5. Implementation of TSP using heuristic approach
6. Implementation of the problem-solving strategies: either using Forward Chaining or Backward Chaining
7. Implement resolution principle on FOPL related problems
8. Implementation and Analysis of DFS and BFS for an application
9. Implementation of minimax algorithm for an application

PART B:

1. Implementation of toy problems
2. Implement any/few of Game and demonstrate the Game playing strategies Tic-Tac-Toe
3. Program Write a Program to Implement 8-Puzzle problem using Python
4. Write a Program to Implement Water-Jug problem using Python
5. Write a Program to Implement Travelling Salesman Problem using Python.
6. Write a Program to Implement Tower of Hanoi using Python.
7. Write a Program to Implement Monkey Banana Problem using Python.
8. Write a Program to Implement Missionaries-Cannibals Problems using Python.
9. Write a Program to Implement N-Queens Problem using Python.

Second Semester			
Title of the Paper: Advanced Java Programming Lab			
Paper	MCACPP 2.7	CIE Marks	15
No of Hours/Week:	4	SEE Marks	35
Total Hours:	52	Credits	02

LIST OF PRACTICAL PROGRAMS

PART A:

1. Implement a java program to demonstrate Inheritance and Packages.
2. Implement a java program to demonstrate Interfaces.
3. Implement a java program to demonstrate Exception Handling Technique.
4. Implement a java program to demonstrate input/output streams.
5. Implement a java program to demonstrate File handling technique.
6. Implement a java program to demonstrate Threading.
7. Implement a java program to work with various AWT controls.
8. Write a Java program to illustrate different operations on collection classes like (i) Array List, (ii) Iterator, (iii) Hash map.
9. Implement a java program to illustrate the use of different types of string class constructors.
10. Implement a java program to illustrate the use of different types of character extraction, string comparison, string search and string modification methods.

PART B:

1. Implement a java program to illustrate the use of different types of String Buffer methods
2. Write a JAVA Servlet Program to implement a dynamic HTML using Servlet.
3. Write a JAVA Servlet Program to implement and demonstrate GET and POST methods
4. Write a JAVA Servlet Program using cookies to remember user preferences.
5. Demonstrate a swing event handling application that creates 2 buttons Alpha and Beta and displays the text "Alpha pressed" when alpha button is clicked and "Beta pressed" when beta button is clicked.
6. Write a JAVA Servlet program to track Http Session by accepting user name and password using HTML and display the profile page on successful login
7. A servlet program to display the name, USN, and total marks by accepting student detail
8. Write a JAVA Program to implement CRUD application using Student DATA BASE.
9. A program to design the Login page and validating the USER ID and PASSWORD using JSP

Second Semester			
Title of the Paper: Office Automation Lab			
Paper	MCAOEP 2.8	CIE Marks	15
No of Hours/Week:	4	SEE Marks	35
Total Hours:	52	Credits	02

LIST OF PRACTICAL PROGRAMS

PART A:

1. Create a letter having the following specifications: (MS-Word)

- Name of the company on the top of the page with big font and good style
- Phone no, Fax no, and E-mail address with symbols.
- Main products manufactured by the company
- Slogans if any should be specified in bold at the bottom

2. Create two pages of curriculum vitae of a graduate with the following specifications: (MS-Word)

- Table to show qualifications with proper headings
- Appropriate left and right margins
- Format ½ page using a two-column approach about yourself
- Name on each page at the top right side
- Page no. in the footer on the right side.

3. Create a news-paper document with at least 200 words: (MS-Word)

- Use margins as, top:1.5, bottom:2, left:2, right:1 inches.
- Use heading “Independence Day”, font size: 16, font color: red, font face: Arial Black.
- With first letter “dropped” (use drop cap option) of the first paragraph containing a picture at the right side
- Use three columns from the second paragraph onwards till the half of the page.
- Then use heading “Computer basics”
- Create paragraph using two columns till the end of the page.

4. Design a visiting card for the Managing Director of a company as per the following specification. (MS-Word)

- Size of visiting card is 3½ x 2
- Name of the company with big font
- Phone number, Fax number, and E-mail address with appropriate symbols.

- Office and Residence addresses separated by a line

5. Create a flowchart using: (MS –Word)

- Proper shapes like ellipse, arrows, rectangle, and parallelogram.
- Use grouping to group all the parts of the flowchart into one single object.

6. Create a table using table menu with: (MS-Word)

- At least 5 columns and 10 rows.
- Merge the first row into one cell.
- Merge the second row into one cell, then split the second row into three cells.
- Use proper table border and color. e. Insert proper content into the table with proper text formatting.

7. Create a table using two columns: (MS-Word)

- The left column contains all the short-cut keys and right side column contains the function of the short-cut keys.
- Insert a left column using layout option. Name the heading as Serial No.

8. Create a letter as the main document and create 10 records for the 10 persons use mail merge to create letters for selected persons among 10.

9. Write a macro format document below (MS-Word)

- Line spacing "2" (double)
- Paragraph indent of 0.1
- Justification formatting style
- Arial font and Bold of 14pt size

PART B:

1. Create a table with the following columns and display the result in separate cells for the following: (MS-Excel)

- Emp Name, Basic pay, DA, HRA, Total salary.
- Sort all the employees in ascending order with the name as the key
- Calculate the total salary of the employee

2. Calculate the net pay of the employees following the conditions below. (MS-Excel)

A	B	C	D	E	F	G	H	I
Sl. no	Employee name	Employee number	Basic Pay	DA	HRA	GPF	Gross Pay	Income Tax

- DA: 56% of the basic pay if Basic Pay Greater Than 20000 or else 44%.

- HRA: 15% of the Basic pay subject to maximum Rs. 4000.
- GPF: -10% of basic pay.
- INCOME TAX: -10% of basic if Basic pay is greater than 20000.
- Find who is getting the highest salary & who is getting the lowest salary?

3. Create a table “Student Result” with following conditions. (MS-Excel)

- The heading must contain, Sl. No., Name, Mark1, Mark2, Mark3, Total, average and result with manual entry.
- Use formulas for total and average.
- Find the name of the students who has secured the highest and lowest marks.
- Round the average to the nearest highest integer and lowest integer (use ceiling and floor function respectively).

4. The ABC Company shows the sales of different products for 5 years. Create a BAR graph, 3D, and Pie chart for the following. (MS-Excel)

A	B	C	D	E	F
S.No.	Year	Pro1	Pro2	Pro3	Pro4
1	1989	1000	800	90	1000
2	1990	800	80	050	900
3	1991	1200	190	040	800
4	1992	400	200	030	1000
5	1993	1800	400	040	1200

5. Create a suitable examination database and find the sum of the marks (total) of each student and respective class secured by the student. (MS-Excel)

- Pass: if marks in each subject ≥ 35
- Distinction: if average ≥ 75
- First class: if average ≥ 60 but < 75
- Second class: if average ≥ 50 but < 60
- Third class: if average ≥ 35 but less than 50
- Fail: if marks in any subject < 35

6. Create a power-point presentation with minimum 5 slides.

- The first slide must contain the topic of the presentation and name of the presentation.
- Must contain at least one table.
- Must contain at least 5 bullets, 5 numbers.
- The heading must be, font size:32, font-face: Arial Rounded MT Bold, font-color: blue.
- The body must be, font size: 24, font-face: Comic Sans MS, font-color: green.

- Last slide must contain „thank you“.

7. Create a power-point presentation with minimum 10 slides

- Use word art to write the heading for each slides.
- Insert at least one clip-art, one picture
- Insert at least one audio and one video
- Hide at least two slides

8. Create a power-point presentation with minimum 5 slides

- Use custom animation option to animate the text; the text must move left to right one line at a time.
- Use proper transition for the slides

Third Semester			
Title of the Paper: Machine Learning			
Paper Code:	MCACPT 3.1	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- To understand the basic theory underlying machine learning.
- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To be able to apply machine learning algorithms to solve problems of moderate complexity.

COURSE OUTCOMES:

- Understanding key terms and concepts in ML such as features, labels, training, testing, and validation.
- Understand how these mathematical principles underpin various ML models and techniques.
- Implement and analyse classical supervised learning algorithms like linear regression, logistic regression, decision trees, and SVMs.
- Apply machine learning techniques to real-world datasets and problems, demonstrating proficiency in data-driven decision-making.
- Apply ethical guidelines and principles to mitigate biases and ensure fairness in ML models.
- Stay updated with current trends and advancements in machine learning, recognizing the evolving nature of the field.

Unit	Description	Hours
1.	Introduction to Machine Learning: Definition and applications of machine learning, Types of machine learning: supervised, unsupervised, reinforcement learning, Basic terminology: features, labels, training, testing.	10
2.	Mathematical Foundations: Linear algebra essentials: vectors, matrices, operations, Probability and statistics: distributions, expected value, variance, hypothesis testing, Calculus basics: gradients, derivatives	10
3.	Data Preprocessing: Data cleaning: handling missing data, outliers, Feature scaling and normalization, Feature engineering: creating new features from existing data	10
4.	Supervised Learning: Regression: linear regression, polynomial	10

	regression, Classification: logistic regression, decision trees, support vector machines (SVM), k-nearest neighbors (k-NN)	
5.	Unsupervised Learning: Clustering: k-means, hierarchical clustering. Dimensionality reduction: principal component analysis (PCA), t-SNE, Ethical and Social Implications: Bias and fairness in machine learning, Privacy concerns, Responsible AI practices	12

TEXT BOOKS:

1. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education.
2. Mitchell, T.M. Machine Learning, McGraw Hill Education, 2017.

REFERENCE BOOKS:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, h The Elements of Statistical Learning, 2nd edition, springer series in statistics.
2. Ethem Alpaydın, Introduction to machine learning, second edition, MIT press.

Third Semester			
Title of the Paper: Software Engineering and Agile Concepts			
Paper Code:	MCACPT 3.2	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
- Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

COURSE OUTCOMES:

- Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
- Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
- Will have experience and/or awareness of testing problems and will be able to develop a simple testing report
- Be able to compare and contrast the differences between Agile and other project management methodologies
- Be able to understand Agile Testing principles for real life situations and learn the basics of SAFE for scaled agile

Unit	Description	Hours
1.	Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths. A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models. Process models: The waterfall model, incremental process models, evolutionary process models, the unified process.	10
2.	Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document. Requirements engineering process:	12

	Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management. System models: Context models, behavioral models, data models, object models, structured methods.	
3.	Design Engineering: Design process and design quality, design concepts, the design model. Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams. Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging.	12
4.	Introduction to Agile: Agile versus traditional method comparisons and process tailoring Software Process Models – overview, Introduction to Agile, Various Agile methodologies - Scrum, XP, Lean, and Kanban, Agile Manifesto, Scrum: Scrum process, roles - Product Owner, ScrumMaster, Team, Project Manager, product manager, architect, events, and artifacts; Product Inception: Product vision, stakeholders, initial backlog creation;	8
5.	Agile Requirements - User personas, story mapping, user stories, 3Cs, INVEST, acceptance criteria, sprints, requirements, product backlog and backlog grooming; Tools: Agile tracking tools such as JIRA; Scaled agile frameworks: SAFe, Scrum@Scale, Disciplined Agile Definition of Done, Definition of Ready; Estimation; Agile forecasting and project Management - Big visible information radiators, velocity, progress tracking, Track Done pattern, project forecasting, Ux Design Testing: Functionality Testing, UI Testing, Performance Testing, Security Testing, Tools - Selenium Agile Testing: Principles of agile testers; The agile testing quadrants, Agile automation, Test automation pyramid	10

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, Mc Graw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. Pankaj Jalote, Software Engineering, Wiley India Pvt Ltd (2010) Paul C Jorgensen Software Testing A CraftMan's Approach, 2nd edition, CRC Press.
4. Agile Project Management: Creating Innovative Products, Second Edition By Jim Highsmith, Addison-Wesley Professional, 2009

REFERENCE BOOKS:

1. Agile Project Management: Managing for Success, By James A. Crowder, Shelli Friess, Springer 2014
2. Learning Agile: Understanding Scrum, XP, Lean, and Kanban, By Andrew Stellman, Jennifer Greene, 2015, O Reilly

3. Agile Testing: A Practical Guide For Testers And Agile Teams, Lisa Crispin, Janet Gregory, Pearson, 2010

Third Semester			
Title of the Paper: Natural Language Processing			
Paper Code:	MCACPT 3.3	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- To learn the basics of Natural Language Processing.
- To apply the techniques of Natural Language Processing.
- To understand the role of sentence semantics.

COURSE OUTCOMES:

- Apply parsing technique to the given problem and verify the output and give valid conclusions
- Illustrate the approaches to syntax and semantics in NLP.
- Formulate solutions for a range of natural language components using existing algorithms, techniques and frameworks, including part-of-speech tagging, language modelling, parsing and semantic role labelling.
- Evaluate NLP solutions of the given problem and arrive at valid conclusions.
- Illustrate information retrieval techniques.

Unit	Description	Hours
1.	Introduction, Morphology: Knowledge in Speech & Lang Processing, Ambiguity, Models & Algorithms, Language, Thought & Understanding, Some Brief History, The State of the Art & Near-Term Future, Summary Morphology and Finite State Transducers: Survey of English Morphology, Finite state Morphological <u>Parsing</u> , Lexicon-Free FST: The Porter Stemmer, Human Morphological Parsing, Summary, Combining FST Lexicon and Rules.	12
2.	N-Grams: Counting Words in Corpora, Simple N-Grams, Smoothing, Back off, Deleted Interpolation, N-Grams for Spelling and Pronunciation, Entropy, Summary. Word Classes and Part-of- Speech Tagging: English Word Classes, Tag sets for English, Part-of-Speech Tagging.	10
3.	Context-Free Grammars and Predicate Calculus for English: Constituency, Context-Free Rules and Trees, Sentence Level Constructions, Coordination, Agreement, The Verb Phrase Sub Categorization, Auxiliaries, Spoken Language Syntax, Grammar Equivalence and Normal Form, Finite –State and Context- Free Grammars, Grammars and Human Processing, The Early Algorithm, Finite-State Parsing Method, Summary Representing Meaning	10
4.	Semantic Analysis:	10

	Syntax-Driven Semantic Analysis, Attachments for a Fragment of English, Integrating Semantic Analysis into the Earley Parser, Idioms and Compositionality, Robust Semantic Analysis, Summary. Lexical Semantics: Relations Among Lexemes and Their Senses, WordNet: A Database of Lexical Relations, The Internal Structure of Words, Creativity and the Lexicon, Summary Word Sense Disambiguation and Information	
5.	Retrieval: Selection Restriction Based Disambiguation, Robust Word Sense Disambiguation, Information Retrieval, Other Retrieval Tasks, and Summary. Case Study of Simple Text Recognition or Content Based Text Extraction System. Evolving Explanatory Novel Patterns for Semantically-Based Text Mining: Related Work, A Semantically Guided Model for Effective Text Mining.	10

TEXT BOOKS:

1. Daniel Jurafsky and James H Martin, "Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", 2nd Edition, Prentice Hall, 2009.
2. Anne Kao and Stephen R. Poteet (Eds), "Natural Language Processing and Text Mining", Springer Verlag London Limited 2007.

REFERENCE BOOKS:

1. Christopher D. Manning and Hinrich Schütze, "Foundations of Statistical Natural Language Processing", MIT Press, 1999.
2. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.

Third Semester			
Title of the Paper: Big Data Analytics			
Paper Code:	MCASPT 3.4	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- The aim of this course is to provide depth knowledge about Big data Technologies and tools used for Big data.
- To know the fundamental concepts of big data and analytics.
- To explore tools and practices for working with big data
- To learn about stream computing.
- To learn about YARN and MapReduce.

COURSE OUTCOMES:

- At the end of the course, the students will be able to:
- Understand the characteristics of big data.
- Explore Hadoop framework and its components.
- Use HDFS and Map Reduce to analyze various industry use cases of big data analytics.
- Understand the YARN Infrastructure.
- Learning different Sorting, Shuffling.

Unit	Description	Hours
1.	Introduction to Big Data, Characteristics and its Use Case Introduction – Why Big data - What is big data – Facts about Big Data - importance of Big Data Evaluation of Big Data – Market Trends – Sources of Data Explosion – Types of Data – Case Study for Netflix and the house of card. Need of Big Data – Big Data and its sources – Characteristics of Big Data – Difference between Traditional IT Approach and Big Data Technology – Capabilities of Big Data – Handling Limitations of Big Data - Technologies Supporting Big Data - Big Data Use Cases.	12
2.	Introduction to Hadoop Introduction – Why Hadoop – What is Hadoop – History and Milestone of Hadoop – Core Components of Hadoop – Difference between Regular File System and HDFS – Common Hadoop Shell Commands – Hadoop Configuration.	10
3.	Hadoop Distributed File System (HDFS) Concepts and Architecture - Data Flow (File Read, File Write) - Fault Tolerance - Java Base API -	10

	Different Daemons in Hadoop cluster (NameNode, Secondary NameNode, Job Tracker, Task Tracker and DataNode) - Loading a dataset into the HDFS.	
4.	Introduction to YARN and MapReduce What is YARN – YARN Infrastructure - Introduction of MapReduce – Analogy of MapReduce – MapReduce Architecture - Example of MapReduce –Sorting, Shuffling – Reducing – Combiner – Partitioner – Creating MapReduce program by using Eclipse.	10
5.	Introduction to Big Data Streaming Real time Big Data Streaming, Big data streaming framework, data streaming process, tools for big data streaming, industry use cases for big data streaming.	10

TEXT BOOKS:

1. Seema Acharya (Author), Subhashini Chellappan, Big Data and Analytics (2015). Wiley Publication.
2. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data (2015), EMC Education Services

REFERENCE BOOKS:

1. Big Data, Black Book: Covers Hadoop MapReduce, Hive, YARN, Pig, R and Data Visualization (2016), DT Editorial Services
2. Tom White, Hadoop: The Definitive Guide, 4th Edition (2015)

Third Semester			
Title of the Paper: Internet of Things			
Paper Code:	MCASPT 3.4	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- Students will understand the concepts of Internet of Things and can able to build IoT applications.
- To understand roles of sensors in IoT
- To be familiar with data handling and analytics tools in IoT

COURSE OUTCOMES:

On successful completion of this course; the student will be able to:

- Understand the basics of networking, the evolution of IoT and addressing strategies in IoT and its building blocks along with their characteristics
- Analyzing the various sensing devices and actuator types.
- Understand the IoT processing Topologies and Types, Understand the protocols and standards designed for IoT and current research on it.
- Improve their knowledge about the various cutting edge technologies in the field of IoT and outline the need of Data Analytics and Security in IoT.
- Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT Industry.

Unit	Description	Hours
1.	Basics of Networking Introduction, Network types, Layered network models. Emergence of IoT : definition, evolution of IoT and characteristics of IoT, challenges and Issues – physical design of IoT, Logical Design of IoT, IoT functional blocks, security, Enabling IoT and the complex interdependence of technologies, IoT networking components. Addressing strategies in IoT.	12
2.	Smart Objects (IoT Sensing and Actuation) The “Things” in IoT, sensors, sensor characteristics, Sensorial deviations. Actuators, Actuator types, Actuator characteristics and Smart Objects, sensor networks, connecting smart objects, communications criteria, IoT access technologies.	10
3.	IoT Processing Topologies and types Data format, Importance of processing in IoT, Processing topologies, IoT	8

	Device design and selection considerations, processing offloading.	
4.	<p>Data and Analytics for IoT Introduction to Data Analytics for IoT, Machine Learning, Big Data analytics tools and technology. Edge streaming Analytics, Network analytics, securing IoT, A brief history of OT security, common challenges in OT Security, How IT and OT security practices and systems vary, formal risk analysis structures OCTAVE and FAIR, the phased application of security in an operational environment.</p>	12
5.	<p>Working principles of sensors IoT The working principles of sensors IoT deployment for Raspberry Pi / Arduino / Equivalent platform Reading from Sensors, communication. Connection microcontroller with mobile devices, communication through Bluetooth, WIFI and USB – Contiki OS- Cooja simulator. IoT applications- Business models for the internet of things, smart city, smart mobility and transport, smart buildings and infrastructure, smart health, environment monitoring and surveillance.</p>	10

TEXT BOOKS:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry, “IoT Fundamentals : Networking Technologies, Protocols and Use Cases for the Internet of Things”, 1 stEdition, Pearson Education (Cisco Press Indian Reprint)
2. Dieter Uckelmann et.al Architecting the Internet of Things, Springer, 2011
3. Srinivasa K G, “Internet of Things”, CENGAGE Learning India 2017.

REFERENCE BOOKS:

- 1.Vijay Madiseti and ArshdeepBahga, Internet of Things (A hands-on-Approach)”, 1 StEdition, VPT, 2014. (ISBN : 9788173719547)
- 2.Charalampos Doukas, building IoT with the Arduino, Create space, April 2002
- 3.Dr. Ovidio, Vermesan and Dr. Peter Friess, IoT : from research and Innovation to market deployment, River Publishers 2014.

Third Semester			
Title of the Paper: Ethical Hacking			
Paper Code:	MCASPT 3.4	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

After Successful completion of the course, students will be able to:

- Understand the different ethical hacking techniques
- Learn aspects of security, importance of data gathering, foot printing and system hacking.
- Learn tools and techniques to carry out a penetration testing.
- How intruders escalate privileges?
- Explain Intrusion Detection, Policy Creation, Social Engineering, DDoS Attacks, Buffer Overflows and Virus Creation.
- Compare different types of hacking tools.

COURSE OUTCOMES:

- Explain aspects of security, importance of data gathering, foot printing and system hacking.
- Demonstrate how intruders escalate privileges.

Unit	Description	Hours
1.	Teaching Hours Casing the Establishment: What is foot printing, Internet Foot printing, Scanning, Enumeration, basic banner grabbing, Enumerating Common Network services. Case study: Network Security Monitoring.	10
2.	Securing permission: Securing file and folder permission, Using the encrypting file system, Securing registry permissions. Securing service: Managing service permission, Default services in windows 2000 and windows XP. Unix: The Quest for Root, Remote Access vs Local access, Remote access, Local access, After hacking root.	10
3.	Dial-up, PBX, Voicemail and VPN hacking, Preparing to dial up, War-Dialing, BruteForce Scripting PBX hacking, Voice mail hacking, VPN hacking, Network Devices: Discovery Autonomous System Lookup, Public Newsgroups, Service Detection, Network Vulnerability, Detecting Layer 2 Media.	10
4.	Wireless Hacking: Wireless Foot printing, Wireless Scanning and Enumeration, Gaining Access, Tools that exploiting WEP Weakness, Denial of Services Attacks, Firewalls: Firewalls landscape, Firewall Identification-Scanning Through firewalls, packet Filtering, Application	10

	Proxy Vulnerabilities, Denial of Service Attacks, Motivation of Dos Attackers, Types of DoS attacks, Generic Dos Attacks, UNIX and Windows DoS.	
5.	Remote Control Insecurities, Discovering Remote Control Software, Connection, Weakness.VNC, Microsoft Terminal Server and Citrix ICA, Advanced Techniques Session Hijacking, Back Doors, Trojans, Cryptography, Subverting the systems Environment, Social Engineering, Web Hacking, Web server hacking web application hacking, Hacking the internet Use, Malicious Mobile code, SSL fraud, E-mail Hacking, IRC hacking, Global countermeasures to Internet User Hacking.	12

TEXT BOOKS:

1. Stuart McClure, Joel Scambray and Goerge Kurtz, Hacking Exposed 7: Network Security Secrets & Solutions, Tata Mc Graw Hill Publishers, 2010.
2. Bensmith, and Brian Komer, Microsoft Windows Security Resource Kit, Prentice Hall of India, 2010.

REFERENCE BOOKS:

1. Stuart McClure, Joel Scambray and Goerge Kurtz, "Hacking Exposed Network Security Secrets & Solutions", 5th Edition, Tata Mc Graw Hill Publishers, 2010.
2. Rafay Baloch, "A Beginners Guide to Ethical Hacking".
3. Allen Harper, Shon Harris, Jonathan Ness, Chris Eagle, "Gray Hat Hacking The Ethical Hackers Handbook", 3rd Edition, McGraw-Hill Osborne Media paperback(January 27, 2011)

Third Semester			
Title of the Paper: Mobile Application Development			
Paper	MCASPT 3.4	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- To facilitate students to understand android SDK
- To help students to gain a basic understanding of Android application development
- To inculcate working knowledge of Android Studio development tool

COURSE OUTCOMES:

- Learn to setup Android application development environment
- Illustrate user interfaces for interacting with apps and triggering actions
- Interpret tasks used in handling multiple activities
- Identify options to save persistent application data
- Appraise the role of security and performance in Android applications

Unit	Description	Hours
1.	Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Get started, build your first app, Activities, Testing, debugging and using support libraries.	10
2.	Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.	12
3.	Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation. User Interaction, Delightful user experience, Testing your UI	10
4.	Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.	10
5.	All about data, Preferences and Settings, storing data using SQLite, sharing data with content providers, loading data using Loaders	10
TEXT BOOKS:		

1. T1. Lauren Darcey and Shane Conder, “Android Wireless Application Development”, Pearson Education, 2nd ed. (2011)
2. Google Developer Training, "Android Developer Fundamentals Course – Concept Reference”, Google Developer Training Team, 2017.

REFERENCE BOOKS:

1. Reto Meier, “Professional Android 2 Application Development”, Wiley India Pvt Ltd
2. Mark L Murphy, “Beginning Android”, Wiley India Pvt Ltd
3. Android Application Development All in one for Dummies by Barry Burd, Edition:
4. Erik Hellman, “Android Programming – Pushing the Limits”, 1st Edition, Wiley India Pvt Ltd, 2014. 2. Dawn Griffiths and David Griffiths, “Head First Android Development”, 1st Edition, O’Reilly SPD Publishers, 2015.
5. J F DiMarzio, “Beginning Android Programming with Android Studio”, 4th Edition, Wiley India Pvt Ltd, 2016. ISBN-13: 978-8126565580
6. Anubhav Pradhan, Anil V Deshpande, “Composing Mobile Apps” using Android, Wiley 2014, ISBN: 978-81-265-4660-2

Third Semester			
Title of the Paper: Software Testing And Quality Assurance			
Paper	MCASPT 3.4	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- Students learn about quality, quality assurance, and software quality engineering.
- To choose appropriate testing strategies and develop test cases.
- Learn how to detect, classify, prevent, and remove defects.
- Learn how to test and maintain software using a variety of methods and tools.

COURSE OUTCOMES:

- Analyze the product Quality.
- Use various testing methods.
- Assess Quality standards.

Unit	Description	Hours
1.	INTRODUCTION Introduction to Software Quality - Challenges – Objectives – Quality Factors – Components of SQA – Contract Review – Development and Quality Plans – SQA Components in Project Life Cycle – SQA Defect Removal Policies – Reviews.	12
2.	TESTING METHODOLOGIES Basics of Software Testing – Test Generation from Requirements – Finite State Models – Combinatorial Designs - Test Selection, Minimization and Prioritization for Regression Testing – Test Adequacy, Assessment and Enhancement.	10
3.	TEST STRATEGIES Testing Strategies – White Box and Black Box Approach – Integration Testing – System and Acceptance Testing – Performance Testing – Regression Testing - Internationalization Testing – Ad-hoc Testing – Website Testing – Usability Testing – Accessibility Testing.	10
4.	TEST AUTOMATION AND MANAGEMENT Test plan – Management – Execution and Reporting – Software Test Automation – Automated Testing tools - Hierarchical Models of Software Quality – Configuration Management – Documentation Control.	10
5.	SQA IN PROJECT MANAGEMENT Project progress control – costs – quality management standards – project	10

	process standards – management and its role in SQA – SQA unit	
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TEXT BOOKS:

1. Daniel Galin, —Software Quality Assurance – from Theory to Implementation, Pearson Education, 2009
2. Yogesh Singh, "Software Testing", Cambridge University Press, 2012
3. Aditya Mathur, —Foundations of Software Testing, Pearson Education, 2008

REFERENCE BOOKS:

1. Ron Patton, —Software Testing, Second Edition, Pearson Education, 2007
2. Srinivasan Desikan, Gopalaswamy Ramesh, —Software Testing – Principles and Practices, Pearson Education, 2006
3. Alan C Gillies, —Software Quality Theory and Management, Cengage Learning, Second Edition, 2003.
4. Robert Furtell, Donald Shafer, and Linda Shafer, "Quality Software Project Management", Pearson Education Asia, 2002.

Third Semester			
Title of the Paper: Internet and Web Technologies			
Paper Code:	MCAOET 3.5	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- Review the current topics in Web & Internet technologies.
- Describe the basic concepts for network implementation.
- Learn the basic working scheme of the Internet and World Wide Web.
- Understand fundamental tools and technologies for web design.
- Comprehend the technologies for Hypertext Mark-up Language (HTML).
- Introduce basics concept of CSS.

COURSE OUTCOMES:

- To understand fundamentals of internet, WWW and protocols
- To get the knowledge of internet services
- Develop web pages using the HTML and CSS features with different layouts as per need of applications.
- Use the JavaScript to develop the dynamic web pages

Unit	Description	Hours
1.	Introduction to Internet: What is Internet – Brief History of the Internet, Use of the Internet – Benefits of Internet – Issues with Internet – Major feature of Internet, Growth of the Internet. WWW – Websites & Browsers Protocols in Computer Communications, the OSI Model, OSI Layer Functions. Internet Working Devices, Repeaters, Bridges, Routers, Gateways,	10
2.	Internet Network: Network definition, Common terminologies: LAN, WAN, Node, Host, Workstation, bandwidth, Interoperability, Network administrator, network security, Network Components: Servers, Clients, Communication Media, Types of network: Peer to Peer, Clients Server, Addressing in Internet: DNS, Domain Name and their organization, understanding the Internet Protocol Address. Network topologies: Bus, star and ring, Ethernet, FDDI, ATM and Intranet.	10
3.	Services on Internet (Definition and Functions): E-mail, WWW, Telnet, FTP, IRC and Search Engine Electronic Mail: Email Networks and Servers, Email protocols –SMTP, POP3, IMAP4, MIME6, Structure of an Email – Email Address, Email Header, Body and Attachments, Email Clients: Netscape mail Clients,	10

	Outlook Express, Web based E-mail. Email encryption- Address Book, Signature File. Current Trends on Internet: Languages, Internet Phone, Internet Video, collaborative computing, e-commerce.	
4.	Markup Language (HTML): What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags Heading-Paragraphs, Line Breaks, HTML Tags. Introduction to elements of HTML, Formatting and Fonts, Commenting Code, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.	08
5.	Introduction to Cascading Style Sheets: Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts), Working with block elements and objects, Working with Lists and Tables, CSS Id and Class, Box Model(Introduction, Border properties, Padding Properties, Margin properties), CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector) CSS Colour, Creating page Layout and Site Designs. JavaScript: Introduction, Core features, Data types and Variables, Operators, Expressions, and Statements, Functions, Objects, Array, Date and Math related Objects, Event Handling, Controlling Windows & Frames and Documents - Form handling and validations.	14
<p>TEXT BOOKS:</p> <ol style="list-style-type: none"> 1. Greenlaw R and Hepp E “Fundamentals of Internet and www” 2nd EL, Tata McGraw Hill, 2007. 2. D. Comer, “The Internet Book”, Pearson Education, 2009. 3. M. L. Young, ”The Complete reference to Internet”, Tata McGraw Hill, 2007. 4. Godbole AS & Kahate A, “Web Technologies”, Tata McGrawHill,2008. 5. Steven M. Schafer “HTML, XHTML, and CSS Bible”, 5th Edition Wiley India <p>REFERENCE BOOKS:</p> <ol style="list-style-type: none"> 1. B. Patel & Lal B. Barik, ” Internet & Web Technology “, Acme Learning Publishers 2. Leon and Leon, “Internet for Everyone”, Vikas Publishing House. 3. Raj Kamal, “Internet and Web Technologies”, Tata McGraw-Hill. 		

Third Semester			
Title of the Paper: Machine Learning Lab			
Paper Code:	MCACPP 3.6	CIE Marks	15
No of Hours/Week:	4	SEE Marks	35
Total Hours:	52	Credits	02

LIST OF PRACTICAL PROGRAMES

PART A:

1. The probability that it is Friday and that a student is absent is 3 %. Since there are 5 school days in a week, the probability that it is Friday is 20 %. What is the probability that a student is absent given that today is Friday? Apply Baye’s rule in python to get the result.
2. Write a program to implement k-Nearest Neighbor algorithm to classify the iris data set. Print both correct and wrong predictions. Implement linear regression using python.
3. Find-S and Candidate Elimination Algorithms
4. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
5. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.

PART B:

1. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task. Built-in Java classes/API can be used to write the program. Calculate the accuracy, precision, and recall for your data set.
2. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
3. Implement the finite words classification system using Back-propagation algorithm
4. Write a program to implement Support Vector Machine algorithm to classify the iris data set. Print both correct and wrong predictions.
5. Implement a single neural network and test for different logic gates.

Third Semester			
Title of the Paper: Minor Project			
Paper Code:	MCACPP 3.7	CIE Marks	15
No of Hours/Week:	4	SEE Marks	35
Total Hours:	52	Credits	02

The Minor Project is not only a part of the coursework, but also a mechanism to demonstrate student abilities and specialization. It provides the opportunity for the student to demonstrate originality, teamwork, inspiration, planning and organization in a software project, and to put into practice some of the techniques the student have been taught throughout the previous courses.

The Minor Project is important for a number of reasons. It provides students with:

- Opportunity to specialize in specific areas of computer science;
- Future employers will most likely ask you about your project at interview;
- Opportunity to demonstrate a wide range of skills and knowledge learned, and
- Encourages integration of knowledge gained in the previous course units.

Note:

1. It is team project with a maximum of three in a team
2. A team shall work under the supervision of an allotted guide.
3. Students shall select a domain and develop an application with social relevance
4. Documentation is to be based on the standards
5. Evaluation pattern is like Lab examination
6. Need to submit a report, presentation with demo.
7. During the examination, each student must demonstrate the project individually.

Internal Marks Distribution:

Distribution:

Sl.No	Description	Marks
1.	Assessment by Guide	10
2.	Attendance and Report	05
Total:		15 Marks

Semester End Examination Marks

Sl.No	Description	Marks
1.	Project Demonstration	20
2.	Viva-Voce	10
3.	Project Report	05
Total:		35 Marks

Third Semester			
Title of the Paper: Internet and Web Technologies Lab			
Paper	MCAOEP 3.8	CIE Marks	15
No of Hours/Week:	4	SEE Marks	35
Total Hours:	52	Credits	02

LIST OF PRACTICAL PROGRAMS

PART A:

1. Create web page using basic HTML tags, Different Formatting tag and Marquee Tags.
2. Create a HTML document giving details of your [Name, Age], [Address, Phone] and [Register Number, Class] aligned in proper order using alignment attributes of Paragraph tag.
3. Write an HTML code to display your CV on a web page.
4. Write an HTML code to illustrate the usage of the following:
 - Ordered List
 - Unordered List
 - Definition List
5. Write the HTML code to generate time table of your college.
6. Write HTML code to create a Web Page that contains an Image at its center.
7. Create a web page, showing an ordered list of all third semester courses
8. Create Web page with different images, audio and video files.

PART B:

1. Create a form by using various attributes of the input tags.
2. Simulate notepad help file in a html.
3. Design a simple Webpage of your College to using frames, frameset having header, navigation and content sections to navigate between different pages of website.
4. Create a html form to create a web page with all types of Cascading style sheets.
5. Write validation function for checking the alphabetical and number fields in HTML Form.
6. Create a web page multiple types of style sheet used in a single page.
7. Write a Java script to prompt for users name and display it on the screen.
8. Design HTML form for keeping student record and validate it using Java script.

Fourth Semester			
Title of the Paper: Research Methodology and IPR			
Paper	MCACPT 4.1	CIE Marks	30
No of Hours/Week:	4	SEE Marks	70
Total Hours:	52	Credits	04

COURSE OBJECTIVES:

- To give an overview of the research methodology and explain the technique of defining a research problem
- To explain the functions of the literature review in research.
- To explain carrying out a literature search, its review, developing theoretical and conceptual frameworks and writing a review.
- To explain various research designs and their characteristics.
- To explain the details of sampling designs, and also different methods of data collections.
- To explain the art of interpretation and the art of writing research reports.
- To explain various forms of the intellectual property, its relevance and business impact in the changing global business environment.
- To discuss leading International Instruments concerning Intellectual Property Rights.

COURSE OUTCOMES:

- To know the meaning of engineering research.
- To know the procedure of the literature Review and Technical Reading
- To understand the fundamentals of the patent laws and drafting procedure
- Understanding the copyright laws and subject matters of copyrights and designs
- Understanding the basic principles of design rights

Unit	Description	Hours
1.	<p>Research Methodology: Introduction, Meaning of Research, Objectives of Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India.</p> <p>Defining the Research Problem: Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration.</p>	8
2.	<p>Reviewing the literature: Place of the literature review in research, Bringing clarity and focus to research problem, Improving research methodology, Broadening knowledge base in research area, Enabling contextual findings, Review of the literature, searching the existing literature, reviewing the selected literature, Developing a theoretical</p>	10

	framework, Developing a conceptual framework, Writing about the literature reviewed. Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Important Experimental Designs.	
3.	Design of Sample Surveys: Design of Sampling: Introduction, Sample Design, Sampling and Non-sampling Errors, Sample Survey versus Census Survey, Types of Sampling Designs. Measurement and Scaling: Qualitative and Quantitative Data, Classifications of Measurement Scales, Goodness of Measurement Scales, Sources of Error in Measurement, Techniques of Developing Measurement Tools, Scaling, Scale Classification Bases, Scaling Technics, Multidimensional Scaling, Deciding the Scale.	8
4.	Data Collection: Introduction, Experimental and Surveys, Collection of Primary Data, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method. Interpretation and Report Writing: Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout of the Research Report, Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports.	12
5.	Intellectual Property: The Concept, Intellectual Property System in India, Development of TRIPS Complied Regime in India, Patents Act, 1970, Trade Mark Act, 1999, The Designs Act, 2000, The Geographical Indications of Goods (Registration and Protection) Act 1999, Copyright Act, 1957, The Protection of Plant Varieties and Farmers' Rights Act, 2001, The Semi-Conductor Integrated Circuits Layout Design Act, 2000, Trade Secrets, Utility Models, IPR and Biodiversity, The Convention on Biological Diversity (CBD) 1992, Competing Rationales for Protection of IPRs, Leading International Instruments Concerning IPR, World Intellectual Property Organisation (WIPO), WIPO and WTO, Patent Cooperation Treaty (PCT), Advantages of PCT Filing, Berne Convention for the Protection of Literary and Artistic Works, Basic Principles, Duration of Protection, Trade Related Aspects of Intellectual Property Rights (TRIPS).	14

TEXT BOOKS:

1. Research Methodology: Methods and Techniques C.R. Kothari, Gaurav Garg New Age International 4th Edition, 2018
2. Ranjit Kumar, Research Methodology- A step by step guide for beginners, Pearson Education, Australia, 2005
3. Stuart Melville and Wayne Goddard, "Research methodology: an introduction for science & engineering students", Juta & Company, 1996.

REFERENCE BOOKS:

1. Robert P. Merges, Peter S. Menell and Mark A. Lemley, “Intellectual Property in New Technological Age”, Aspen Publishers, 2016.
2. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd ,2007.
3. Mayall , “Industrial Design”, McGraw Hill, 1992.
4. Niebel , “Product Design”, McGraw Hill, 1974.
5. Asimov , “Introduction to Design”, Prentice Hall, 1962.

Fourth Semester			
Title of the Paper: Major Project/Dissertation			
Paper Code:	MCACPP 4.2	CIE Marks	100
No of Hours/Week:		SEE Marks	200
Total Hours:		Credits	12

The major project work should be carried out in the fourth semester in an industry/R&D organisation/department. If the project is carried out in an industry or R&D organisation outside the campus, the student should obtain prior permission from the head of the department. A co-guide shall be selected from the department and submit the project commencement and completion letter duly signed by the concerned industry or R&D organisation to the department.

Every student should do the Major Project individually within that semester and no grouping is allowed. All the candidates are required to get the approval of their synopsis and the guide before commencement of the project from the Department.

A Supervisor / Guide will review the project periodically every week. The Continuous Assessment marks will be based on the periodic progress and progress report. At the end of the semester the candidate shall submit the Project report (two bound copies and one soft copy) duly approved by the guide, co-guide for End Semester Assessment.

The candidate has to present the work carried out before the examiners during the University session ending examination.

Major Project Internal Marks Allotment:

Attendance	5
Seminar	10
Assessment by the Guide	40
Viva Voice	20
Projects	25
Total:	100 Marks

Major Project Semester End Examination:

Major Project Report Evaluation	125
Demo and Presentation	40
Viva Voice	35
Total:	200 Marks

Evaluation Scheme for Practical Examination:

Assessment Criteria	
Writing 2 Programs	10
Execution of 2 Programs	15
Record	05
Viva	05
Total	35 Marks

Theory Examination Question Paper Pattern:

**Semester M.C.A. Degree Examination
(CBCS – New Scheme)
Computer Applications**

Q.P. Code:

Time: 3 Hours

Max.

Marks: 70

Instructions to Candidates: Answer any **FIVE** full questions of the following.

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