Tumkur University

Choice Based Credit System (CBCS) Scheme

Detailed Syllabus

Of

Master of Computer Applications

MCA Course

2020-21 year onwards

Course Matrix Semester Wise

Department of Studies and Research in Computer Applications

B H Road Tumakuru

SEMESTER-I

SL.NO	COURSE CODE	SUBJECT CODE	SUBJECT TITLE	TEACHING HOURS/WEEK			CREDITS	EXAM HOURS	CIE	SEE	TOTAL
				L	T	LAB					
1	**20MCA11**	CPT 1.1	PROBLEM SOLVING USING C	04	-	-	04	**03**	20	80	**100**
2	**20MCA12**	CPT 1.2	ADVANCED DATA STRUCTURES AND ALGORITHMS	04	-	-	04	**03**	20	80	**100**
3	**20MCA13**	CPT 1.3	OPERATING SYSTEMS	04	-	-	04	**03**	20	80	**100**
4	**20MCA14**	SPT 1.4	DISCRETE MATHEMATICAL STRUCTURES AND STATISTICS	04	-	-	04	**03**	20	80	**100**
5	**20MCA15**	SPT 1.5	ADVANCED DATA BASE MANAGEMENT SYSTEMS	04	-	-	04	**03**	20	80	**100**
6	**20MCA16**	CPP 1.6	DATA STRUCTURE LAB	-	-	04	02	**03**	10	40	**50**
7	**20MCA17**	CPP1.7	LINUX PROGRAMMING LAB	-	-	04	02	**03**	10	40	**50**
8	**20MCA18**	SPP 1.8	ADVANCED. DBMS LAB	-	-	04	02	**03**	10	40	**50**
TOTAL CREDITS							**26**	**TOTAL MARKS**			**650**
TOTAL CONTACT HOURS /WEEK							**32**				

CPT: Core Paper Theory,

SPT: Special paper Theory,

CPP: Core Paper Practical,

SPP: Special paper Practical

OEPT: Open Elective Paper Theory, OEPP: Open Elective paper Practical

SEMESTER-II

SL. NO	COURSE CODE	SUBJECT CODE	SUBJECT TITLE	TEACHING HOURS/WEEK			CREDITS	EXAM HOURS	CIE	SEE	TOTAL
				L	T	LAB					
1	20MCA21	CPT 2.1	ADVANCED SOFTWARE ENGINEERING	04	-	-	04	**3**	20	80	100
2	20MCA22	CPT 2.2	ADVANCED JAVA PROGRAMMING	04	-	-	04	**3**	20	80	100
3	20MCA23	CPT 2.3	ELECTIVE 1	04	-	-	04	**3**	20	80	100
4	20MCA24	OEPT2.4	INTERNET TECHNOLOGY	04	-	-	04	**3**	20	80	100
5	20MCA25	SPT 2.5	DATA MINING AND DATA WAREHOUSING	04	-	-	04	**3**	20	80	100
6	20MCA26	CPP 2.6	JAVA PROGRAMMING LAB	-	01	02	02	**3**	10	40	50
7	20MCA27	SPP 2.7	DATA MINING LAB	-	01	02	02	**3**	10	40	50
8	20MCA28	OEPP 2.8	IT LAB	-	01	02	02	**3**	10	40	50
		TOTAL CREDITS					**26**	**TOTAL MARKS**			**650**
		TOTAL CONTACT HOURS /WEEK					**29**				

ELECTIVE 1	
20MCA231	**ARTIFICIAL INTELLIGENCE**
20MCA232	**CLOUD COMPUTING**
20MCA233	**BIG DATA ANALYTICS**
20MCA234	**OPTIMIZATION TECHNIQUES**

SEMESTER-III

SL.NO	COURSE CODE	SUBJECT CODE	SUBJECT TITLE	TEACHING HOURS/WEEK			CREDITS	EXAM HOURS	CIE	SEE	TOTAL
				L	T	LAB					
1	20MCA31	CPT 3.1	FINITE AUTOMATA AND FORMAL LANGUAGES	4	-	-	4	**3**	20	80	100
2	20MCA32	CPT 3.2	COMPUTER NETWORKS	4	-	-	4	**3**	20	80	100
3	20MCA33	CPT 3.3	PYTHON PROGRAMMING	4	-	-	4	**3**	20	80	100
4	20MCA34	SPT 3.4	ELECTIVE 2	4	-	-	4	**3**	20	80	100
5	20MCA35	OET 3.5	ADVANCED WEB PROGRAMMING	4	-		4	**3**	20	80	100
6	20MCA36	CPP 3.6	PYTHON PROGRAMMING LAB	-		4	2	**3**	10	40	50
7	20MCA37	OEPP 3.7	ADVANCED WEB PROGRAMMING LAB	-	-	4	2	**3**	10	40	50
8	20MCA38	CPP 3.8	MINI PROJECT	-		4	2	**3**	10	40	50
	TOTAL CREDITS						**26**	**TOTAL MARKS**			**650**
	TOTAL CONTACT HOURS /WEEK						**32**				

ELECTIVE 2	
20MCA341	LINEAR ALGEBRA AND PROBABILITY DISTRIBUTION
20MCA342	MACHINE LEARNING
20MCA343	IOT
20MCA344	DEEP LEARNING

SEMESTER-IV

SL.NO	COURSE CODE	SUBJECT CODE	SUBJECT TITLE	TEACHING HOURS/ WEEK			CREDITS	EXAM HOURS	CIE	SSE	TOTAL
				L	T	LAB					
1.	20MCA61	CPP 6.1	RESEARCH METHODOLOGY	4	-	-	4	**03**	20	80	100
2.	20MCA62	CPP 6.2	DISSERTATION/ MAJOR PROJECT (DURING 4TH SEMESTER 12 WEEKS)	-	-	-	12	**03**	100	200	300
TOTAL CREDITS							**16**	**TOTAL MARKS**			**400**

I SEMESTER

SUBJECT NAME: PROBLEM SOLVING USING C			
SUBJECT CODE	**20MCA11**	**CIE MARKS**	**20**
NO. OF HOURS/WEEK:	**04**	**SEE MARKS**	**80**
TOTAL HOURS:	**52**	**CREDITS**	**04**

Module-1: **14 Hours**

Algorithms and Flowcharts

The meaning of algorithms, Flowcharts and their need, Writing algorithms and drawing flowcharts for simple exercises like finding biggest of three numbers, to find roots of given quadratic equation, to find the biggest and smallest of given set of numbers and such other simple examples Introduction to programming in C, Constants, Variables and Data Types Character set, C tokens, keywords & identifiers, structure of C program, executing a C program. Constants, variables, data types, declaration of variables, declaration of storage classes, assigning values to variables defining symbolic constants, declaring a variable as constant, declaring a variable as volatile, overflow and underflow of data. Operators and Expressions Arithmetic operators, relational operators, logical operators, assignment operator, increment and decrement operator, conditional operator, bitwise operators, comma operator, special operators, arithmetic expressions, evaluation of expressions, precedence of arithmetic operators, type conversions in expressions, operator precedence and associability, mathematical functions

Module -2: **10 Hours**

Managing Input and Output Operations

The scanf() & printf() functions for input and output operations, reading a character, writing a character, (the getchar() & putchar() functions) , the address operator(&), formatted input and output using format specifiers, Writing simple complete C programs. Control

Statements Decision making with if statement, simple if statement, the if..else statement, nesting of if..else statements, the else..if ladder, the switch statement, the ? : operator, the goto statement, the break statement, programming examples Loop Control Structures The while statement, the do. while statement, the for statement, nested loops, jumps in loops, the continue statement, programming examples**.**

Module -3: 10 Hours

Arrays

The meaning of an array, one dimensional and two-dimensional arrays, declaration and initialization of arrays, reading, writing and manipulation of above types of arrays, multidimensional arrays, dynamic arrays, programming examples. Character Arrays and Strings Declaring and initialing string variables, reading string from terminal, writing string to screen, arithmetic operations on characters, putting strings together, comparison of two strings, string handling functions, table of strings, other features of strings, programming examples**.**

Module – 4: 10 Hours

User Defined Functions

Need for user defined functions, a multi-function program, elements of User defined functions, defining functions, return values and their types, function calls, function declaration, category of functions, no arguments and no return values, arguments but no return values, arguments with return values, no arguments with return value, functions that return multiple values, nesting of functions, recursion, passing arrays to functions, passing string to functions, programming examples. Structures and Unions Defining a structure, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, operations on individual members, array of structures, structures within structures, structures and functions, Unions, size of structures, programming examples.

Module -5: **8Hours**

Pointers

Understanding pointers, accessing the address space of a variable, declaring and initialization pointer variables, accessing a variable through its pointer, chain of pointers, pointer expressions, pointers and arrays, pointer and character strings, array of pointers, pointer as function arguments, functions returning pointers, pointers to functions, pointers and structures, programming examples.

Question paper pattern:

- The question paper will have ten questions.
- Each full question consists of 16 marks.
- There will be 2full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.

The students will have to answer 5 full questions, selecting one full question from each module.

Text Books:

1. Behrouz A Forouzan and Richard F Gilbert, Structured Programming Approach in C, 2nd Edition, Thomson, 2001.
2. V Raja Raman, Computer Programming in C, Prentice Hall India, 2000. Chapters: 1.1, 1.3, 2.1, 2.3, 3.1, 3.2, 3.3.

SUBJECT NAME: ADVANCED DATA STRUCTURES AND ALGORITHMS			
SUBJECT CODE	**20MCA12**	CIE MARKS	20
NO OF HOURS/WEEK:	04	SEE MARKS	80
TOTAL HOURS:	52	CREDITS	04

Course Learning Objectives: This course will enable students to:

- Familiarize the knowledge of various types of data structures, operations and algorithms
- sorting and searching operations.
- Use the concepts of Stack, Queue, Lists, Trees, Hashing, Searching and Sorting
- Techniques
- Build solutions for real world problems using concepts of data structures
- Know the importance of designing efficient algorithm
- Know various possible algorithm design techniques/methods
- Analyze the algorithm and understand its performance

Course Outcome (CO): At the end of this course, the students will be able to

CO1: Acquire knowledge of

- Various types of data structures, operations and algorithms

- Sorting and searching operations

CO2: Analyze the performance of

- Stack, Queue, Lists, Trees, Hashing, Searching and Sorting techniques

CO3: Implement all the applications of Data structures in a high-level language

CO4: Design and apply appropriate data structures for solving computing problems

CO5: Classify problems as P, NP or NP Complete

CO6: Implement algorithms using various design strategies and determine their order of growth.

Module-1: **12 Hours**

Classification of Data Structures: Primitive and Non- Primitive, Linear and Nonlinear; Data structure Operations, ADT, Array as ADT, Operations - Insert, Delete, Search, Sort, String Definition, Representation, String as ADT, Operations – Insert, Delete, Concatenate, Comparing, Substring.

Stack*:* Definition, Representation, Stack as ADT, Operations and Applications: Polish and reverse polish expressions, Infix to postfix conversion, evaluation of postfix expression, infix to prefix, postfix to infix Conversion;

Recursion - Recursive definition and processes, Properties of recursive definition or Algorithm, Recursive algorithms: Factorial, GCD, Fibonacci Sequence, Tower of Hanoi.

Queue*:* Definition, Representation, Queue as ADT, Operations, Queue Variants: Circular Queue, Priority Queue, Double Ended Queue; Applications of Queues. Programming Examples.

Module-2: **10 Hours**

Linked List: Limitations of array implementation, Memory Management: Static (Stack) and Dynamic (Heap) Memory Allocation, Memory management functions. Definition, Representation, Operations:get node () and Free node () operations, Types:

Singly Linked List. Linked list as a data Structure, Inserting and removing nodes from a list, Linked implementations of stacks, Example of list operations such as insert and delete an element before a key element, Header nodes, Array implementation of lists.

Circular Linked List: Inserting, deleting and searching elements in lists, **Doubly Linked List**: Inserting and Deleting Nodes, Queue as doubly linked lists, such as insert into position, delete an specified element.

Application of Linked Lists: Stacks, Queues, Double-ended Queues, Priority Queues, Sparse Matrix and Polynomials using Lists, Trees, BST.

Module-3: **10 Hours**

Introduction, Fundamentals of the Analysis of Algorithm Efficiency: Notion of Algorithm, Fundamentals of Algorithmic Problem Solving, Important Problem Types, Fundamental data Structures. Analysis Framework, Asymptotic Notations and Basic efficiency classes, Mathematical analysis of Recursive and Non-recursive algorithms.

Module -4: **10 Hours**

Brute Force: Selection Sort and Bubble Sort, Sequential Search, Exhaustive search and String Matching.

Divide-and-Conquer

Merge sort, Quicksort, Binary Search, Binary tree Traversals and related properties, Multiplication of
large integers.

Module -5: **10 Hours**

Decrease-and-Conquer

Insertion Sort, Depth First and Breadth First Search, Topological sorting, Algorithms for Generating
Combinatorial Objects: generating permutations.

Greedy Technique

Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm, Huffmann Trees.

Question paper pattern:

- The question paper will have ten questions.
- Each full question consists of 16 marks.
- There will be 2full questions (with a maximum of four sub questions) from each module.

- Each full question will have sub questions covering all the topics under a module.
- **The students will have to answer 5 full questions, selecting one full question from each module**

Text Books:

1. Anany Levitin: Introduction to the Design and Analysis of Algorithms, Pearson Education, 2nd

Edition.(Chapters 1.1-1.4, 2.1-2.4, 3.1, 3.2, 3.4, 4.1-4.5, 5.1-5.4, 7.1-7.3, 8.1, 8.2, 8.4, 9.1-9.4, 11.1,11.3, 12.1-12.2)

Reference Books:

1. Coremen T.H., Leiserson C.E., and Rivest R.L.: Introduction to Algorithms, PHI 1998.

2. Horowitz E., Sahani S., Rajasekar S.: Computer Algorithms, Galgotia

SUBJECT NAME: OPERATING SYSTEMS			
SUBJECT CODE	**20MCA13**	CIE MARKS	20
NO OF HOURS/WEEK:	04	SEE MARKS	80
TOTAL HOURS:	52	CREDITS	04

Course Outcome:

- Understand the principles and methods for resource-analysis for embedded- and real-time systems.
- Acquire good knowledge of the relevant mechanisms and methods in operating systems and hardware that have influence on real-time aspects, principles and methods for design and construction of embedded- and real-time systems.

Course Content:

Module – 1 **10Hours**

Introduction to OS and RTOS: Architecture of OS (Monolithic, Microkernel, Layered, Exo-kernel and Hybrid kernel structures), Operating system objectives and functions, Virtual Computers, Interaction of O. S. & hardware architecture, Evolution of operating systems, Batch, multi programming. Multitasking, Multiuser, parallel, distributed & real –time O.S.

Module – 2 **08Hours**

Process Management of OS/RTOS: Uniprocessor Scheduling: Types of scheduling, scheduling algorithms: FCFS, SJF, Priority, Round Robin, UNIX Multi-level feedback queue scheduling, Thread Scheduling, Multiprocessor Scheduling concept, Real Time Scheduling concepts.

Module – 3 **12Hours**

Process synchronization and concurrency: Principles of Concurrency, Mutual Exclusion H/W Support, software approaches, Semaphores and Mutex, Message Passing, Monitors, Classical Problems of Synchronization: Readers-Writers Problem, Producer Consumer Problem, Dining Philosopher problem. Deadlock: Principles of deadlock, Deadlock Prevention,

Deadlock Avoidance, Deadlock Detection, An Integrated Deadlock Strategies.

Module – 4 **12Hours**

Memory and I/O Management: Memory Management requirements, Memory partitioning: Fixed, dynamic, partitioning, Buddy System Memory allocation Strategies (First Fit, Best Fit, Worst Fit, Next Fit), Fragmentation, Swapping, Segmentation, Paging, Virtual Memory, Demand paging, Page Replacement Policies (FIFO, LRU, Optimal, clock), Thrashing, Working Set Model.

Module – 5 **10Hours**

I/O Management and Disk Scheduling: I/O Devices, Organization of I/O functions, Operating System Design issues, I/O Buffering, Disk Scheduling (FCFS, SCAN, C-SCAN,SSTF),

Diskcaches .RTOS Application Domains: Comparison and study of RTOS:Vx works and µCOSCasestudies:RTOSforImageProcessing–EmbeddedRTOSforvoiceoverIP–**R**TOSforfault Tolerant Applications – RTOS for Control Systems.

Reference Books:

1. Wayne Wolf, **"**Computers as Components: Principles of Embedded Computing system Design,**"** 2/e, KindlePublishers,2005.
2. Tanenbaum,**"**Modern Operating Systems,**"** 3/e, Pearson Edition, 2007.
3. Jean J Labrosse,**"** Embedded Systems Building Blocks Complete and Ready-to-use Modules in C,**"** 2/e,1999.
4. C.M. Krishna and G. Shin, "Real Time Systems," McGraw-Hill International Edition, 1997.

SUBJECT NAME: DISCRETE MATHEMATICAL STRUCTURES AND STATISTICS			
Subject code	**20MCA14**	CIE Marks	20
No of Hours/Week:	4	SEE Marks	80
Total Hours:	52	Credits	04

Course Learning Objectives: This course (18MCA23) will enable students to:

- Familiarize the logical notation to define and reason about fundamental
- Mathematical concepts such as sets, relations, functions and integers.
- Use elementary combinatorial processes such as per mutations and combinations.
- Understand probabilities and distributions for simple combinatorial processes, and statistical methods for correlation and regression.

Course Outcome (CO): At the end of this course, the students will be able to

CO1: Use the logical notation to define and reason about fundamental mathematical concepts Such as sets, relations, functions and integers.

CO2: Calculate numbers of possible outcomes of elementary combinatorial processes such as Permutations and combinations.

CO3: Calculate probabilities and distributions for simple combinatorial processes; calculate Expectations.

CO4: Apply statistical methods for correlation and regression. Fitting a curve to a discrete data.

Module-1: 12Hours

Fundamentals of Logic

Basic connectives and truth tables, logical equivalence, laws of logic, logical implication rules of inference. Quantifier's Propositional logic, equivalences, predicates and quantifiers, rules of inference,

introduction to proofs, proof methods.

Module-2: 10Hours

Sets Theory and Probability

Sets and subsets, set operations, laws of set theory, counting and Venn diagrams. A first word on Probability, axioms of probability, conditional probability, Bayes' theorem.

Module-3: 10Hours

Fundamentals of Counting and Properties of Integers

The rules of Sum and Product, Permutations and Combinations, the Binomial theorem, Mathematical Induction, Recursive definitions: Fibonacci and Lucas numbers

Module-4: 10Hours

Random variables and Probability Distributions

Concept of a random variable discrete probability distributions, Continuous probability distributions, Mean, Variance and Covariance of random variables. Binomial and Poisson distributions, Exponential and Normal distributions with mean, variables and problems.

Module-5: 10Hours

Statistical methods and Curve Fitting

Correlation, coefficient of correlations, lines of regression-principle of least square. Rank correlation.

Curve Fitting- Graphical method, Principle of least square- to fit a straight line and parabola. Fitting of Other curves of the form y = axb y = aebxxyn = b

Question paper pattern:

- The question paper will have ten questions.
- Each full question consists of 16 marks.
- There will be 2 full questions (with a maximum of four sub questions) from each module.
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer 5 full questions, selecting one full question from each module

Text Books:

1. Discrete and Combinatorial Mathematics by Ralph P. Grimaldi and B V Ramana, 5th edition, Pearson, 2011.(Chapters: 1.1 to 1.3 4.1, 4.2, 2.1 to 2.5, 3.1 to 3.6)
2. Probability and Statistics for Engineers and Scientists by Walpole Myers Ye Pearson Education, Eighth edition.(Chapters: 3.1–3.3, 4.1 to 4.4, 5.3, 5.6, 6.2 to 6.4, 6.6, 6.7)
3. Higher Engineering Mathematics by Dr. B. S. Grewal, Khanna publishers, 40th edition (Chapters: 25.12 to 25.16, 24.1 to 24.6)

Reference Books:

1. Discrete Mathematics and its Applications by Kenneth H Rosen, 7th edition, (Indian adaptation by Kamala Krithivasan), Tata McGraw Hill, 2011.
2. Discrete Mathematical Structures with Applications to Computer Science by J.P. Tremblay and R.Manohar, McGraw-Hill.
3. Probability and Statistics for Engineers by Richard A. Johnson and C. B. Gupta, Pearson Education.

SUBJECT NAME: ADVANCED DATA BASE MANAGEMENT SYSTEMS			
Subject code	**20MCA15**	CIE Marks	10
No of Hours/Week:	04	SEE Marks	40
Total Hours:	52	Credits	02

Module-1: **12 Hours**

NOSQL and Query Optimization: Definition of NOSQL, History of NOSQL and Different NOSQL products, Exploring Mongo DB Basics: NOSQL Storage architecture, CRUD operations with Mongo DB, Querying, Modifying and Managing NOSQL Data stores, Indexing and ordering data sets (Mongo DB/Couch DB/Cassandra). Advanced NOSQL, NOSQL in CLOUD, Parallel Processing with Map Reduce, Big Data with Hive. Working with NOSQL: Query Optimization: Overview, Transformation of Relational Expressions, Estimating Statistics of Expression Choice of Evaluation Plans, and Materialized views Advanced Query Optimization: Motivation, Query Processing Phases, Logical Query Optimization.

Module-2: **10 Hours**

SAN: Introduction to Information Storage and Management, Data Center Infrastructure, Information Lifecycle Components of Storage System Environment, Disk Drive Components, Disk Drive Performance, Fundamental Laws Governing Disk Performance, Logical Components of the Host, Application Requirements and Disk Performance. Data Protection, Intelligent Storage system: Implementation of RAID, RAID Array Components, RAID Levels, RAID Impact on Disk Performance

Module-3: **10 Hours**

Data Warehousing and Data Mining: Data Warehouse Architecture, Data Warehouse Implementation, Mining Methods, Mining Various Kinds of Association Rules. Data Mining: Data Mining Applications, Social Network Analysis.

Module-4: **10 Hours**

Big Data: Introduction to principles and practice of systems that improve performance through experience. Topics include statistical learning framework, supervised and unsupervised learning, performance evaluation and empirical methodology; design tradeoffs. Introduction to the Big Data problem. Current challenges, trends, and applications Algorithms for Big Data analysis. Mining and learning algorithms that have been developed specifically to deal with large datasets Technologies for Big Data management. Big Data technology and tools, special consideration made to the Map Reduce paradigm and the Hadoop ecosystem

Module-5: **10 Hours**

Information Retrieval and Search Engines: Architecture of search engine, Ranking and Evaluation; CRAWLS AND FEEDS: Crawling the Web, Directory Crawling, Conversion Problem, Storing the Documents, Detecting Duplicates. Processing text: Text Statistics, Document Parsing, Document Structure and Markup, Link analysis, Information Extraction, Internationalization; RANKING WITH INDEXES: Inverted indexes, Compression, Entropy and Ambiguity, Delta Encoding, Bit-aligned codes, Auxiliary Structures, Index Construction, Query Processing.

Reference

1. “Professional NOSQL” by Shashank Tiwari, 2011, WROX Press The Definitive guide to MongoDB, The NoSQL Database for Cloud and Desktop Computing, by Eelco Plugge, Tim Hawkins, Peter Membrey Apress 2010 "NoSQL Handbook” by Mathias Meyer, 2011 Paper planes.
2. MongoDB: The Definitive Guide, 2nd Edition, by Kristina Chodorow 2013 Silberschatz, Korth and Sudharshan Andreas Meister Otto-von-Guericke University Magdeburg
3. G. Somasundaram, Alok Shrivastava (Editors): Information Storage and Management: Storing, Managing & Protecting Digital Information in Classic, Visualized and Cloud

Environments, 2 nd edition, EMC Education Services, Wiley- India, 2009. ISBN 978-1- 1180-9483-9

4. Jiawei Han and Micheline Kamber, Data Mining, Concepts and Techniques, Morgan Kaufmann Publisher, II Edition, 2006.
5. Machine Learning, Tom Mitchell. ISBN-10: 0070428077 | ISBN-13: 978- 0070428072 | Editi993on: 1 (optional).

SUBJECT NAME: DATA STRUCTURE LAB			
Subject code	**20MCA16**	CIE Marks	10
No of Hours/Week:	04	SEE Marks	40
Total Hours:	52	Credits	02

Detailed Syllabus

Laboratory Experiments:

1. Write a program to convert a prefix notation to postfix notation.
2. Write a program to Evaluate a given postfix expression and its values for the variables
3. Write a program to simulate the working of circular queue providing the following operations–Insert, Delete and Display.
4. Write a program to Demonstrate recursion, Generate Fibonacci sequence, Solve Towers of Hanoi Problem.
5. Write a program to simulate the working of a linked list providing the following operations: Insert at the beginning/end; Insert at the position; Display list
6. Write a program to simulate the working of a circular linked list providing the following operations Delete from the beginning/end; Delete a given element; Display list
7. Write a program to simulate the working of a dequeue
8. Write a program to simulate the working of a double linked list to implement stack.
9. Write a program to create a binary tree and implement the tree traversal techniques of inorder, preorder and post order.
10. Write a program to implement quick sort
11. Write a program to implement the search techniques of Linear Search; Binary Search
12. Write a program to create a class called STACK using an array of integers. Implement the following operations by overloading the operators '+' and '--': s1 = s1 + element; where s1 is an object of the class STACK and element is an integer to be pushed on the top of the stack s1 = --s1; where s1 is an object of the class STACK. '-'operator pops

the element.

13. Handle the STACK empty and full conditions. Also display the contents of the stack after each operation, by overloading the << operator.
14. Write a program to create a class called QUEUE with member functions to add an element and to delete an element from the queue. Using the member functions, implement a queue of integers. Demonstrate the operations by displaying the contents of the queue after every operation.

SUBJECT NAME: LINUX PROGRAMMING LAB			
Subject code	**20MCA17**	CIE Marks	10
No of Hours/Week:	04	SEE Marks	40
Total Hours:	52	Credits	02

Objectives:

- To write shell script programs to solve problems.
- To implement some standard Linux utilities such as ls.cp etc using system calls.
- To develop network based applications.

Recommended Systems/Software Requirements:

Intel based desktop PC with minimum of 166 MHZ or faster processor with at least 64 MB RAM and 100MB free disk space. Fedora OS.

List of programs

1. Write a shell script that accept a file name starting and ending line numbers as arguments and display all the lines between given line no:
2. Write a shell script that delete all lines containing a specified word.
3. Write a shell script that displays a list of all the files in the current directory.
4. Write a shell script that receives any number of file names as arguments checks if every argument supplied is a file or a directory and reports accordingly. Whenever the argument is a file or directory.
5. Write a shell script that accept a list of file names as arguments count and report the occurrence of each word. 12
6. Write a shell script to find the factorial of given integer
7. Write a shell script that list the all files in a directory. 4
8. Write awk script to find the number of characters, words and lines in a file? 16 linked list respectively.
9. Write a C Program that makes a copy of a file using standard I/O and system calls?
10. Implement in C the following Unix commands using system calls A) cat B)mv 5
11. Write a C program to emulate the Unix ls-l command?

12. Write a C program to list for every file in a directory, its inode number and file name.?
13. Write a C Program that demonstrates redirection of standard output to a file .EX:ls>f1.?
14. Write a C program to create a child process and allow the parent to display “parent” and the child to display “child” on the screen
15. Write a C program to create a child process and allow the parent to display “parent” and the child to display “child” on the screen.
16. Write a C program to create a Zombie process.
17. Write a C program that illustrates how an orphan is created
18. Write a program that illustrates how to execute two commands concurrently with a command pipe.
19. Write C programs that illustrate communication between two unrelated processes using named pipe.
20. Write a C program to create a message queue with read and write permissions to write 3 messages to it with different priority numbers?

SUBJECT NAME: ADVANCED DBMS LAB			
Subject code	**20MCA18**	CIE Marks	10
No of Hours/Week:	04	SEE Marks	40
Total Hours:	52	Credits	02

DBMS Lab Experiments:

Instructions for the Exercises:

Draw ER diagram based on given scenario with various Constraints. Create Relational Database Schema based on the above scenario using Mapping Rules. Perform the given queries using any RDBMS Environment. Suitable tuples have to be entered so that queries are executed correctly. The results of the queries may be displayed directly.

1. Create the following tables with properly specifying Primary keys, Foreign keys and solve the following queries.

   BRANCH(Branchid,Branchname,HOD)

   ,STUDENT(USN,Name,Address,Branchid,sem)

   BOOK(Bookid,Bookname,Authorid,Publisher,Branchid)

   AUTHOR(Authorid,Authorname,Country,age)

   BORROW(USN,Bookid,Borrowed_Date) Queries:

   a) List the details of Students who are all Studying in 2nd sem MCA.
   b) List the students who are not borrowed any books.
   c) Display the USN, Student name, Branch_name, Book_name, Author_name , Books_Borrowed_Date of 2nd sem MCA Students who borrowed books.
   d) Display the number of books written by each Author.
   e) Display the student details who borrowed more than two books.
   f) Display the student details who borrowed books of more than one Author.
   g) Display the Book names in descending order of their names.
   h) List the details of students who borrowed the books which are all published by the same Publisher.

2 Design an ER-diagram for the following scenario, Convert the same into a relational model and then solve the following queries. Consider a Cricket Tournament "ABC CUP" organized by an organization. In the tournament there are many teams are contesting each having a Teamid,Team_Name, City, a coach. Each team is uniquely identified by using Teamid. A team can have many Players and a captain. Each player is uniquely identified by Playerid, having a Name, and multiple phone numbers,age. A player represents only one team. There are many Stadiums to conduct matches. Each stadium is identified using Stadiumid, having a stadium_name,Address (involves city,area_name,pincode).A team can play many matches. Each match played between the two teams in the scheduled date and time in to record in the database. For each match man_of_the match award given to aplayer.

Queries:

a) Display the youngest player (in terms of age) Name, Team name, age in which he belongs of the tournament.
b) List the details of the stadium where the maximum number of matches were played.
c) List the details of the player who is not a captain but got the man of the match award at least in two matches.
d) Display the Team details who won the maximum matches. 5 Display the team name where all its won matches played in the same stadium.

3. Consider the following Scenario and design an ER-Diagram, map the designed ER- diagram into a Relational model. Consider an organization "ABC" having many employees. An employee works for one department. Each employee identified by using Empid, having Name, address (described as House_no, city, district, state, pin code**)** and more than one phone numbers. Department identified by using Dno, having Dname, Dlocation. Each Department having a manager . Each department having many employees. There are many Projects , each project is controlled by the department. Each Project uniquely identified by Pno, having Project_name, Project_location. An employee works on many Projects. Number of hours per week worked on each project by an Employee also needs to be recorded in the database . A

project is worked by many employees. Each employee supervised by the supervisor. Employee having many dependents. Dependents having the dependent name, gender, age, address. Dependents are identified by Empid. T1(Empid, Emp_Name,city, district, state, pin_code, phoneno, Dno,Dname,Dlocation, Dept_mgr_id, Pno, Project_name, Project_location, Number_of_Hours,Supervisor_Empid, Dependent_name, gender, address)

Deduce the above Relation T1 into the 3NF and then solve the following queries.

Queries:

a) Display the details of the employees who are working on both the projects having project no 5 and 10.
b) Display the details of employees having at least two dependents.
c) Display the project name on which a greater number of employees are working.
d) Retrieve the employees who do not have any dependents.
e) Display the Employee details whose total number of hours per week working on various projects is maximum than all other employees. 6. create a view to display the number of employees working in each department.

4 Design an ER-diagram for the following scenario, Convert the same into a relational model, normalize Relations into a suitable Normal form and then solve the following queries. A country can have many Tourist places. Each Tourist place is identified by using tourist_place_id, having a name, belongs to a state, Number of kilometers away from the capital city of that state, history. There are many Tourists visits tourist places every year. Each tourist is identified uniquely by using Tourist_id, having a Name, age, Country and multiple email ids. A tourist visits many Tourist places, it is also required to record the visted_date in the database. A tourist can visit a Tourist place many times at different dates. A Tourist place can be visited by many tourists either in the same date or at different dates.

Queries:

a) List the state name which is having maximum number of tourist places.

b) List details of Tourist place where maximum number of tourists visited.
c) List the details of tourists visited all tourist places of the state “KARNATAKA”.
d) Display the details of the tourists visited at least one tourist place of the state, but visited all states tourist places. 5 Display the details of the tourist place visited by the tourists of all country.

5. Design an ER-diagram for the following scenario, Convert the same into a relational model, normalize Relations into a suitable Normal form and then solve the following queries.

A country wants to conduct an election for the parliament. A country having many constituencies. Each constituency is identified uniquely by Constituency_id, having the Name, belongs to a state, Number_of_voters. A constituency can have many voters. Each voter is uniquely identified by using Voter_id, having the Name, age, address (involves Houseno, city,state,pincode). Each voter belongs to only one constituency. There are many candidates contesting in the election. Each candidates are uniquely identified by using candidate, having Name, phone no, age, state. A candidate belongs to only one party.There are many parties. Each party is uniquely identified by using Party_id, having Party_Name,Party_symbol. A candidate can contest from many constituencies under a same party. A party can have many candidates contesting from different constituencies. No constituency having the candidates from the same party. A constituency can have many contesting candidates belongs to different parties. Each voter votes only one candidate of his/her constituency.

Queries: List the details of the candidates who are contesting from more than one constituencies which are belongs to different states.

a) Display the state name having maximum number of constituencies.
b) Create a stored procedure to insert the tuple into the voter table by checking the voter age. If voter’s age is at least 18 years old, then insert the tuple into the voter else display the “Not an eligible voter msg” .
c) Create a stored procedure to display the number_of_voters in the specified constituency Where the constituency name is passed as an argument to the stored procedure. 5 Create a TRIGGER to UPDATE the count of “

d) Number_of_voters" of the respective constituency in "CONSTITUENCY" table, AFTER inserting a tuple into the "VOTERS" table. Note 1: In the practical Examination each student has to pick one question from a lot of all the 5 questions. Note2: Change of program is not permitted in the Practical Examination

SEMESTER-II

SUBJECT NAME: ADVANCED SOFTWARE ENGINEERING			
Subject code	**20MCA21**	CIE Marks	20
No of Hours/Week:	04	SEE Marks	80
Total Hours:	52	Credits	04

Course Outcome:

At the end of this course, the students will be able to

CO1: Categorize problems based on their characteristics and practical importance. CO2: Apply the correct process models for software development.

CO3: Apply the techniques, skills, and modern engineering tools necessary for engineering practice.

CO4: Define, formulate and analyze a problem as per the testing techniques.

CO5: Apply new Generation of Software Engineering Technology to Meet Current and Future Industrial Challenges of Emerging Software Trends

Module -1: **12hours**

Overview Introduction

Professional Software Development Attributes of good software, software engineering diversity, IEEE/ ACM code of software engineering ethics, case studies Software Process & Agile Software Development Software Process models: waterfall, incremental development, reuses oriented, Process activities; Coping with change, The rational Unified process. Agile methods, Plan-driven and agile Development, Extreme Programming, Agile project management, Scaling agile methods.

Module -2: **10hours**

Requirements Engineering Functional and non-functional requirements:

The software requirements document, Requirements specification, Requirements engineering processes, Requirement elicitation and analysis, Requirements validation, Requirements management Component-based software engineering Components and component model, CBSE process, Component composition.

Module -3: 10hours

System Modeling, Architectural Design Context models, Interaction models, Structural models, Behavioral models, Model-driven engineering, Software architecture: the role of software architecture, architectural views, component and connector view, Architectural styles for C&C view, Documenting architectural design

Module -4: 10hours

Design and implementation Design:

Design concepts, Function oriented design, detailed design, verification, matrix (Complexity matrix for function-oriented design) Distributed Software engineering Distributed system issues, Client-server computing, Architectural patterns for distributed systems, Software as a service. Module -5 Planning a software Project Process planning, Effort estimation, Project scheduling and staffing, Software configuration management plan, Quality plan, Risk Management, Project monitoring plan. Software Testing, testing fundamentals, Black-box testing, White-box testing, Testing process

Module -5: 10hours

Planning a software Project

Process planning, Effort estimation, Project scheduling and staffing, Software configuration management plan, Quality plan, Risk Management, Project monitoring plan.

Software Testing

Testing fundamentals, Black-box testing, White-box testing, Testing process.

Text Books:

1. Ian Sommerville: Software Engineering, 9th edition, Person Education Ltd, 2011. 2. Pankaj Jalote: Software Engineering, Wiley India Pvt Ltd (2010) (Chapters-:4, 6.1, 6.2).

SUBJECT NAME: ADVANCED JAVA PROGRAMMING			
Subject code	**20MCA22**	CIE Marks	20
No of Hours/Week:	4	SEE Marks	80
Total Hours:	52	Credits	04

Course Outcome

- Use an integrated development environment to write,compile,run,and test simple object-Oriented Java programs.
- Read and make elementary modifications to Java programs that solve real-world problems.
- Validate input in a Java program, Identify and fix defects and common security issues in code.
- Document a Java program using Javadoc.
- Use a version control system to track source code in a project.

Course Content

Module – 1 **12Hours**

Introduction to Java: Origin and features of Java. Java Program Structure, Java Tokens, Java statements, Java Virtual machine, Command Line Parameters, Java Variables and Data Types, Operators, Decision Making, Branching and looping statements.

Classes, Objects and Methods used in Java: Class fundamentals, Methods, Constructors, Overloading, Inheritance, Interfaces, One- and two-dimensional arrays, Vectors, Strings, Wrapper Classes.

Module – 2 **12Hours**

Java Packages: API packages, system packages, naming conventions, creating and accessing a package, adding a class to a package, hiding classes.

Multi-threads Programming: Java thread Model, Main Thread, creating a Thread, Creating Multiple Threads, Extending the thread class, Stopping and blocking a thread, Life cycle of a thread, Managing Errors and Exceptions.

Module – 3 **10Hours**

Applet Programming: Introduction, how applet differ from application, Applet life cycle, Applet tag, passing parameters to applet. Abstract Windows Toolkit: Components, Container, Panel, Label, Button, Checkbox, Checkbox Group, Choice, List, Text Field, Text Area, Scrollbars.

Module – 4 **08Hours**

Graphics Programming: The Graphics class, Lines and Rectangles, Circles and Ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Using Control Loops in Applets.

Module – 5 **10Hours**

Managing Input/output Files in Java: Stream Classes, Byte Stream Classes, Character Stream Classes, Creation of Files, Reading/Writing characters, Reading/Writing Bytes, Handling Primitive Data Types, Concatenating and Buffering Files, Random Access Files.

Networking: Internet Address, TCP/IP Client Sockets, TCP/IP Server Sockets, URL, URL Connection, JDBC connectivity

Reference Books

1. Programming with Java – A PRIMER by - E.Balagurusamy, Tata McGraw-Hill 3rd Edition
2. The Complete Reference - Java-2 by- Patrick Naughton and Herbert Scheldt Published by Tata McGraw-Hill India.

3. The Complete Reference – J2EE by - Jim Keogh, published by Tata McGraw-Hill

ELECTIVE-I

SUBJECT NAME: ARTIFICIAL INTELLIGENCE			
Subject code	**20MCA231**	CIE Marks	20
No of Hours/Week:	04	SEE Marks	80
Total Hours:	52	Credits	04

Course Outcome

- Explain what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence.
- Explain how Artificial Intelligence enables capabilities that are beyond conventional technology, for example, chess-playing computers, self-driving cars, robotic vacuum cleaners.
- Use classical Artificial Intelligence techniques, such as search algorithms, minimax algorithm, neural networks, tracking, and robot localization.
- Ability to apply Artificial Intelligence techniques for problem-solving.
- Explain the limitations of current Artificial Intelligence techniques.

Course Content

Module – 1 **12 Hours**

INTRODUCTION TO Al AND PRODUCTION SYSTEMS:

Introduction to AI-Problem formulation, Problem Definition -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics -Specialized productions system-Problem solving methods –Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction –Related algorithms, Measure of performance and analysis of search algorithms.

Module – 2 **10 Hours**

REPRESENTATION OF KNOWLEDGE :Game playing –Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation of knowledge.

Module – 3 **10 Hours**

KNOWLEDGE INFERENCE: Knowledge representation -Production based system, Frame based system. Inference –Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning –Certainty factors, Bayesian Theory-Bayesian Network-Dempster –Shafer theory.

Module – 4 **10 Hours**

PLANNING AND MACHINE LEARNING: Basic plan generation systems –Strips -Advanced plan generation systems –K strips -Strategic explanations -Why, Why not and how explanations. Learning-Machine learning, adaptive Learning.

Module – 5 **10 Hours**

EXPERT SYSTEMS Expert systems –Architecture of expert systems, Roles of expert systems –Knowledge Acquisition –Meta knowledge, Heuristics. Typical expert systems –MYCIN, DART, XOON, Expert systems shells.

Text books

1. Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", Mc Graw Hill-2008. (Units-I,II,VI & V)
2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007. (Unit-III).

Reference books

1. Peter Jackson, "Introduction to Expert Systems", 3rd Edition, Pearson Education.

SUBJECT NAME: CLOUD COMPUTING			
Subject code	**20MCA232**	CIE Marks	20
No of Hours/Week:	4	SEE Marks	80
Total Hours:	52	Credits	04

Course Outcome:

- Define Cloud Computing and memorize the different Cloud service and deployment models.
- Describe importance of virtualization along with their technologies.
- Use and Examine different cloud computing services.
- Analyze the components of open stack & Google Cloud platform and understand Mobile Cloud Computing.
- Design & develop backup strategies for cloud data based on features.

Course Content

Module-1 **12 Hours**

Introduction to Cloud Computing: Eras of computing, The vision of Cloud Computing, Defining a cloud, A closer look, Cloud computing reference model, Historical developments: Distributed systems, Virtualization, Web 2.0; Service oriented computing; Utility oriented computing.

Module-2 **10 Hours**

Architectures for parallel and distributed computing: Parallel Vs Distributed computing, Elements of distributed computing, Technologies for distributed computing.

Module-3 **10 Hours**

Virtualization: Introduction, Characteristics of virtualized environments, Taxonomy of virtualization techniques, Virtualization and cloud computing, Pros and cons of virtualization, Technology examples: Xen: Para virtualization, VmWare: Full virtualization,
Microsoft Hyper –V.

Module-4 **10 Hours**

Cloud computing architecture: Introduction, Cloud reference model: Architecture, IaaS, PaaS, SaaS, Types of Clouds: Public, Private, Hybrid and Community clouds, Economics of the cloud, Open challenges.

Module-5 **10 Hours**

Cloud Tools and Applications: Aneka PaaS; Open stack: Introduction to open stack; Components of open stack; Amazon web services; Google App Engine; Microsoft Azure; Scientific applications: Healthcare; Biology; Geo-Science, Business and Consumer applications: ARM & ERP; Productivity; Social networking.

Textbooks:

1. RajkumarBuyya, Christian Vecchiola, and ThamaraiSelci, Mastering Cloud Computing, Tata McGraw Hill, New Delhi, India, 2013.

References:

1.Cloud Computing for Dummies by Judith Hurwitz, R.Bloor, M. Kanfman, F.Halper (Wiley India Edition)

2.Cloud Computing: A Practical Approach by J.Vette, Toby J. Vette, Robert Elsenpeter (Tata McGraw Hill)

Subject Name: BIG DATA ANALYTICS			
Subject code	**20MCA233**	CIE Marks	20
No of Hours/Week:	04	SEE Marks	80
Total Hours:	52	Credits	04

OBJECTIVES:

- 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 know about the research that requires the integration of large amounts of data.

Course content

Module 1 12 Hours

Getting an Overview of Big Data: What is Big Data? History of Data, Management – Evolution of Big Data, Structuring Big Data, Types of Data, Elements of Big Data, Volume, Velocity, Variety, Veracity, Big Data Analytics, Careers in Big data, Advantages of Big Data Analytics, Future of Big Data.

Exploring the Use of Big Data in Business Context: Use of Big Data in Social Networking, Business Intelligence, Marketing, Product Design and Development, Use of Big Data in Preventing Fraudulent Activities, Preventing Fraud Using Big Data Analytics, Use of Big Data in Retail Industry, Use of RFID Data in Retail.

Module 2 (10 Hours)

Introducing Technologies for Handling Big Data: Distributed and Parallel Computing

for Big Data, How data models and computing models are different, Introducing Hadoop, HDFS and MapReduce, How does Hadoop Function? Cloud Computing and Big Data, Cloud Services for Big Data, In-Memory Computing Technology for Big Data

Understanding Hadoop Ecosystem: Hadoop Ecosystem**,** Hadoop Distributed File System, HDFS Architecture, Concepts of Blocks in HDFS Architecture, Name Nodes and Data Nodes, Features of HDFS, MapReduce, Hadoop Yarn, Introducing HBase, HBase Architecture, Regions, Storing Bigdata with HBase, Interacting with the Hadoop Ecosystem, HBase in Operation – Programming with HBase, Combining HBase and HDFS, REST and Thrift, Data Integrity in HDFS, Features of HBase ,hive, Pig and Pig Latin, Sqoop, Zookeeper, Flume, Oozie

Module 3

Understanding Big Data Technology Foundations: 10 Hours

Exploring the Big Data Stack, Data Sources Layer, Ingestion Layer, Storage Layer, Physical Infrastructure Layer, Platform Management Layer, Security Layer, Monitoring Layer, Analytics Engine, Visualization Layer, Big Data Applications, Virtualization and Big Data, Virtualization Approaches, Server virtualization, Application Virtualization, Network Virtualization, Processor and Memory Virtualization, Data and Storage Virtualization, Managing Virtualization with Hypervisor.

Storing Data in Databases and Data Warehouses: RDBMS and Big Data, CAP Theorem, Issues with the Relational Model, Non-Relational Database, Issues with the Non-Relational Model, Polyglot Persistence, Integrating Big Data with Traditional Data Warehouses, Big Data Analysis and Data Warehouse, Changing Deployment Models in Big Data Era

Module 4 012Hours

Understanding MapReduce Fundamentals and HBase: The MapReduce Framework. Exploring the

Features of MapReduce. Working of MapReduce. Exploring Map and Reduce Functions. Techniques to Optimize MapReduce Jobs. Hardware/Network Topology, Synchronization, File System. Uses of MapReduce. Role of HBase in Big Data Processing. Characteristics of HBase.
Understand Hadoop YARN Architecture: Limitations of MapReduce, Advantages of YARN, YARN architecture: Resource manager, application manager, Integration of Resource Manager and Application Manager. Working of YARN. YARN schedulers: Capacity and Fail Scheduler. Backward compatibility with YARN

Module 5 **08Hours**

Exploring Hive: Introducing Hive, Getting Started with Hive, Hive services, Hive Variables, Hive Properties, Hive Queries, Data Types in Hive, Built-In Functions in Hive, Hive DDL, Creating Databases, Viewing a Database, Dropping a Database, Altering Databases, Creating Tables, Creating a Table Using the Existing Schema, Dropping Tables, Altering Tables, Using Hive DDL Statements, Data Manipulation in Hive, Loading Files into Tables, Inserting Data into Tables, Update in Hive, Delete in Hive, Using Hive DML Statements, Data Retrieval Queries, Using the SELECT Command, Using the WHERE Clause, Using the GROUP BY Clause, Using the HAVING Clause, Using the LIMIT Clause, Executing HiveQL Queries, Using JOINS in Hive, Inner Joins, Outer Joins, Cartesian Product Joins, Map-Side Joins, Joining Tables NoSQL: Introduction to NoSQL, why NoSQL, Characteristics of NoSQL. Types of NoSQL models: key value Data model, Column-oriented data model, document data model, graph databases. Schema less database, materialized views, Distributed models: CAP theorem.

Text Books:

1. BIG DATA Black Book ,D T Editorial Services, Dreamtech press 2016 Edition

Reference Books:

1. Big Data, Anil Maheshwari, Mc Graw Hill
2. NoSQL For Mere Mortals, Dan Sullivan, Addison Wisley Pearson

SUBJECT NAME: OPTIMIZATION TECHNIQUES			
Subject code	**20MCA234**	CIE Marks	20
No of Hours/Week:	4	SEE Marks	80
Total Hours:	52	Credits	04

OBJECTIVES:

- To introduce the basic concepts of linear programming
- To educate on the advancements in Linear programming techniques
- To introduce non-linear programming techniques
- To introduce the interior point methods of solving problems
- To introduce the dynamic programming method

Module 1: 12hours

Introduction – formulation of linear programming model-Graphical solution–solving LPP using simplex algorithm – Revised Simplex Method.

Module 2: ADVANCES IN LPP 10hours

Dualit theory- Dual simplex method – Sensitivity analysis–-Transportation problems–Assignment problems-Traveling sales man problem -Data Envelopment Analysis.

Module 3: NON LINEAR PROGRAMMING 10hours

Classification of Non Linear programming – Lagrange multiplier method – Karush – Kuhn Tucker conditions–Reduced gradient algorithms–Quadratic programming method – Penalty and Barrier method.

Module **4 Non-Traditional Optimization – I 10 hours**

Separable programming, Convex programming, Non-convex programming, Geometric programming, Stochastic programming.

Module **5 Non-Traditional Optimization – II 10 hours**

Neural network basics – learning rules – single layer – multi-layer networks, Basic concepts of fuzzy sets, membership functions. Basic operations on fuzzy sets, Properties of fuzzy sets, Fuzzy relations. Propositional logic and Predicate logic, fuzzy If – Then rules, fuzzy mapping rules and fuzzy implication functions, Applications

OUTCOMES:

- To understand ethical issues, environmental impact and acquire management skills.

TEXT BOOKS:

1. Hillier and Lieberman "Introduction to Operations Research", TMH, 2000.
2. R. Panneerselvam, "Operations Research", PHI, 2006
3. Hamdy ATaha, "Operations Research –An Introduction", Prentice Hall India, 2003.

REFERENCES:

- Philips, Ravindran and Solberg, "Operations Research", John Wiley, 2002.
- Ronald L. Rardin, "Optimization in Operation Research" Pearson Education Pvt. Ltd. New Delhi, 2005.

SUBJECT NAME: INTERNET TECHNOLOGY			
Subject code	**20MCA24**	CIE Marks	20
No of Hours/Week:	4	SEE Marks	80
Total Hours:	52	Credits	04

Module -1: **10 Hours**

Web Fundamentals Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, the Web Programmers Toolbox. Evolution of the Web, Peak into the History of the Web, Internet Applications, Networks, TCP/IP, Higher Level Protocols, Important Components of the Web, Web Search Engines, Application Servers

Module -2: **12 Hours**

Introduction to XHTML and CSS Basic syntax, Standard structure, Basic text markup, Images, Hypertext Links. Lists, Tables, Forms, Frames, syntactic differences between HTML and XHTML.

Cascading Style Sheets: Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The and tags, Conflict resolution.

Module -3: **10 Hours**

The basics of JavaScript Overview of JavaScript, Object orientation and JavaScript, general Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts

JavaScript and XHTML Documents The JavaScript Execution Environment, The Document Object Model, Elements Access in Java Script, Events and Event Handling, Handling

Events from Body Elements, Handling Events from Text Box and password Elements, The DOM2 Model, The navigator Object, Dom Tree Traversal and Modification.

Module -4: **10 Hours**

Dynamic Documents with JavaScript: Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Colors and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, Reacting to a Mouse Click, Slow Movement of Elements, Dragging and Dropping Elements

Introduction to XML Introduction, Syntax of XML, XML Document Structure, Document type definitions, Namespaces, XML schemas, displaying raw XML documents, XML documents Displaying with CSS, XSLT style sheets, XML processors, Web services.

Module -5: **10 Hours**

Perl and CGI Programming Origins and uses of Perl, Scalars and their operations, Assignment statements and simple input and output, Control statements, Fundamentals of arrays, Hashes, References, Functions, Pattern matching, File input and output; Examples.

Using Perl for CGI Programming: The Common Gateway Interface; CGI linkage; Query string format; CGI.pm module; a survey example; Cookies.

Text Books:

1. Robert W. Sebesta: Programming the World Wide Web, 4thEdition, Pearson education, 2012. (Chapters 1, 2, 3, 4, 5, 6, 7, 8, 9)

2. M. Srinivasan: Web Programming Building Internet Applications, 3rd Edition, WileyIndia, 2009. (Chapter 1)

Reference Books:

1. Jeffrey C Jackson: Web Technologies –A Computer Science Perspective Pearson Education, 7 Impressions, 2012. Chris Bates: Web Technology Theory and Practice, Pearson Education, 2012.

2. Internet Technology and Web Design, Instructional Software Research and Development (ISRD) Group, Tata McGraw-Hill, 2011RajKamal Internet and Web Technologies, McGraw Hill Education.

SUBJECT NAME: DATA MINING AND DATA WAREHOUSING			
SUBJECT CODE	**20MCA25**	CIE MARKS	20
NO OF HOURS/WEEK:	4	SEE MARKS	80
TOTAL HOURS:	52	CREDITS	04

Objectives:

• Learn the concept of Data warehousing and OLAP and Understand storage and retrieval technique of data from DATA CUBE.

• Study different types of data and different preprocessing techniques.

• Understand various Association algorithms and its applications.

• Learn how to apply different Classification technique and to evaluate different types of classifiers.

• Distinguish different clustering techniques and their

Module -1: **12hours**

Data warehousing and OLAP: **(10hours)**

Data Warehouse basic concepts, Data Warehouse Modeling, Data Cube and OLAP: Characteristics of OLAP systems, Data Cube Implementations, Data Cube operations, Implementation of OLAP and overview on OLAP Software.

Module -2: **10hours**

Data Mining and its Applications:

Introduction, what is Data Mining, Motivating Challenges, Data Mining Tasks, Which technologies are used for data mining, Kinds of pattern that can be mined, Data Mining Applications, Data Preprocessing, Data cleaning, data integration, data reduction and data transformation.

Module-3: **10hours**

Association Analysis: Basic Concepts and Algorithms:

Frequent Item set Generation, Rule Generation, Compact Representation of Frequent Item sets, Alternative methods for generating Frequent Item sets, FP Growth Algorithm, Evaluation of

Association Patterns

Module-4: **10hours**

Classification:

Methods, improving accuracy of classification

Basics, General approach to solve classification problem, Decision Trees, Rule Based Classifiers,

Nearest Neighbor Classifiers. Bayesian Classifiers, Estimating Predictive accuracy of classification methods, improving accuracy of classification methods, Evaluation criteria for classification methods, Multiclass Problem.

Module-5: **10hours**

Clustering Techniques

Overview, features of cluster analysis, Types of Data and Computing Distance, Types of Cluster Analysis Methods, Partitional Methods, Hierarchical Methods, Density Based Methods, Quality and Validity of Cluster Analysis.

Reference Books:

1. Jiawei Micheline Kamber, 'Data Mining Concepts and Techniques', Morgan Kauf Mann Publishers.
2. George M. Marakas, 'Modern Data Warehousing, Mining and Visualization', Pearson Education,2003.
3. W.H. Inmon, 'Building the Data Warehouse', Wiley dreamtech, 3rd Edition.
4. Mastering Data Mining – Michael J.A. Berry & Gordon S. Linoff (Wiley Pub.).
5. Data Warehousing (Pearson Ed.) – Sam Anahory & Dennis Murray.

SUBJECT NAME: JAVA PROGRAMMING LAB			
Subject code	**20MCA26**	CIE Marks	10
No of Hours/Week:	04	SEE Marks	40
Total Hours:	52	Credits	02

Detailed Syllabus:

1. **Programs on classes and objects**
2. **Programs on Inheritance**
3. **Programs on abstract class and inner class**
4. **Programs on interfaces**
5. **programs on packages**
6. **programs on string and string buffer classes**
7. **Programs on Collections**
8. **programs on exception handling**
9. **programs on IO streams**
10. **Programs on Multithreading**

SUBJECT NAME: DATA MINING LAB			
Subject code	**20MCA27**	CIE Marks	10
No of Hours/Week:	4	SEE Marks	40
Total Hours:	52	Credits	02

List of Programs:

1. Data Exploration and visualization with R
2. Regression with R
3. Classification with R
4. Data Clustering with R
5. Association Rule Mining with R.

SUBJECT NAME: INFORMATION TECHNOLOGY LAB			
Subject code	**20MCA28**	CIE Marks	10
No of Hours/Week:	4	SEE Marks	40
Total Hours:	52	Credits	02

1. Create an XHTML page that provides information about your department. Your XHTML page must use the following tags:

a) Text Formatting tags

b) Horizontal rule

c) Meta element

d) Links

e) Images

f) Tables

(Use of additional tags encouraged).

2. Develop and demonstrate the usage of inline, external and internal style sheet using CSS. Use XHTML page that contains at least three paragraphs of text, listed elements and a table with four rows and four columns.

3. Develop and demonstrate a XHTML file that includes JavaScript script for the following problems: a) Input: A number n obtained using prompt Output: The first n Fibonacci numbers b) Input : A number n obtained using prompt Output : A table of numbers from 1 to n and their squares using alert

4. Write a JavaScript program to generate n number of random numbers and store them in an array. Sort the generated numbers in ascending order using array sort method. Develop separate functions to find mean and median of numbers that are in the array. Display the results with appropriate messages.

5. Create a XHTML document that describes the form for taking orders for popcorn. Text boxes are used at the top of the form to collect the buyer's name and address. These are placed in a borderless table to force the text box align vertically. A second table to collect actual order. Each row of this table names a product, displays the price, and uses text box with size 2 to collect the

quantity ordered using <td> tag. The payment method is input by the user through one of four radio buttons. Provide provision for submission of order and clear the order form.

6. a) Develop and demonstrate, a HTML document that collects the USN (the valid format is : A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by three upper-case characters followed by two digits; (no embedded spaces are allowed) from the user. Use JavaScript that validate the content of the document. Suitable messages should be display in the alert if errors are detected in the input data. Use CSS and event handlers to make your document appealing. b) Modify the above program to get the current semester also (restricted to be a number from 1 to 6).

7. Develop and demonstrate a HTML file which includes JavaScript that uses functions for the following problems: a. Parameter: A string Output: The position in the string of the left-most vowel. b. Parameter: A number Output: The number with its digits in the reverse order.

8. Develop and demonstrate a HTML5 page which contains a) Dynamic Progressive bar.

SEMESTER-III

SUBJECT NAME: FINITE AUTOMATA AND FORMAL LANGUAGES			
Subject code	**20MCA31**	CIE Marks	20
No of Hours/Week:	4	SEE Marks	80
Total Hours:	52	Credits	04

Module-1: **10 Hours**

Introduction to Finite Automata:
Introduction to Finite Automata, The central concepts of Automata theory, Determata, Regular Expressions: An application of finite automata;

Finite automata with Epsilon-transitions; Regular expressions;

Finite Automata and Regular Expressions; Applications of Regular Expressions.

Module-2 **10 Hours**

Regular Languages, Properties of Regular Languages:
Regular Languages, Properties of Regular Languages: Regular languages; Proving languages not to be regular languages; Closure properties of regular languages; Decision properties of regular languages; Equivalence and minimization of automata.

Module 3 **10 Hours**

Context-Free Grammars and Language:
Context-Free Grammars And Languages: Context-free grammars; Parse trees; Applications; Ambiguity in grammars and Languages. Definition of the Pushdown automata; the languages of a PDA; Equivalence of PDA's and CFG's; Deterministic Pushdown.

Module 4 **10 Hours**

Pushdown Automata:
Definition of pushdown automation, equivalence of PDA's and CFGS
Properties of Context-Free Languages.

Properties of context-free language forms for CFGS, the pumping CFGS, closure properties of CFGS.

Module 5: **12 Hours**

Introduction to Turing Machine:

Problem that computer cannot solve the turning machine, programming technique for turning machine; Extension to the basic turning machine, turning machine and computer.

Undecidability:

A language that is not recursively enumerable, an undeniable problem that is RE posts correspondence problem other undecidable problem

Text Books:

1. Finite Automata and Formal Languages: A Simple Approach by A.M. Padma Reddy.
2. Formal Languages and Automata Theory by K.V.N. Sunitha, Publisher(s): Pearson Education India.

SUBJECT NAME: COMPUTER NETWORKS			
Subject code	**20MCA32**	CIE Marks	20
No of Hours/Week:	04	SEE Marks	80
Total Hours:	52	Credits	04

Module -1: 10 Hours

Introduction to Computer Networks and Physical Layer Networking Devices, Classification of Computer Networks, Network Protocol Stack (TCP/IP and ISO-OSI), Network Standardization and Examples of Networks. Data Transmission Concepts, Analog and Digital Data Transmission, Transmission Impairments and Channel Capacity, Guided and Wireless transmission, communication media, Digital modulation techniques (FDMA,TDMA,CDMA) and mobile telephone systems (1G,2G,3G and 4G).

Module -2: 10 Hours

Data Link layer Data link layer design issues, Error Detection and Correction Codes, Data Link Protocols and Sliding window protocols.

Medium Access Sub Layer the Channel Allocation Problem, Multiple access protocols and Examples: Wireless LAN, Bluetooth.

Module -3: 10 Hours

Network Layer Network Layer Design issues, Routing algorithms, Congestion Control Algorithms, Quality of Service, Internetworking and The Network Layer in the Internet.

Module -4: 10 Hours

The Transport Layer the Transport Service, Elements of Transport Protocols, Congestion Control, The Internet Transport Protocol: UDP, The Internet Transport Protocols – TCP, Performance Issues.

Module -5: **12 Hours**

The application Layer DNS: Domain Name Space, Domain Resource Records, Domain Name Servers. Electronic mail: SMTP, The World Wide Web: Static and dynamic web pages, web applications, HTTP, mobile web. Streaming audio and Video: Digital audio and video, streaming stored and line media, real-time conferencing, Content Delivery: content and internet traffic, server forms, web proxies, content delivery networks, peer-to-peer networks.

Text Books:

1. "Computer Networks" by Andrew S Tanenbaum, David J Wetheral, 5th Edition, Pearson 2012(Chapter 1, 2.2, 2.3, 2.5, 2.7, 3.1, 3.2, 3.3, 3.4,4.1, 4.2, 4.4, 4.6) Chapter 5, Chapter 6 (excluding 6.7), Chapter 7.

SUBJECT NAME: PYTHON PROGRAMMING			
Subject code	**20MCA33**	CIE Marks	20
No of Hours/Week:	04	SEE Marks	80
Total Hours:	52	Credits	04

Module -1: **10 Hours**

Installing Python, Simple program using Python, Expressions and Values, Variables and Computer Memory, error detection, multiple line statements, designing and using functions, functions provided by Python, Tracing function calls in memory model, omitting return statement. Working with Text: Creating Strings of Characters, Using Special Characters in Strings, Creating a Multiline String, Printing Information, Getting Information from the Keyboard.

Module -2: **10 Hours**

A Boolean Type , Choosing Statements to Execute, Nested If Statements , Remembering the Results of a Boolean Expression Evaluation , A Modular Approach to Program Organization, Importing Modules , Defining Your Own Modules, Testing Code Semi automatically Grouping Functions Using Methods: Modules, Classes, and Methods , Calling Methods the Object-Oriented Way, Exploring String Methods, Underscores.

Module -3: **10 Hours**

Storing Collections of Data Using Lists: Storing and Accessing Data in Lists, modifying Lists, Operations on Lists, Slicing Lists, Aliasing, List Methods, Working with a List of Lists. Repeating Code Using Loops: Processing Items in a List, Processing Characters in Strings, Looping Over a Range of Numbers, Processing Lists Using Indices, Nesting Loops in Loops, Looping Until a Condition Is Reached, Repetition Based on User Input, Controlling Loops Using Break and Continue Reading and Writing

Module -4: **10 Hours**

Files: Kinds of files, Opening a File, Techniques for Reading Files, Files over the Internet, Writing Files, and Writing Algorithms that Use the File-Reading Techniques, Multiline Records. Storing Data Using Other Collection Types: Storing Data Using Sets, Storing Data Using Tuples, Storing Data Using Dictionaries, Inverting a Dictionary, Using the In Operator on Tuples, Sets, and Dictionaries, Comparing Collections.

Module -5: **12 Hours**

Collection of New Information Object-Oriented Programming: Understanding a Problem Domain, Function "Is instance," Class Object, and Class Book , Writing a Method in Class Book, Plugging into Python Syntax: More Special Methods ,Creating Graphical User interface: Building a Basic GUI, Models, Views, and Controllers, Customizing the Visual Style Introducing few more Widgets, Object-Oriented GUIs, Keeping the Concepts from Being a GUI Mess.

Text Books:

1. Practical Programming: An introduction to Computer Science Using Python, second edition, Paul Gries, Jennifer Campbell, Jason Montojo, The Pragmatic Bookshelf.
2. Learning with Python: How to Think Like a Computer Scientist Paperback – Allen Downey , Jeffrey Elkner, 2015

Reference Books:

1. Introduction to Python for Computational Science and Engineering (A beginner's guide), Hans Fangohr. Exploring Python, Timothy A. Budd, Mc Graw Hill Education Python for Informatics: Exploring Information, Charles Severance. Learning Python, Fourth Edition, Mark Lutz, O'Reilly publication.

ELECTIVE 2

SUBJECT NAME: LINEAR ALGEBRA AND PROBABILITY DISTRIBUTION			
Subject code	**20MCA341**	CIE Marks	20
No of Hours/Week:	04	SEE Marks	80
Total Hours:	52	Credits	04

Course Outcome

- Understand the concept and applications of vector spaces, subspaces and linear independence.
- Understand various inner products and able to perform various inner product operations.
- Explore the applicability of general Liner Transformations, Linear operators, Composition of operators and linear transformations.
- Understand the basics of probability theory and its applications

Course Content

Module-1: **10 hours**

Vector Spaces: General Vector Spaces, Subspaces, Linear Independence, Basis and Dimension, Span, Some Fundamental Theorems, Row Space, Column Space, Null space, Rank and Nullity, Four Fundamental Spaces,

Module-2: **11 hours**

Inner Product Spaces: General Inner Products, Euclidean and Weighted Inner Product, Length, Distance, Norm, Angle and Orthogonally in Inner Product Spaces, Caucy-Schwarz Inequality, Orthogonal Complement, Orthonormal Bases, Gram-Schmidt Procedure, QR-decomposition.

Module-3: **10 hours**

Linear Transformations: General Liner Transformations, Linear operators, Composition of operators and linear transformations, Kernel and Range, Dimension theorem for Linear

Transformation, Inverse Linear Transformations, Matrices of General Linear Transformations, Matrices of Compositions and Linear Transformations.

Module-4 **10 hours**

Probability Theory: Basics of Probability theory, Discrete Random Variables and Probability Distributions, Mean and Variance, Moments of a Discrete Random Variable, Uniform Distribution, Binomial Distribution, Poisson Distribution, Functions of Random Variables, Continuous Random Variables and Probability Distributions

Module-5 **11 hours**

STANDARD PROBABILITY DISTRIBUTIONS:

Uniform (discrete/continuous)- mean, variance, **moment generating function(**mgf), Bernoulli (mean, variance, mgf), binomial (mean, variance, mgf), Poisson (mean, variance, mgf), Geometric, exponential (mean, variance, mgf, lack of memory property). gamma- one and two parameter(s)(mean, variance, mgf) Concept of sampling and sampling distributions, Concept of, Statistic(s) and standard error(s). Mean and variance of sample mean when sampling is from a finite population. Chi-square distributions, Student's t distribution.

Text Books/References:

1. Howard Anton and Chris Rorres, "Elementary Linear Algebra", John Wiley and Sons, 9th Edition,2008.
2. Douglas C. Montgomery and George C. Runger, "Applied Statistics and Probability for Engineers", John Wiley and Sons, 3rd Edition,2003.
3. Goon A. M., Gupta M. K., and Dasgupta B.(2005). Fundamentals of Statistics, Vol. II, 8th edition, World Press, Kolkata.
4. Gupta S. C. and Kapoor V. K.(2002). Fundamentals of Mathematical Statistics, 11th edition, Sultan Chand and Sons.

5. Hogg R. V., Mckean J. W., and Craig A. T.(2014). Introduction to Mathematical Statistics, 6th edition, Pearson Education Inc.

6. R.S.N. Pillai, Bagavathi(2010). STATISTICS- Theory and Practice, S.Chand publications.

7. Miller, I. and Miller, M.(2014). Mathematical Statistics, 8th edition, Pearson Education Inc.

SUBJECT NAME: MACHINE LEARNING			
Subject code	**20MCA342**	CIE Marks	20
No of Hours/Week:	04	SEE Marks	80
Total Hours:	52	Credits	04

Course Outcome

- Gain knowledge about basic concepts of Machine Learning.
- Identify machine learning techniques suitable for a given problem.
- Solve the problems using various machine learning techniques
- Design and implement machine learning solutions to classification, regression, and clustering problems; and be able to evaluate and interpret the results of the algorithms.

Module-1 **12 Hours**

Introduction, Machine learning definition, importance of machine learning, machine learning framework, types of machine learning, relation to other fields, examples of machine learning applications, designing a learning system, issues in machine learning.

Module-2 **10 Hours**

Introduction to Supervised Learning, Decision tree-based classifier, Bayesian theory-based classifier, Neural network-based classifier, Nearest neighbor classifier,

Module –3 **10 Hours**

Support vector classifier, performance evaluation. Introduction to Unsupervised Learning, Clustering methods,

Module –4 **10 Hours**

Criteria functions for clustering, Similarity measures, Component analysis, Low dimensional analysis and multidimensional scaling.

Module -5 **10 Hours**

Additional topics, Reinforcement learning, Genetic algorithms, Analytical learning, Ensemble of classifiers, Design and analysis of machine learning experiments.

Reference Books

1. Machine Learning: a Probabilistic Perspective by Kevin Patrick Murphy, MIT Press, March2014.
2. Introduction to Machine Learning by Alex Smola and S.V.N. Viswanathan, Cambridge University Press.
3. Understanding Machine Learning: From Theory to Algorithms by Shai Shalev-Schwartz and ShaiBen-David
4. Published 2014 by Cambridge University Press.

SUBJECT NAME: INTERNET OF THINGS (IOT)			
Subject code	**20MCA343**	CIE Marks	20
No of Hours/Week:	4	SEE Marks	80
Total Hours:	52	Credits	04

OBJECTIVES:

- To understand the fundamentals of Internet of Things
- To learn about the basics of IOT protocols
- To build a small low cost embedded system using Raspberry Pi
- To apply the concept of Internet of Things in the real world scenario.

Module-1: **10 Hours**

M2M to IoT Introduction: The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example.

Module-2: **10 Hours**

M2M to IoT A Market Perspective–

Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information monopolies. M2M to IoT- An Architectural Overview– Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

Module – 3: **10 Hours**

M2M and IoT Technology Fundamentals Devices and gateways, Local and wide area networking, Data management, Business processes in IoT, Everything as a Service (XaaS), M2M and IoT Analytics, Knowledge Management

Module -4: **10 Hours**

IoT Architecture-State of the Art Introduction, State of the art, Architecture Reference Model

Introduction, Reference Model and architecture, IoT reference Model

Module-5: **12 Hours**

IoT Reference Architecture Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views. Real-World Design Constraints-Introduction, Technical Design constraints-hardware is popular again, Data representation and visualization, Interaction and remote control. Industrial Automation- Service-oriented architecture-based device integration, SOCRADES: realizing the enterprise integrated Web of Things, IMC-AESOP: from the Web of Things to the Cloud of Things, Commercial Building Automation- Introduction, Case study: phase one-commercial building automation today, Case study: phase two- commercial building automation in the future.

Text Books:

Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnowski's, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.

References

1. Vijay Madisetti and Ars deep Bahga, "Internet of Things (A Hands-on-Approach)", 1st Edition,VPT, 2014.

2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.

SUBJECT NAME: DEEP LEARNING			
Subject code	**20MCA344**	CIE Marks	20
No of Hours/Week:	4	SEE Marks	80
Total Hours:	52	Credits	04

Module-1: **12 Hours**

Basics: Biological Neuron, Idea of computational units, McCulloch–Pitts unit and Thresholding logic, Linear Perceptron, Perceptron Learning Algorithm, Linear separability. Convergence theorem for Perceptron Learning Algorithm.

Module-2: **10 Hours**

Feed forward Networks: Multilayer Perceptron, Gradient Descent, Back propagation, Empirical Risk Minimization, regularization, auto encoders.

Deep Neural Networks: Difficulty of training deep neural networks, Greedy layer wise training.

Module-3: **10 Hours**

Better Training of Neural Networks: Newer optimization methods for neural networks (Adagrad, adadelta, rmsprop, adam, NAG), second order methods for training, Saddle point problem in neural networks, Regularization methods (dropout, drop connect, batch normalization).

Recurrent Neural Networks: Back propagation through time, Long Short Term Memory, Gated Recurrent Units, Bidirectional LSTMs, Bidirectional RNNs

Module-4: **10 Hours**

Convolutional Neural Networks: LeNet, AlexNet.

Generative models: Restrictive Boltzmann Machines (RBMs), Introduction to MCMC and Gibbs Sampling, gradient computations in RBMs, Deep Boltzmann Machines.

Module-5: **10 Hours Recent trends:** Variational Auto encoders, Generative Adversarial Networks, Multi-task Deep Learning, Multi-view Deep Learning.

Applications: Vision, NLP, Speech (just an overview of different applications in 2-3 lectures).

Textbooks

Deep Learning, Ian Good fellow and Yoshua Bengio and Aaron Courville MIT Press 2016.

References

1. Neural Networks: A Systematic Introduction, Raúl Rojas, 1996.
2. Pattern Recognition and Machine Learning, Christopher Bishop, 2007

SUBJECT NAME: ADVANCE WEB PROGRAMMING			
Subject code	**20MCA35**	CIE Marks	20
No of Hours/Week:	4	SEE Marks	80
Total Hours:	52	Credits	04

Module -1: **12 Hours**

Programming in Perl and CGI Scripting and Building Web Applications with Perl Origins and uses of Perl, Scalars and their operations, Assignment statements and simple input and output, Control statements, Fundamentals of arrays, Hashes, References, Fun, What is CGI? Developing CGI Applications actions, Pattern matching, File input and output; Examples. CGI.pm methods, Example, Creating HTML Pages Dynamically, Using CGI. pm An Example, Adding Robustness, libwww, Carp, Cookies, uploading files, tracking users with Hidden Data, Using Relational Databases

Module -2: **10 Hours**

Introduction to PHP and Building Web applications with PHP Origins and uses of PHP, Overview of PHP, General syntactic characteristics, Primitives, operations and expressions, Output, Control statements, Arrays, Functions, Pattern matching, Form handling, Files, Tracking users, cookies, sessions, Using databases, Handling XML

Module -3: **10 Hours**

Introduction to Ruby and Introduction to Rails Origins and uses of Ruby, Scalar types and their operations, Simple input and output, Control statements, Arrays, Hashes, Methods, Classes, Code blocks and iterates, Pattern matching. Overview of Rails, Document requests, Processing forms, Layouts. Rails applications with Databases.

Module – 4: **10 Hours**

Introduction to web 2.0 and Web Services What is Web 2.0?, Folksonomies and Web 2.0, Software As a Service (SaaS), Data and Web 2.0, Convergence, Iterative development, Rich

User experience, Multiple Delivery Channels, Social Networking. Web Services: SOAP, RPC Style SOAP, Document style SOAP. WSDL, REST services, JSON format, what is JSON? Array literals, Object literals, Mixing literals, JSON Syntax, JSON Encoding and Decoding, JSON versus XML

Module -5: **10 Hours**

Data Driven Documents: Data visualization tool for web apps

Introduction to D3: Building a Simple Subway Train Status Board, Graphing Mean Daily Plaza Traffic. Scales Axes, and Lines, Graphing Turnstile Traffic, Interaction and Transitions, Subway Connectivity, Scheduled Wait Time Distribution.

Text Books:

1. RobertW.Sebesta: Programming the Worldwide Web, 4th Edition, Pearson Education, 2012 Francis Shanahan: Mashups, Wiley India, 2012

2. Mike Dewar: "Getting Started with D3": O'Reilly Media, 2012

Reference Books:

1. M.Deitel, P.J.Deitel, A.B.Goldberg: Internet & World Wide Web How to program, 3rd Edition, Pearson Education/PHI, 2004.

SUBJECT NAME: PYTHON PROGRAMMING LAB			
SUBJECT CODE	**20MCA36**	CIE MARKS	10
NO OF HOURS WEEK:	04	SEE MARKS	40
TOTAL HOURS:	52	CREDITS	02

LIST OF EXPERIMENTS:

1. Write a program to sum all the elements from n1 to n2 where n1 and n2 are positive integers
2. Input an array of n numbers and find separately the sum of positive numbers and negative numbers.
3. Write a program to search an element using linear search
4. Write a program to search an element using binary search.
5. Write a program to simulate stack.
6. Using a stack evaluate an arithmetic expression.
7. Write a program to multiply two matrices.
8. Write a program to find the roots of a quadratic equation
9. Write a program to insert a number in a sorted array.
10. Write a Python Program to check whether the given string is palindrome or not using built in string.

SUBJECT NAME: ADVANCED WEB PROGRAMMINGLAB			
Subject code	**20MCA37**	CIE Marks	10
No of Hours/Week:	04	SEE Marks	40
Total Hours:	52	Credits	02

1. Develop and demonstrate a XHTML file that includes JavaScript script to generate first n Fibonacci numbers.
2. Develop and demonstrate the usage of inline and external style sheet using CSS.
3. Develop and demonstrate, using JavaScript script, a XHTML document that collects the student register number (the valid format is: A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected.

4. Develop and demonstrate, using JavaScript script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible.

5. Design an XML document to store information about a student in a college affiliated to BU. The information must include USN, Name, Name of the College, Brach, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.

6. Write a Perl program to display a digital clock which displays the current time of the server.

7. Write a Perl program to insert name and age information entered by the user into a table created using MySQL and to display the current contents of this table.

8. Write a PHP program to store current date-time in a COOKIE and display the 'Last visited on' date-time on the web page upon reopening of the same page.

9. Write a PHP program to read student data from an XML file and store into the MYSQL database. Retrieve and display.

10. Write a Perl program to keep track of the number of visitors visiting the web page and to display this count of visitors, with proper headings.

11. Write a CGI-Perl program to use a cookie to remember the day of the last login from a user and display it when run.

12. Write a Perl program to display various Server information's like Server Name, Server Software, Server protocol, CGI Revision etc.

13. Create a XHTML form with Name, Address Line 1, Address Line 2, and E-mail text fields. On submitting, store the values in MySQL table. Retrieve and display the data based on Name.

14. Write a Perl program to accept the User Name and display a greeting message randomly chosen from a list of 4 greeting message.

Note: In examination Student should execute any of the above programs.

SUBJECT NAME: MINI PROJECT LAB			
Subject code	**20MCA38**	CIE Marks	10
No of Hours/Week:	4	SEE Marks	40
Total Hours:	52	Credits	02

Develop a web application project using the languages and concepts learnt in the theory with a good look and feel effects. You can use any web technologies and frameworks and databases.

Note:

1. A team of two or three students must develop the mini project. However, during the examination, each student must demonstrate the project individually.
2. The team must submit a brief project report.
3. The report must be evaluated for 40 Marks. Demonstration and Viva for 40 Marks.

SEMESTER-IV

Sl.No	Course code	Subject Code	Subject Title	Teaching Hours/Week			Credits	Exam Hours	CIE	SSE	Total
				L	T	Lab					
1.	20MCA61	CPP6.1	Research Methodology	04	-	-	04	**03**	20	80	100
2.	20MCA62	CPP 6.2	Dissertation/ Major Project (During 4th semester -12 weeks)	-	-	-	12	**03**	100	200	300
Total Credits							**16**	**Total Marks**			**400**

SUBJECT NAME: RESEARCH METHODOLOGY			
Subject code	**20MCA61**	CIE Marks	10
No of Hours/Week:	4	SEE Marks	40
Total Hours:	52	Credits	02

Module-1 **12 Hours**

Research Methodology: Introduction, Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, and Problems Encountered by Researchers in India.

Module-2 **10 Hours**

Defining the Research Problem: Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, an Illustration. Reviewing the literature: Place of the literature review in research, Bringing clarity and focus to your research problem, Improving research methodology, Broadening knowledge base in research area, Enabling contextual findings, How to review the literature, searching the existing literature, reviewing the selected literature, Developing a theoretical framework, Developing a conceptual framework, Writing about the literature reviewed.

Module-3 **10 Hours**

Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs, Important Experimental Designs. Design of Sample Surveys: Introduction, Sample Design, Sampling and Non-sampling

Errors, Sample Survey versus Census Survey, Types of Sampling Designs.

Module-4 **10 Hours**

Data Collection: 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. Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports.

Module-5 **10 Hours**

Intellectual Property (IP) Acts: Introduction to IP: Introduction to Intellectual Property (IP), different types of IPs and its importance in the present scenario, Patent Acts: Indian patent acts 1970.Design Act: Industrial Design act 2000. Copy right acts: Copyright Act 1957. Trade Mark Act, 1999

Text books

1. Research Methodology: Methods and Techniques, C.R. Kothari, Gaurav GargNew Age International 4th Edition, 2018.
2. Research Methodology a step-by-step guide for beginners. (For the topic Reviewing the literature under module 2) Ranjit Kumar SAGE Publications Ltd 3rd Edition, 2011 Study Material.
3. Intellectual property, Debirag E. Bouchoux, Cengage learning, 2013.

References

1. Research Methods: the concise knowledge baseTrochim, Atomic Dog Publishing, 2005.
2. Conducting Research Literature Reviews: From the Internet to Paper Fink Age Publications, 2009.

SUBJECT NAME: DISSERTATION/ MAJOR PROJECT			
SUBJECT CODE	**20MCA62**	CIE MARKS	100
NO OF HOURS/WEEK:	04	SEE MARKS	200
TOTAL HOURS:	**12 WEEKS DURING 4TH SEMESTER**	CREDITS	12

The candidate should carry out the project in any industry or R&D institution or educational institution under a guide/co-guide. The candidate has to present the work carried out before the examiners during the University session ending examination. The literature study may be clearly written which may be summary of existing project and highlight of what are the functionalities that are proposed to this project. Student shall indicate the different research papers, documents refereed as a part of the literature study. This is an individual project for a duration of minimum of 4 months or duration of the semester.

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