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Website: www.diet.edu.in, 9963993229 E-mail: principal@diet.edu.in

COURSE STRUCTURE AND SYLLABUS

For PG –DR24

MASTER OF COMPUTER APPLICATIONS (MCA)

(For Two-Year PG Programme)

(Applicable for batches admitted from2024-2025)

DADI INSTITUTE OF ENGINEERING & TECHNOLOGY

ANAKAPALLE-531002, Andhra Pradesh, India.

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COURSE STRUCTURE

I Semester

S. No	Course Code	Course Name	Category	L	T	P	Credits
1	DR24MCA1101	Business Communication	BS&H	2	0	0	2
2	DR24MCA1102	Mathematical and statistical Foundations	BS&H	3	0	0	3
3	DR24MCA1103	Computer Organization & Operating Systems	PC	3	1	0	4
4	DR24MCA1104	Data Structures	PC	3	0	0	3
5	DR24MCA1105	Object Oriented Programming With JAVA	PC	3	0	0	3
6	DR24MCA1106	Operating Systems and Linux Lab	LB	0	0	3	1.5
7	DR24MCA1107	Data Structures Lab	LB	0	0	3	1.5
8	DR24MCA1108	JAVA Programming Lab	LB	0	0	3	1.5
9	DR24MCA1109	Socially Relevant Project using Design Thinking	MC	0	0	1	0.5
			Total	14	1	10	20

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II Semester

S. No	Course Code	Course Name	Category	L	T	P	Credits
1	DR24MCA1201	Database Management Systems	PC	3	0	0	3
2	DR24MCA1202	Computer Networks	PC	3	0	0	3
3	DR24MCA1203	Software Engineering and Design Patterns	PC	3	0	0	3
4	DR24MCA1204	Data Warehousing and Mining	PC	3	0	0	3
5	DR24MCA1205A DR24MCA1205B DR24MCA1205C DR24MCA1205D DR24MCA1205E	**Elective-I** • No SQL Databases • Design and Analysis of Algorithms • Mobile Application Development • Artificial Intelligence • Accounting for Managers	PE	3	0	0	3
6	DR24MCA1206	DBMS Lab	LB	0	0	3	1.5
7	DR24MCA1207	Computer Networks Lab	LB	0	0	3	1.5
8	DR24MCA1208	Software Engineering and Design Patterns Lab	LB	0	0	3	1.5
9	DR24MCA1209	Employability Skills	MC	0	0	1	0.5
10	DR24MCA1210	Bridge Course (Python Programming To be taken through MOOCs)	MC	0	0	0	0
			Total	15	0	10	20

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III Semester

S. No	Course Code	Course Name	Category	L	T	P	Credits
1	DR24MCA2101	Machine Learning with Python	PC	3	0	0	3
2	DR24MCA2102	Internet of Things	PC	3	0	0	3
3	DR24MCA2103	Web Technologies	PC	3	0	0	3
4	DR24MCA2104	Cryptography and Network Security	PC	3	0	0	3
5	DR24MCA2105A DR24MCA2105B DR24MCA2105C DR24MCA2105D DR24MCA2105E	**Elective-II** • Soft Computing • Software Project Management • Cloud Computing • Optimization Techniques • Cyber Security	PE	3	0	0	3
6	DR24MCA2106	Machine Learning with Python Lab	LB	0	0	3	1.5
7	DR24MCA2107	IoT Lab	LB	0	0	3	1.5
8	DR24MCA2108	Web Technologies Lab	LB	0	0	4	2
9	DR24MCA2109	Internship/Industry Oriented Mini Project/ Skill Development Course (Minimum6-weeks)	PR	0	0	0	2
			Total	15	0	10	22

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IV Semester

S. No	Course Code	Course Name	Category	L	T	P	Credits
1	DR24MCA2201A DR24MCA2201B DR24MCA2201C DR24MCA2201D DR24MCA2201E	Elective-III* • Digital Marketing • Human Resource Management • Deep Learning • Ad-hoc and Sensor Networks • MOOCs-1(NPTEL/SWAYAM) - Full Stack Technologies - Any recommended course	PE	3	0	0	3
2	DR24MCA2202A DR24MCA2202B DR24MCA2202C DR24MCA2202D DR24MCA2202E	Elective-IV* • Network Programming • Block Chain technologies • Software Testing Methodologies • Big Data Analytics • MOOCs-2(NPTEL/SWAYAM) -Data Science -Any recommended course	PE	3	0	0	3
3	DR24MCA2203	Project Work/Dissertation	PR	0	0	0	12
			Total	6	0	0	18

*Students going for Industrial Project / Thesis will complete these courses through MOOCs (even in earlier semester)

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I Semester		L	T	P	C
		2	0	0	2
	BUSINESS COMMUNICATION(MCA1101)				

Course Objectives:
To acquaint the students with fundamentals of communication, help them honing oral, written and non- verbal communication skills and to transform them as effective communicators.

UNIT I:
Purpose and process of communication: Objectives of Communication-Process of Communication- Types of communication; noise, listening skills, Types of listening, essentials of good listening and tips.

UNIT II:
Managing Organizational Communication: Formal and Informal Communication- Interpersonal and Intrapersonal communication- Role of Emotion in Interpersonal Communication- Barriers to Interpersonal Communication – Exchange Theory-Gateways for Effective Interpersonal Communication.

UNIT III:
Non-verbal communication and Body Language: Kinesics, Proxemics, Paralanguage, Hap tics, handshakes, appropriate body language and mannerisms for interviews: business etiquettes-across different cultures.

UNIT IV:
Written communication: mechanics of writing, report writing- business correspondence-business letter format- Meetings and managing meetings- Resume Writing-Formats and Skills.

UNIT V:
Presentation skills: prerequisites of effective presentation, format of presentation; Assertiveness – strategies of assertive behavior; Communication skills for group discussion and interviews, Interview Techniques.

Note: Relevant case shave to bed is cussed in each unit and in examination case is compulsory from any unit.

Text Books:
1. Mallika Nawal: ―Business Communication, C engage Learning, New Delhi, 2012.
2. Edwin A. Gerloff, Jerry C. Wofford, Robert Cummins Organizational Communication: The key stone to managerial effectiveness.
3. Meenakshi Rama: ―Business Communication‖, Oxford University Press, New Delhi.

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4. C.S.G. Krishnamacharyulu and Dr. Lalitha Ramakrishnan, Business Communication, Himalaya Publishing House, Mumbai

Reference Books:
1. Paul Turner: ― Organisational Communication‖, JAICO Publishing House, New Delhi.
2. Sathya Swaroop Debasish, Bhagaban Das‖―Business Communication‖, PHI Private Limited, New Delhi, 2009.
3. R.K. Madhukar: ―Business Communication‖, Vikas Publishing House, NewDelhi,2012.
4. Kelly M Quintanilla, Shawn T. Wahl: ―Business and Professional Communication‖, SAGE, New Delhi,2012.
5. Sangita Mehta, Neety Kaushish: ―Business Communication, University Science Press, New Delhi, 2010.
6. Anjali Ghanekar: ―Business Communication Skills‖, Everest Publishing House, New Delhi, 2011.

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I Semester		L	T	P	C
		3	0	0	3
MATHEMATICAL AND STATISTICAL FOUNDATIONS(MCA1102)					

Course Objectives:

This course is aimed at enabling the students to
- Understand the mathematical fundamentals that is prerequisites for variety of courses like Data mining, Network protocols, analysis of Web traffic, Computer security, Software engineering, Computer architecture, operating systems, distributed systems bioinformatics, Machine learning.
- Develop the understanding of the mathematical and logical basis to many modern techniques in computer science technology like machine learning, programming language design, and concurrency.
- Study various sampling and classification problems.

Course Outcomes:
After the completion of the course, student will be able to
- Apply the basic rules and theorems of probability theory such as Baye's Theorem, determine probabilities that help to solve engineering problems and to determine the expectation and variance of a random variable from its distribution.
- Able to perform and analyze of sampling, means, proportions, variances and estimates the maximum likelihood based on population parameters.
- Learn how to formulate and test hypotheses about sample means, variances and proportions and to draw conclusions based on the results of statistical tests.
- Design various ciphers using number theory.
- Apply graph theory for real time problems like network routing problem.

UNIT I:
Basic Probability and Random Variables: Random Experiments, Sample Spaces Events, the Concept of Probability the Axioms of Probability, Some Important Theorems on Probability Assignment of Probabilities, Conditional Probability Theorems on Conditional Probability, Independent Events, Baye's Theorem or Rule. Random Variables, Discrete Probability Distributions, Distribution Functions for Random Variables, Distribution Functions for Discrete Random Variables, Continuous Random Variables

UNIT II:
Sampling and Estimation Theory: Population and Sample, Statistical Inference Sampling with and Without Replacement Random Samples, Random Numbers Population Parameters Sample Statistics Sampling Distributions, Frequency Distributions, Relative Frequency Distributions, Computation of Mean, Variance, and Moments for Grouped Data. Unbiased

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Estimates and Efficient Estimates Point Estimates and Interval Estimates. Reliability Confidence Interval Estimates of Population Parameters, Maximum Likelihood Estimates

UNIT III:
Tests of Hypothesis and Significance: Statistical Decisions Statistical Hypotheses. Null Hypotheses Tests of Hypotheses and Significance Type I and Type II Errors Level of Significance Tests Involving the Normal Distribution One-Tailed and Two-Tailed Tests P Value Special Tests of Significance for Large Samples Special Tests of Significance for Small Samples Relationship between Estimation Theory and Hypothesis Testing Operating Characteristic Curves. Power of aTest Quality Control Charts Fitting Theoretical Distributions to Sample Frequency Distributions, The Chi-Square Test for Goodness of Fit Contingency Tables Yates' Correction for Continuity Coefficient of Contingency.

UNIT IV:
Algebraic Structures and Number Theory: Algebraic Systems, Examples, General Properties, Semi Groups and Monoids, Homomorphism of Semi Groups and Monoids, Group, Subgroup, Abelian Group, Homomorphism, Isomorphism. Properties of Integers, Division Theorem, The Greatest Common Divisor, Euclidean Algorithm, Least Common Multiple, Testing for Prime Numbers, The Fundamental Theorem of Arithmetic, Modular Arithmetic (Fermat 's Theorem and Euler's Theorem)

UNIT V:
Graph Theory: Basic Concepts of Graphs, Sub graphs, Matrix Representation of Graphs: Adjacency Matrices, Incidence Matrices, Isomorphic Graphs, Paths and Circuits, Eulerian and Hamiltonian Graphs, Multi graphs, Planar Graphs, Euler 's Formula, Graph coloring and Covering, Chromatic Number, Spanning Trees, Algorithms for Spanning Trees (Problems Only and Theorems without Proofs).

Text Books:
1. Foundation Mathematics for Computer Science,1stEdition,JohnVince,Springer,2015
2. Probability & Statistics, 3rd Edition, Murray R. Spiegel, John J. Schiller and R. Alu Srinivasan, Schaum's Outline Series, Tata McGraw-Hill Publishers, 2018
3. Probability and Statistics with Reliability,2ndEdition,K.Trivedi,Wiley,2011
4. Discrete Mathematics and its Applications with Combinatorics and Graph Theory,7th Edition, H. Rosen, Tata McGraw Hill, 2003.

Reference Books:
1. Probability and Computing: Randomized Algorithms and Probabilistic Analysis,1st Edition, M. Mitzenmacher and E. Upfal,2005
2. Applied Combinatorics, 6thEdition, Alan Tucker, Wiley,2012.

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I Semester		L	T	P	C
		3	1	0	4
COMPUTER ORGANIZATION & OPERATING SYSTEMS (MCA1103)					

Course Objectives:
The objectives of this course are to
Conceptualize the basics of organizational and architectural issues of a digital computer.
• Learn the function of each element of a memory hierarchy.
• Study various data transfer techniques in digital computer.

Course Outcomes:
(COs): At the end of the course, student will be able to
• Understandthebasicorganizationofcomputeranddifferentinstructionformatsandaddressing modes
• Analyze the concept of pipelining, segment registers and pin diagram of CPU.
• Understand and analyze various issues related to memory hierarchy
• Evaluate various modes of data transfer between CPU and I/O devices
• Examine various inter connection structures of multi processors

UNIT I:
Introduction: Basic Structure of Computers: Computer Types, Functional units, Basic Operational concepts, Bus structures, Software, Performance, multiprocessor and multi computers, Historical perspective.
Machine Instructions and Programs: Numbers, Arithmetic Operations, and c Characters, Memory locations and addresses, Memory operations, Instructions and Instruction sequencing, Addressing Modes, Assembly Languages, stacks and Queues Basic Input/output Operations, role of Stacks and Queues Additional Instructions

UNIT II:
Processing Unit: Fundamental Concepts: Register Transfers, Performing an Arithmetic or Logic Operation, fetching a Word from Memory, Execution of Complete Instruction, Hardwired Control, Micro Programmed Control: Microinstructions, Micro program Sequencing, Wide Branch Addressing Microinstructions with next –Address Field

UNIT III:
Introduction to Operating System Concept: Types of Operating Systems, Operating Systems Concepts, Operating System Operations. Operating Systems Structures- Operating System Services, User Operating-System Interface, Introduction to System calls, Types of System Calls.
Process Management: Process concept, Process State Diagram, Process control block, Process Scheduling, Inter process Communication, Threads- Threading Issues, Scheduling- Basic Concepts, Scheduling Criteria, Scheduling Algorithms.

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UNIT IV:
Process Synchronization: The Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors, Principles of deadlock: System Model, Deadlock characterization, Deadlock handling, Deadlock Prevention, Detection and Avoidance, Recovery Starvation, Critical Regions form Deadlock

UNITV:
Memory Management: Swapping, Contiguous Memory Allocation, Paging, structure of the Page Table, Segmentation Virtual Memory Management- Demand Paging, Page-Replacement Algorithms, Thrashing. File-System Interface: File Concept, Access Methods, Directory structure, File-System mounting, Files Sharing, Protection. File-System implementation- File-System Structure, Allocation Methods, Free-Space Management, Disk Structure, Disk Scheduling

Text Books:
1. Computer Organization, Carl Hamacher, Zvonks Vranesic, SafeaZaky, 5thed, Mc GrawHill.
2. Operating System concepts, 7[th]ed, Abraham Siliberschatz, Galvin, John Wiley & Sons, Inc
3. Advanced Programming in the Unix environment by W. Richard Stevens

Reference Books:
a. Computer Architecture and Organization, John P.Hayes, 3[rd]Edition, McGraw Hill
b. Computer Organization and Architecture, William Stallings 6thEdition,Pearson/PHI
c. Operating Systems,6[th]Edition,WilliamStallings,PHI/Pearson
d. Unix and Shell Programming by B.M.Harwani, OXFORD University Press

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I Semester		L	T	P	C
		3	0	0	3
	DATA STRUCTURES(MCA1104)				

Course Objectives:
The objective of this course is to explore basic data structures such as stacks and queues, introduce a variety of data structures such as hash tables, search trees, tries, heaps, graphs, sorting and pattern matching algorithms

Course Outcomes:
At the end of the course, student will be able to
- Implement basic programs by using C concepts.
- Select the data structures that efficiently model the information in a problem
- Assess efficiency trade-offs among different data structure implementations or combinations
- Implement and know the application of algorithms for sorting and pattern matching.

UNIT I:
Introduction to C: Constants and variables, Operators and Expressions, Managing Input and Output operators, Decision making-branching and looping, Arrays,

UNIT II:
Functions, Structures and Unions, Pointers, File handling in C.

UNIT III:
Data structure: Definition, types of data structures Recursion Definition, Design Methodology and Implementation of recursive algorithms, Linear and binary recursion. Preliminaries of algorithms, analysis and complexity. Linear list– singly linked list, Double linked list and circular linked list - implementation, insertion, deletion and searching operati6ons on linear list.

UNIT IV:
Stacks-Operations, array and linked representations of stacks, stack applications, Queues-operations, array and linked representations. Hash Table Representation: hash functions, collision resolution- separate chaining, open addressing-linear probing, quadratic probing, double hashing and rehashing, extendible hashing.

UNIT V:
Sorting Techniques: Insertion sort, selection sort, exchange-bubble sort, quick sort and merge sort Algorithms. Trees: Binary Trees, terminology, representation and traversals- pre, post& in order traversals. Search Trees: Binary Search Trees, Definition, Implementation, Operations-Searching, Insertion and Deletion

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Text Books:
1. Let Us C: Authentic Guide to C Programming Language, 17thed., Yashavant Kanetkar, BPB Publications.
2. DataStructuresUsingC.2ndEdition,ReemaThareja,Oxford
3. DataStructuresandAlgorithmAnalysisinC,2nded,MarkAllenWeiss

Reference Books:
1. Data Structures: A Pseudo code Approach with C, 2ndEdition, R. F.Gilberg and B.A. Forouzan, Cengage Learning.
2. ProgramminginANSIC,5thed,E. Balaguru swamy,   TMH.

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I Semester		L	T	P	C
		3	0	0	3
OBJECT ORIENTED PROGRAMMING WITH JAVA (MCA1105)					

Course Objectives:
- To understand the basic concepts of object oriented programming concepts.
- To introduce the principles of inheritance and polymorphism and demonstrate how they are related   to the design of abstract classes
- To understand the implementation of packages and interfaces
- To introduce the concept of multithreading and exception handling
- To learn and understand the design of Graphical
- User Interface using applets and swing controls

Course Outcomes:
At the end of the course, student will be able to
- Describe the uses OOP concepts
- Apply OOP concepts to solve real world problems
- Distinguish the concept of packages and interfaces
- Demonstrate the exception handing, multithread applications with synchronization
- Design the GUI based applications using AWT and Swings
- Discuss the Collection Framework

UNIT I:
Basics of Object Oriented Programming (OOP):Need for OO paradigm , A way of viewing world- Agents, responsibility, messages, methods, classes and instances, class hierarchies (Inheritance), method binding, overriding and exceptions, summary of OOP concepts, coping with complexity, abstraction mechanisms. Java Basics: Data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and costing, simple java program, classes and objects- concepts of classes, objects, constructors methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, string handling.

UNIT II:
Inheritance: Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance- specialization, specification, construction, extension, limitation, combination, benefits of inheritance costs of inheritance. Member access rules, super uses, using final with inheritance, polymorphism, abstract classes. Packages and Interfaces: Defining, Creating and Accessing a package, Understanding CLASSPATH, Importing packages, differences between classes and interfaces, defining an interface, Implementing interface, applying interfaces variables in interface and extending interfaces.

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UNIT III:
Exception handling and Multithreading: Concepts of exception handling, benefits of exception handling, Termination or presumptive models, exception hierarchy, usage of try, catch, throws and finally, built in exceptions, creating own exception subclasses. Differences between multithreading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

UNIT IV:
Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes, inner classes. The AWT class hierarchy, user- interface components-labels, button, canvas, scrollbars, text components, check box, check box groups, choices, list panes- scroll pane, dialogs, menu bar, graphics, layout manager- layout manager types- boarder, grid, flow, card and grid bag.

UNITV:
Applets:ConceptsofApplets,differencesbetweenappletsandapplications,lifecycleofanapplet, types of applets, creating applets, passing parameters to applets, Swings: Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JApplet, JFrame and JComponent, Icons and Labels, text fields, buttons-The JButton class, Check boxes, Radio Buttons, Combo boxes, Tabbed panes, Scroll panes, Trees and Tables.

Text Books:
1. Java-Thecompletereference,7/e, Herbert Schildt, TMH
2. JAVA: How to program,8/e,Dietal, Dietal, PHI
3. Introduction of programming with JAVA, S.Dean, TMH
4. IntroductiontoJavaprogramming,6/e, Y .Daniel Liang, Pearson

Reference Books:
1) CoreJava2, Vol1(Vol2) Fundamentals (Advanced), 7/e, Cay. S.Horstmann, GaryCornell, Pearson
2) BigJava2,3/e, Cay. S.Horstmann,Wiley
3) Object Oriented Programming through Java, P.RadhaKrishna, University Press
4) JAVA & Object Orientation an Introduction, 2/e,John Hunt,Springer
5) Introduction to JAVA Programming, 7/e, Y. Daniel Liang, Pearson.,TMH

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I Semester		L	T	P	C
		0	0	3	1.5
OPERATING SYSTEMS AND LINUX LAB (MCA1106)					

Course Objectives:
This Course will enable students to implement CPU scheduling algorithms, Disk scheduling algorithms, Execute different types of Linux commands and Write shell scripts

Course Outcomes:
At the end of the course, student will be able to
- Implement various CPU scheduling algorithms and compare results
- Implement various disk scheduling algorithms and compare results
- Implement page replace algorithms
- Implement various memory management techniques.
- Execute basic Linux commands

List of Experiments:

UNIX Lab-Introduction to UNIX

1. Study of Unix/Linux general purpose utility commands
2. Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.
3. Study of UNIX/LINUX File System(tree structure).
4. C program to emulate the UNIX l s –l command
5. C program that illustrates how to execute two commands concurrently with a command pipe. Ex:-l s –l | sort
6. Multi programming- Memory management-Implementation of fork(),wait(),exec() and exit(), System calls

Operating Systems Lab

1. Simulate the Following CPU Scheduling Algorithms A) FCFS   B)SJF   C)Priority D)Round   Robin
2. Multiprogramming-Memory Management- Implementation of fork(), wait(),exec() and exit()
3. Simulate The Following
a. Multi programming with A Fixed Number Of Tasks (MFT)
b. Multi programming with A Variable Number Of Tasks (MVT)
4. Write a program to implement first fit, best fit and worst fit algorithm for memory management.
5. Simulate Bankers Algorithm for Dead Lock Avoidance

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6.   Simulate Bankers Algorithm for Dead Lock Prevention.
7.   Simulate The Following Page Replacement Algorithms. a) FIFO   b)LRU c) LFU
8.   Simulate the Following File Allocation Strategies
 a) Sequenced   b)Indexed   c)Linked

Linux Lab

1.   Write a Shell program to check whether given number is prime or not.
2.   Write a shell script which will display Fibonacci series up to the given range.
3.   Write a shell   script to check whether the given number is Armstrong or   not.
4.   Write a shell script to the calculate the value of
5.   Write a shell   script to accept student number, name, marks in5subjects.
6.   Find total, average and grade using the following rules: Avg >=80 then grade A Avg <80&&Avg>=70 then grade B Avg<70&&Avg>=60 then gradeC Avg<60&&Avg>=50 then grade D Avg<50&&Avg>=40 then grade E
7.   Write a shell script to find minimum and maximum elements in the given list of elements.
8.   Write a shell program to check whether the given string is palindrome or not.
9.   Write a new program to print sum, avg of students marks list
10.   Write a   shell script to compute No.of character sand word sin each line of given file
11.   Write a shell script to check whether the given input is a number or a string

Note: Fundamentals of UNIX and Linux to be taught in the lab.

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I Semester		L	T	P	C
		0	0	3	1.5
DATA STRUCTURES LAB(MCA1107)					

Course Objectives:
This Course will enable students to
- Design and implement various data structures.
- Implement operations like searching, insertion, and deletion, traversing mechanism
- Develop applications using data structure algorithms.

Course Outcomes:
At the end of the course, student will be able to
- Implement various basic data structures and its operations.
- Apply sorting and searching algorithms to given numbers
- Implement various tree operations.
- Implement various graphs algorithms.
- Develop applications using various data structures.

Experiment 1:
a)   Write a program in C to display then terms of even natural number and their sum.
b)   Write a program in C to display then terms of harmonic series and their   sum.1+1/2+1/3+1/4
+1/5...1/n terms.
c)   Write a C program to check whether a given number is an Armstrong number or not.
d)   Write a   C program to calculate the factorial of a given number.

Experiment2:
a)   Write a program in C for multiplication of two square Matrices.
b)   Write a program in C to   find transpose of a given matrix.

Experiment3:
a)   Write a program in C to check whether a number is a prime number or not using the function.
b)   Write recursive program which computes the nth Fibonacci number, for appropriate values of n.
c)   Write a program in C to add numbers using call by reference.

Experiment4:
a)   Write a program in C to append multiple lines at the end of a text file.
b)   Write a program in C to copy a file in another name.

Experiment5:

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Write recursive program for the following

a) Write recursive and non-recursive C program for calculation of Factorial of an integer.

b) Write recursive and non-recursive C program for calculation of GCD (n ,m)

c) Write recursive and non-recursive C program for Towers of Hanoi: N disks are to be transferred from peg S to peg D with Peg I as the intermediate peg.

Experiment6:

a) Write C program that use both recursive and non recursive functions to perform Linear search for a Key value in a given list.

b) Write C program that use both recursive and non recursive functions to perform Binary search for a Key value in a given list.

Experiment7:

a) Write C program that implement stack (its operations) using arrays.

b) Write C program that implement stack (its operations)using Linked list.

Experiment8:

a) Write a C program that uses Stack operations to convert in fix expression into post fix expression.

a) Write C program that implement Queue (its operations)using arrays.

b) Write C program that implement Queue (its operations)using linked lists.

Experiment9:

Write a C program that uses functions to create a singly linked list and perform various operations on it.

Experiment 10:

Write a   C program to store a polynomial expression in memory using linked list and perform polynomial   addition.

Experiment 11:

a) Write a recursive C program for traversing a binary tree in preorder, in order and post order.

b) Write a non recursive C program for traversing a binary tree in pre order, in order and post order.

Experiment 12:

a) Write a C program to implement Prims' algorithm.

b) Write a C program to implement Kruskal's algorithm.

Experiment 13:

Implementation of Hash table using double hashing a scollisionre solution function.

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Experiment 14:

Implementation of Binary Search trees-Insertion and deletion.

Experiment 15:

a)   Write C program that implement Bubble sort ,to sort a given list of integers in ascending order.

b)   Write C program that implement Quick   sort, to sort a given list of integers in ascending order.

c)   Write C program that implement merge sort, to sort a given list of integers in ascending order.

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I Semester		L	T	P	C
		0	0	3	1.5
JAVA PROGRAMMING LAB(MCA1108)					

Course Objectives:
- To understand how to design, implement, test, debug, and document programs that use basic data types and computation, simple I/O, conditional and control structures, string handling and functions.
- TounderstandtheimportanceofClasses&objectsalongwithconstructors,Arraysand   Vectors.
- Discuss the principles of inheritance, interface and packages and demonstrate though problem analysis assignments how they relate to the design of methods, abstract classes and interfaces and packages.
- TounderstandimportanceofMulti-threading&differentexceptionhandlingmechanisms.
- To learn experience of designing, implementing, testing, and debugging graphical user interfaces in Java using applet and AWT that respond to different user events.
- TounderstandJavaSwingsfordesigningGUIapplicationsbasedonMVCarchitecture

Course Outcomes:
At the end of the course, student will be able to
- Apply OOP concepts to solve real world problems
- Implement different forms of inheritance
- Create packages and tore use them.
- Implement multi threaded programs using synchronization concepts
- Create user defined exceptions
- Design GUI applications using AWT and SWINGS.

List of Experiments:

1. The Fibonacci sequence is defined by the following rule. The first 2 values in the sequence are 1,1. Every subsequent value is the sum ofthe2 values preceding it. Write a Java Program that uses both recursive and non recursive functions to print the nth value of the Fibonacci sequence.
2. Write a Java Program that prompts the user for an integer and then prints out all the prime numbers up to that Integer.
3. Write a Java Program that checks whether a given string is a palindrome or not .Ex. MALAYALAM is a palindrome.
4. Write a Java Program for sorting a   given list of names in ascending order.
5. Write a Java Program that illustrates how runtime polymorphism is achieved.
6. Write a Java Program to create and demonstrate packages.
7. Write a Java Program, using String Tokenizer class, which reads a line of integers and then displays each integer and the sum of all integers.

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8. Write a Java Program that reads on file name form the user then displays information about whether the file exists, whether the file is readable /writable, the type of file and the length of the file in bytes and display the content of the using File Input Stream class.
9. Write a Java Program that displays the number of characters, lines and words in a text/text file.
10. Write an Applet that displays the content to a file.
11. Write a Java Program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the+-*?% operations. Add a text field to display the result.
12. Write a Java Program for handling mouse events.
13. Write a Java Program demonstrating the life   cycle of a thread.
14. Write a Java Program that lets users create Pie charts. Design your own user interface (with Swings & AWT).
15. Write a Java Program to implement a Queue, using user defined Exception Handling (also make use of throw, throws).

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I Semester		L	T	P	C
		0	0	1	0.5
SOCIALLY RELEVANT PROJECT USING DESIGN THINKING(MCA1109)					

Course Objectives:

- Build mind sets & foundations essential for designers
- Learn about the Human-Centered Design methodology and understand the real-world applications
- Use Design Thinking for problem solving methodology for investigating ill defined problems.
- Under go several design challenges and work towards the final design challenge

Apply Design Thinking on the following Streams to

- Project Stream1:Electronics,Robotics,IOTandSensors
- Project Stream2:Computer Science and IT Applications
- Project Stream3: Mechanical and Electrical tools
- ProjectStream4: Eco-friendly solutions for waste management, infrastructure, safety, alternative energy sources, Agriculture, Environmental science and other fields of engineering.

How to Pursue The Project Work?

- The first part will be learning-based-masking students to embrace the methodology by exploring all the phases of design thinking through the wallet/ bag challenge and podcasts.
- The second part will be more discussion-based and will focus on building some necessary skills as designers and learning about complementary material for human- centered design.
- The class will then divide into teams and they will be working with one another for about 2 – 3 weeks. These teams and design challenges will be the basis for the final project and final presentation to be presented.
- TheteamsstartwithDesignChallengeandgothroughallthephasesmoreindepthfromcoming up with the right question to empathizing to ideating to prototyping and to testing.
- Outside of class, students will also be gathering the requirements, identifying the challenges, usability, importance etc
- At the end, Students are required to submit the final reports, and will be evaluated by the faculty.

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Tasks to be done:

Task1: Everyone is a Designer
- Understand class objectives & harness the designer mind set Task 2: The Wallet/Bag Challenge and Podcast
- Gain a quick introduction to the design thinking methodology
- Go through hall stages of the methodology Through a simple design challenge

- **Task2:**
- Podcast: Observe, Listen and Engage with the surrounding environment and identify a design challenge.

- **Task3: Teams & Problems**
- Start Design Challenge and learn about teams & problems through this
- Foster team collaboration, find inspiration from the environment and learn how to identify problems

- **Task4: Empathizing**
- Continue Design Challenge and learn empathy
- Learn technique son how to empathize with users
- Go to the field and interview people in their environments
- Submit Activity Card

- **Task 5: Ideating**
- Continue Design Challenge and learn how to brain storm effectively
- Encourage exploration and foster spaces for brain storming
- Submit Activity Card

- **Task 6: Proto typing**
- Continue Design Challenge and learn how to create effective prototypes
- Build tangible models and use the miscommunication tools
- Start giving constructive feedback to classmates and teammates
- Submit Activity Card

- **Task 7: Testing**
- Finish Design Challenge and iterate prototypes and ideas through user feedback
- Evolve ideas and prototypes through user feedback and constructive criticism
- Get peer feedback on individual land group performance
- Submit Activity Card

- **Task 8:**

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- Final Report Submission and Presentation

- **Note:** The colleges may arrange for Guest Speakers from Various Design Fields: Graphic Design, Industrial Design, Architecture, Product Design, Organizational Design, etc to enrich the students with Design Thinking Concept.

- **References:**
- TomKelly,TheArtofInnovation:LessonsinCreativityFromIDEO,America'sLeading Design Firm (Profile Books, 2002)
- Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation (Harper Business, 2009)
- JeanneLiedtka,RandySalzman,andDaisyAzer,DesignThinkingfortheGreaterGood: Innovation in the Social Sector (Columbia Business School Publishing, 2017)

- **Other Useful Design Thinking Frameworks and Methodologies:**

- Human-CenteredDesignToolkit(IDEO);https://www.ideo.com/post/design-kit
- Design Thinking Boot Camp Bootleg (Stanford D-School); https://dschool.stanford.edu/resources/the-bootcamp-bootleg
- Collective Action Toolkit (frog design); https://www.frogdesign.com/wpcontent/uploads/2016/03/CAT_2.0_English.pdf
- DesignThinkingforEducators(IDEO);https://designthinkingforeducators.com/

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II Semester		L	T	P	C
		3	0	0	3
DATA BASE MANAGEMENT SYSTEMS(MCA2101)					

Course Objectives:

This Course will enable students to
- Explain the concept of databases, database management systems, database structures and how they work.
- Make use of Entity-Relationship Modeling and Relational Modeling for creating simple databases from the real world scenarios.
- Write relational algebra and structured query language (SQL)statements.
- Normalize a database using Normalization Rules.
- Discuss the issues associated with Transaction Management and Recovery, Tree Structured and Hash- Based Indexing

Course Outcomes:

At the end of the course the student will be able to
- Illustrate the concept of databases, database management systems, database languages, database structures and their work
- Apply ER modeling and Relational modeling for designing simple databases.
- Summarize the concepts related to relational model and SQL and Write database queries using relational algebra and structured query language.
- Design and develop databases from the real world by applying the concepts of Normalization.
- Outline the issues associated with Transaction Management and Recovery, Tree Structured and Hash-Based Indexing

UNIT I:

Introduction to Databases: Introduction, An Example, Characteristics of the Database Approach, Actor son Scene, Workers behind the scene, Advantages of Using the DBMS Approach ,A Brief History of Database Applications, When Not to Use a DBMS [Text book-3]
Overview of Database Languages and Architectures: Data Models, Schemas and Instances, Three- Schema Architecture and Data Independence, Database Languages and Interfaces, The Database System Environment, Centralized and Client/Server Architecture for DBMSs, Classification of Database Management Systems [Text book-3]

UNIT II:

Introduction to Database Design: Database Design and ER Diagrams, Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model, Conceptual Design for Large Enterprises

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Relational Model: Introduction to the Relational Model, Integrity Constraints over Relations, Enforcing Integrity Constraints, Querying Relational Data, Logical Database Design: ER to Relational, Introduction to Views, Destroying/Altering Tables and Views

UNIT III:
Relational Algebra: Selection and Projection, Set Operations, Renaming, Joins, Division, More Examples of Algebra Queries.
SQL: Queries, Constraints, Triggers: The Form of a Basic SQL Query, UNION, INTERSECT and EXCEPT, Nested Queries, Aggregate Operators, Null Values, Complex Integrity Constraints in SQL, Triggers and Active Databases, Designing Active Databases.

UNIT IV:
Introduction to Normalization Using Functional and Multi valued Dependencies: Informal Design Guidelines for Relation Schema, Functional Dependencies, Normal Forms Based on Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form, Multi valued Dependency and Fourth Normal Form, Join Dependencies and Fifth Normal Form.

UNIT V:
Transaction Management and Concurrency Control: Transaction Concept, A Simple Transaction Model, Storage Structure, ACID Properties, Serializability, Transaction Isolation Levels, Concurrency Control, Lock-Based Protocols, Validation-Based Protocols [Text Book-2]
Note: For Practical Examples Please Go Through Reference1

Text Books:
1)   Database Management Systems, 3/e, Raghurama Krishnan,Johannes Gehrke ,McGraw-Hill
2)   Database System Concepts, 6/e, Abraham Silberschatz, Henry F. Korth,S.Sudarshan,McGraw-   Hill6
3)   Database Systems,6/e Ra6mez Elmasri,ShamkantB. Navathe, Pearson

Reference Books:
1)   Database Systems,9/e, CarlosCoronel, StevenMorris, PeterRob,Cengage
2)   Introduction to Database Systems,8/e, CJDate,Pearson

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II Semester		L	T	P	C
		3	0	0	3
	COMPUTER NETWORKS(MCA2102)				

Course Objectives:
At the end of the course, the students will be able to:
- Understands the fundamental concepts of computer networking and OSI Reference model.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Learn and understand the advanced networking concepts, preparing the student for entry advanced courses in computer networking.
- Develop and gain expertise in some specific are as of networking such as the design and maintenance of individual networks.

Course Outcomes:
At the end of the course, student will be able to
- Explain the network architecture, TCP/IP and OSI reference models
- Identify and understand various technique sand modes of transmission
- Demonstrate the data link protocols, multi-channel access protocols and IEEE802 standards for LAN
- Describer outing and congestion in network layer with routing algorithms and classify IPV4 addressing scheme
- Discuss the elements and protocols of transport layer
- Develop network security and define various protocols such as FTP, HTTP, Telnet, DNS

UNIT I:
Introduction: Network Topologies WAN, LAN, MAN. Reference models- The OSI Reference Model- the TCP/IP Reference Model - A Comparison of the OSI and TCP/IP Reference Models. Physical Layer –Introduction to physical layer-Data and Signals, Periodic analog signals, digital signals, transmission impairment, ,Data rate limits, performance -Introduction to Guided Media-Twisted-pair cable, Coaxial cable and Fiber optic cable and Unguided media: Wireless-Radio waves, microwaves, infrared.

UNIT II:
The Data Link Layer -Services Provided to the Network Layer – Framing – Error Control – Flow Control, Error Detection and Correction– Error- Correcting Codes–Error Detecting Codes. Elementary Data Link Protocols- A Utopian Simplex Protocol-A Simplex Stop and Wait Protocol for an Error free channel-A Simplex Stop and Wait Protocol for a Noisy Channel, Sliding Window Protocols-A One Bit Sliding Window Protocol-A Protocol Using Go-Back-N- A Protocol Using Selective Repeat.

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UNIT III:

The Medium Access Control Sub layer-The Channel Allocation Problem-Static Channel Allocation- Assumptions for Dynamic Channel Allocation, Multiple Access Protocols-Aloha-Pure aloha- slotted aloha-Carrier Sense Multiple Access Protocols-Collision-Free Protocols-Limited Contention Protocols. Wireless LAN Protocols-Ethernet-Classic Ethernet Physical Layer-Classic Ethernet MAC Sub-layer Protocol-Ethernet Performance-Fast Ethernet- Wireless LANs-The 802.11 Architecture and Protocol Stack-The 802.11 Physical Layer-The802.11 MAC Sub-layer Protocol- The 805.11 Frame Structure- Services.

UNIT IV:

The Network Layer Design Issues –Store and Forward Packet Switching-Services Provided to the Transport layer- Implementation of Connectionless Service-Implementation of Connection Oriented Service- Comparison of Virtual Circuit and Datagram Networks, Routing Algorithms-The Optimality principle-Shortest path, Flooding, Distance vector, Link state, Hierarchical. Congestion Control algorithms-General principles of congestion control, Congestion prevention polices, Approaches to Congestion Control-Traffic Aware Routing- Admission Control-Traffic Throttling-Load Shedding. Internet Working: How networks differ- How networks can be connected- Tunneling, internetwork routing-, Fragmentation, network layer in the internet – IP protocols-IP Version 4 protocol-, IP addresses-, Subnets-IP Version 6-The main IPV6 header-Internet control protocols- ICMP-ARP- DHCP.

UNIT V:

The Transport Layer: Transport layer protocols: Introduction-services- port number-User data gram protocol-User datagram-UDP services-UDP applications-Transmission control protocol: TCP services- TCP features- Segment- A TCP connection- windows in TCP- flow control-Error control. Application Layer–-World Wide Web: HTTP,FTP-Two connections-control connection-Data connection-security of FTP-Electronic mail-Architecture- web based mail- email security-TELENET-local versus remote Logging. Domain Name System: Name Space, DNS in Internet, -Resolution-Caching- Resource Records- DNS messages- Registrars-security of DNS Name Servers.

Text Books:

1) Computer Networks: Andrew S Tanenbaum DavidJ.Wetherall,5/e, Pearson
2) Data communications and networking: Behrouz Forouzan, 5/e, Mc GrawHill

Reference Books:

1) Computer Networks–A System Approach, Peterson, BruceDavie,2/e, Harcourt Asia
2) Compute communications and networking technologies, Gallo, Hancock, Cengage
3) An Engineering approach to compute net working, Kesha, Pearson

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II Semester		L	T	P	C
		3	0	0	3
SOFTWARE ENGINEERING AND DESIGN PATTERNS(MCA2103)					

Course Objectives:
- To understand the nature of software development and software life cycle models
- To understand methods of capturing, specifying, visualizing and analyzing software requirements.
- Understand the concept of Design patterns and its importance.
- Understand the behavioral knowledge of the problem and solutions.
- Relate the Creational, Structural, behavioral Design patterns.
- Apply the suitable design pattern store fine the basic design for given context.

Course Outcomes:
(COs): At the end of the course, student will be able to
- Define various software application domains and remember different process model used in software development.
- Explain needs for software specification so they can classify different types of software requirements and their gathering techniques.
- Convert the requirements model into the design model and demonstrate use of software and user interface design principles.
- Illustrate the appropriate design patterns to solve object-oriented design problems.
- Apply structural patterns to solve design problems.
- Evaluate the design solutions by using behavioral patterns.

UNIT I:
Introduction to Software Engineering: The evolving role of software, Changing Nature of Software, Software myths. (Text Book 3), The software problem: Cost, schedule and quality, Scale and change. Software Process: Process and project, component software process, Software development process models: Waterfall model, prototyping, iterative development, relational unified process, time boxing model, Extreme programming and agile process, using process models in a project, Project management process.

UNIT II:
Software requirement analysis and specification: Value of good SRS, requirement process, requirement specification, functional specifications with use-cases, other approaches for analysis, validation, Planning a software project: Effort estimation, project schedule and staffing, quality planning, risk management planning, project monitoring plan, detailed scheduling.

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UNIT III:

Software Architecture: Role of software architecture, architecture views, components and connector view, architecture styles for C& C view, documenting architecture design, evaluating architectures, Design: Design concepts, function-oriented design, object oriented design, detailed design, verification, metrics.

Software Testing: Introduction, verification and validation, White box and black box techniques

UNIT IV:

Introduction: History and Origin of Patterns, Design Patterns in MVC, Describing Design Patterns, How Design Patterns Solve Design Problems, selecting a Design Pattern, Using a Design Pattern

Design Patterns-1: Creational, Abstract Factory-Builder, Factory Method, Prototype-Singleton

UNIT V:

Design Patterns-2: Structural Patterns: Adapter, Bridge, Composite, Decorator, Façade, Flyweight, Proxy

Design Patterns-3: Behavioural Patterns, Chain of Responsibility, Command-Interpreter, Iterator- Mediator, Memento, Observer, State, Strategy, Template Method, Visitor

Text Books:

1) Software Engineering: A Practitioner's Approach, Roger S.Pressman, 10thed, Mc GrawHill.
2) Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides, Design patterns: Elements of Reusable object-oriented software, Addison-Wesley, 1995.
3) James WCooper, Java Design Patterns-A Tutorial, Addison-Wesley

Reference Books:

1) Software Engineering, 8/e,Sommerville,Pearson
2) Software Engineering principles and practice, WSJawadekar, TMH
3) Craig Larman, Applying UML and Patterns: An Introduction to object- Oriented Analysis and Design and iterative development,3rd Edition, Pearson,2005.
4) Thomas JMowbray and Raphael Malveau,CORBA and Design Patterns,JohnWiley,1997.
5) William JBrown, Anti-Patterns: Refactoring Software, Architectures and Projects in Crisis, John Wiley, 1998.

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II Semester		L	T	P	C
		3	0	0	3
DATA WARE HOUSING AND MINING(MCA2104)					

Course Objectives:
• Be familiar with mathematical foundations of data mining tools..
• Understand and implement classical models and algorithms in data ware houses and data mining
• Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.
• Develop skill in selecting the appropriate data mining algorithm for solving practical problems.

Course Outcomes:
(COs): At the end of the course, student will be able to
• Understand the basic subtypes of data, quality of data, suitable techniques required for preprocessing and measures required to perform data analysis
• Describe the need of classification, identify suitable technique(s) to perform classification, model building and evaluation
• Identify the requirements and usage of association rule mining on categorical and continuous   data.
• Compare and Identify suitable clustering algorithm(s) (apply with open source tools), interpret, evaluate and report the result
• Describe the requirements and the need of web mining

UNIT I:
Introduction to Data mining, types of Data, Data Quality, Data Processing, Measures of Similarity and Dissimilarity, Exploring Data: Data Set, Summary Statistics, Visualization, Data Warehouse, OLAP and multi dimensional data analysis.

UNIT II:
Classification: Basic Concepts, Decision Trees and model evaluation: General approach for solving a classification problem, Decision Tree induction, Model over fitting: due to presence of noise, due to lack of representation samples, Evaluating the performance of classifier. Nearest Neighborhood classifier, Bayesian Classifier, Support vector Machines: Linear SVM, Separable and Non Separable case.

UNIT III:
Association Analysis: Problem Definition, Frequent Item-set generation, rule generation, compact representation of frequent item sets, FP-Growth Algorithms. Handling Categorical, Continuous attributes, Concept hierachy, Sequential, Sub graph patterns

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UNIT IV:
Clustering: Overview, K-means, Cluster Evaluation using cohesion and separation, using proximity matrix, Scalable Clustering algorithm

UNITV:
Web data mining: Introduction, Web terminology and characteristics, Web content mining, Web usage mining, web structure mining, Search Engines: Characteristics, Functionality, Architecture, Ranking of WebPages, Enterprise search

Text Books:
1)   Introduction to Data Mining, Tan, Steinbach and Vipin Kumar, PearsonEducation,2016
2)   Data Mining: Concepts and Techniques, 2^{nd}Edition, JiaweiHan and Micheline Kamber, ELSEVIER

Reference Books:
1)   Data Mining: The Text book, Springer,May2015,CharuC.Aggarwal.

Web resources:
1)   NPTEL: https://nptel.ac.in/courses/106/105/106105174/
2)   https://www.saedsayad.com/data_mining.htm

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II Semester		L	T	P	C
		3	0	0	3
	NoSQL DATA BASES(MCA2105)				

Course Objectives:

The objective of the course is to:
• Define, compare and use the four types of NoSQL Databases (Document-oriented, Key Value Pairs, Column oriented and Graph)
• Demonstrate an understanding of the detailed architecture, define objects, load data, query data and performance tune Column-oriented NoSQL databases
• Explain the detailed architecture, define objects, load data, query data and performance tune Document oriented NoSQL databases
• Ability to design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data

Course Outcomes:
After the completion of the course, student will be able to do the following
• Identify what type of NoSQL database to implement based on business requirements (key-value, document, full text, graph, etc.)
• Apply NoSQL data modeling from application specific queries
• Use Atomic Aggregates and de-normalization as data modeling techniques to optimize query processing

UNIT I:
Introduction to NoSQL: Definition And Introduction, Sorted Ordered Column-Oriented Stores, Key/Value Stores, Document Databases, Graph Databases, Examining Two Simple Examples, Location Preferences Store, Car Make And Model Database, Working With Language Bindings.

UNIT II:
Interacting with NoSQL: If NoSQL Then What, Language Bindings For NoSQL Data Stores, Performing Crud Operations, Creating Records, Accessing Data, Updating And Deleting Data

UNIT III:
NoSQL Storage Architecture: Working With Column-Oriented Databases, Hbase Distributed Storage Architecture, Document Store Internals, Understanding Key/Value Stores In Memcached And Redis, Eventually Consistent Non-Relational Databases.

UNIT IV:
NoSQL Stores: Similarities Between Sql And Mongo db Query Features, Accessing Data From Column-Oriented Databases Like Hbase, Querying Redis Data Stores, Changing Document

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Databases, Schema Evolution In Column-Oriented Databases, Hbase Data Import And Export, Data Evolution   In Key/Value Stores.

UNITV:
Indexing and Ordering Data Sets :Essential Concepts Behind A Database Index, Indexing And Ordering In Mongodb, Creating and Using Indexes In Mongodb, Indexing And Ordering In Couchdb, Indexing In Apache Cassandra.

Text Books:
1) Pramod Sadalage and Martin Fowler, NoSQL Distilled6, Addison-Wesley Professional, 2012.
2) Dan McCreary and AnnKelly, Making Sense of NoSQL, Manning Publications,2013.

Reference Books:
1) Shashank Tiwari, Professional NoSQL, Wrox Press, Wiley,2011, ISBN:978-0-470-94224-6
2) Gaurav Vaish, Getting Started with NoSQL, Packt Publishing,2013.

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II Semester		L	T	P	C
		3	0	0	3
	DESIGN AND ANALYSIS OF ALGORITHMS **(MCA2105)**				

Course Objectives:
*   To provide an introduction to formalisms to understand, analyze and denote time complexities of algorithms
*   To introduce the different algorithm ic approaches for problem solving through numerous example problems
*   To provide some theoretical grounding in terms of finding the lower bounds of algorithms and the NP- completeness

Course Outcomes:
*   Describe a symptotic notation used for denoting performance of algorithms
*   Analyzetheperformanceofagivenalgorithmanddenoteitstimecomplexityusingthe asymptotic notation for recursive and non-recursive algorithms
*   List and describe various algorithmic approaches
*   Solve problems using divide and conquer, greedy, dynamic programming, back tracking and branch and bound algorithmic approaches
*   Apply graph search algorithms to real world problems
*   Demonstrate an understanding of NP-Completeness theory and lower bound theory

UNIT I:
Introduction: Algorithm, Pseudo code for expressing algorithms, performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, joint Sets-disjoint set operations, union and find algorithms, spanning trees, connected components and bi- connected components.

UNIT II:
Divide and conquer: General method, applications-Binary search, Quick sort, Merge sort, Stassen's matrix multiplication. Greedy method: General method, applications-Job sequencing with deadlines, 0/1knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

UNIT III:
Dynamic Programming: General method, applications-Matrix chain multiplication, Optimal binary search trees, 0/1 knapsack problem, All pairs shortest path problem, Travelling sales person problem, Reliability design.

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UNIT IV:
Back tracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

UNIT V:
Branch and Bound: General method, applications - Travelling sales person problem, 0/1 knapsack problem- LCBranch and Bound solution, FIFO Branch and Bound solution.NP-Hard and NP-Complete problems: Basic concepts, non deterministic algorithms, NP - Hard and NP Complete classes, Cook's theorem.

Text Books:
1) Fundamentals of Computer Algorithms, EllisHorowitz, Satraj Sahni and Raja sekharam, Universities Press
2) The Algorithm Design Manual, 2ndedition, Steven S.Skiena, Springer
3) Introduction to Algorithms, second edition, T.H.Cormen, C.E.Leiserson ,R.L.Rivest and C. Stein, PHI Pvt. Ltd

Reference Books:
1) Introduction to the Design and Analysis of Algorithms, Anany Levitin, PEA
2) Design and Analysis of Algorithms, Pearson Education, Parag Himanshu Dave, Himansu Bala chandra Dave
3) Introduction to Design and Analysis of Algorithms A strategic approach, R.C.T.Lee, S.S.Tseng, R.C.Chang and T.Tsai, McGrawHill.
4) Design and Analysis of algorithms, Pearson education, Aho, Ullman and Hopcroft

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II Semester		L	T	P	C
		3	0	0	3
MOBILE APPLICATION DEVELOPMENT (MCA2105)					

Course Objectives:
- To demonstrate the introduction and characteristics of mobile applications
- Application models of mobile application frameworks. Managing application data and User- interface design for mobile applications
- Integrating networking, the OS and hardware into mobile-applications
- Addressing enterprise requirements in mobile applications – performance, scalability, modifiability, availability and security
- Testing methodologies for mobile applications–Publishing, deployment, maintenance and management. To demonstrate their skills of using Android software development tools
- To demonstrate their ability to deploy software to mobile devices

Course Outcomes:
Upon completion of the course students should be able to:
- Install and configure Android application development tools
- Design and develop user Interfaces for the Android platform
- Save state information across important operating system events
- Apply Java programming concepts to Android application development

UNIT I:
Introduction to mobile devices: Introduction to Mobile Computing, Introduction to Android Development Environment, Mobile devices vs. desktop devices, ARM and Intel architectures, Screen resolution, Touch interfaces, Application deployment, App Store, Google Play, Windows Store.
Development environments: XCode, Eclipse, VS2012, Phone GAP, etc.; Native vs. web applications. Factors in Developing Mobile Applications: Mobile Software Engineering, Frameworks and Tools, Generic UI Development, Android User.

UNIT II:
Android User Interface: Measurements– Device and pixel density independent measuring units User Interface(UI)Components– Editable and non editable Text Views, Buttons, Radio and Toggle Buttons, Checkboxes, Spinners, Dialog and pickers Fragments – Creating fragments, Lifecycle of fragments, Fragment states, Adding fragments to Activity, adding, removing and replacing fragments with fragment transactions, interfacing between fragments and Activities, Multi-screen Activities.

UNIT III:
Back Ground Running Process, Networking and Telephony Services: Services: Introduction to

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services–local service, remote service and binding the service, the communication between service and activity, Intent Service.
Multi Threading: Handlers, Async Task.
Broad cast receivers: Local Broadcast Manager, Dynamic broadcast receiver, System Broadcast. Pending Intent, Notifications.

UNIT IV:
Android: Introduction– Establishing the development environment – Android architecture– Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment – Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications. Android network programming: Http Url Connection, Connecting to REST-based and SOAP based Web services.

UNIT V:
Advanced Topics: Power Management: Wake locks and assertions, Low-level OS support, Writing power-smart applications.
Augmented Reality via GPS and other sensors: GPS, Accelerometer, Camera.
Mobile device security in depth: Mobile malware, Device protections, iOS ―Jail breaking‖, Android
―rooting‖ and Windows' ―defenestration‖; Security and Hacking: Active Transactions, More on Security, Hacking Android.

Text Books:
1) Bill Phillips, Chris Stewart, Brian Hardy, and Kristin Marsicano, Android Programming: The Big Nerd Ranch Guide, Big Nerd Ranch LLC, 2nd edition, 2015.
2) Valentino Lee, Heather Schneider, and Robbie Schell, Mobile Applications: Architecture, Design and Development, Prentice Hall, 2004.
3) Professional Android4 Application Development, RetoMeier, WileyIndia, (Wrox), 2012
4) Android Application Development for Java Programmers, James C Sheusi, Cengage Learning, 2013
5) Dawn Griffiths, David Griffiths, "HeadFirst: Android Development", Oreilly2015, ISBN: 9781449362188
6) JeffMc Wherter and ScottGowell, "Professional Mobile Application Development", Wrox, 2012

Reference Books:
1) Beginning Android Application Development, Wei-MengLee, Wiley India(Wrox),2013
2) Tomasz Nurkiewicz and Ben Christensen, Reactive Programming with RxJava, O'Reilly Media, 2016.
3) Brian Fling, Mobile Design and Development, O'Reilly Media, Inc., 2009.
4) Maximiliano Firtman, Programming the Mobile Web, O'Reilly Media, Inc.,2nded., 2013.
5) Cristian Crumlish and Erin Malone, Designing Social Interfaces, 2nd ed., O'Reilly

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Media, Inc., 2014.
6)   Suzanne Ginsburg, Designing the iPhone User Experience: A User-Centered Approach to Sketching and Prototyping iPhone Apps, Addison-Wesley Professional, 2010.

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II Semester		L	T	P	C
		3	0	0	3
	ARTIFICIAL INTELLIGENCE (MCA2105)				

Course Objectives:
*   To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language
*   To have an understanding of the basic issues of knowledge representation and   blind and heuristic   search, as well as an understanding of other topics such as mini max, resolution that play an important role in AI programs
*   To have a basic understanding of some of the more advanced topics of AI

Course Outcomes:
*   Outline problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem
*   Apply the language/ frame work of different AI methods for a given problem
*   Implement basic AI algorithms
*   Design and carry out an empirical evaluation of different algorithms on problem formalization and state the conclusions that the evaluation supports

UNIT I:
Introduction, history, intelligent systems, foundations of AI, applications, tic-tac-toe game playing, development of AI languages, current trends.

UNIT II:
Problem solving: state-space search and control strategies: Introduction, general problem solving, characteristics of problem, exhaustive searches, heuristic search techniques, iterative deepening A*, constraint satisfaction
Problem reduction and game playing: Introduction, problem reduction, game playing, alpha beta pruning, two-player perfect information games.

UNIT III:
Logic concepts: Introduction, propositional calculus, proportional logic, natural deduction system, axiomatic system, semantic tableau system in proportional logic, resolution refutation in proportional logic, predicate logic.

UNIT IV:
Knowledge representation: Introduction, approaches to knowledge representation, knowledge representation using semantic network, extended semantic networks for KR, knowledge representation using frames Advanced knowledge representation techniques: Introduction,

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conceptual dependency theory, script structure, CYC theory, case grammars, semantic web.

UNITV:

Expert system and applications: Introduction phases in building expert systems, expert system versus traditional systems

Uncertainty measure: probability theory: Introduction, probability theory, Bayesian belief networks, certainty factor theory, dempster-shafer theory.

Fuzzy sets and fuzzy logic: Introduction, fuzzy sets, fuzzy set operations, types of membership functions, multi valued logic, fuzzy logic, linguistic variables and hedges, fuzzy propositions, inference rules for fuzzy propositions, fuzzy systems.

Text Books:

1)   Artificial Intelligence-Saroj Kaushik, CENGAGE Learning.
2)   Artificial intelligence, A modern Approach, 2nded, Stuart Russel, Peter Norvig,PEA.

Reference Books:

1)   Artificial Intelligence- Deepak Khemani,TMH,2013.
2)   Introduction to Artificial Intelligence, Patterson,PHI.
3)   Artificial intelligence, structures and Strategies for Complex problem solving, George FLugar,   5thed, PEA.

e- Resources:

1)https://nptel.ac.in/courses/106/105/106105077/2
2)http://aima.cs.berkeley.edu/

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II Semester		L	T	P	C
		3	0	0	3
ACCOUNTINGING FOR MANAGERS (MCA2105)					

Course Objectives:
•   To learn   different Accounting Systems, preparation of Financial Statement and uses of different   tools for performance evaluation. GAAP Principles
•   To understand the concept of financial management and financial interpretations cost and management accounting principles and applications of standard costing and marginal costing analysis

Course Outcomes:
•   The Learn erasable to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various techniques for decision making.

UNIT I:
Accounting   Generally   Accepted   Accounting   Principles   (GAAP) &   Accounting   standards, Characteristics and limitations of single entry system, double entry system of accounting, introduction of basis books of accounts, ledgers. Preparation of trail balance – Final accounts – company final accounts – Users of Accounting Information, Role of Accountant in modern Organizations.

UNIT II:
Financial Management –meaning and scope, role, objectives of time value of money – over vitalization – under capitalization – profit maximization– wealth maximization – EPS maximization.
Ration Analysis -advantages -limitations- Fund flow analysis– meaning, importance, preparation and interpretation of Funds flow and cash flow statements – statements of changes in working capital.

UNIT III:
Costing – nature and importance and basic principles. Elements of cost – Absorption costing Vs. Marginal costing – Financial accounting vs. cost accounting vs. management accounting. Marginal costing and Break – even Analysis: nature, scope and importance– Practical applications of marginal costing, limitation and importance of cost – volume, profit analysis, short run decisions.

UNIT IV:
Standard costing and budgeting: nature, scope and computation and analysis – materials variance, labor variance and sales variance– cash budget, sales - budget – flexible Budgets, master budgets.

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UNIT V:
Introduction to computerized accounting system: coding logic and codes, master files, transaction files, introduction documents used for data collection, processing of different files and Outputs obtained.

Text Books:
1)   Accounting for Management, N.P. Srinivasan and M.Sakthivel Murugan
2)   Financial Accounting, S.NMaheswari and S.K.Maheswari, Vikas.
3)   Financial Analysis and Accounting, P.Prem chand Babu and M.Madan Mohan, Himalaya.

Reference Books:
1)   Financial Accounting, A. Mukherjee and M.Heneef, TMH.
2)   Basic Financial Accounting for Management, Ambaresh Gupta,Pearson.
3)   Accounts And Finance for Non accounts, Chatterjee, D.K. Himalaya.
4)   Essential of Financial Accounting, Ashish, Kand Ball acharya, PHI.
5)   Guide to Financial Management, John Tannent, Viva.

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II Semester		L	T	P	C
		0	0	3	1.5
DBMS LAB (MCA2106)					

Course Objectives:

This Course will enable students to
1. Populate and query a database using SQL DDL/DML Commands
2. Declare and enforce integrity constraint son a database
3. Writing Queries using advanced concepts of SQL
4. ProgrammingPL/SQLincludingprocedures,functions,cursorsandtriggers

Course Outcomes:

At the end of the course the student will be able to:
1. Utilize SQL to execute queries for creating database and performing data manipulation operations
2. Examine integrity constraints to build efficient databases
3. Apply Queries using Advanced Concepts of SQL
4. Build PL/SQL programs including stored procedures, functions, cursors and triggers

List of Experiments:

1) Execute all DDL, DML and DCL commands on sample tables.
2) Implementation of different types of operators and built-in functions with suitable examples
3) Implementation of different types of joins with suitable examples
4) Create views, partitions, Sequence, Indexes and locks for a particular DB
5) Implement different types of constraints on relations.
6) Implementation of sub queries and nested queries.
7) Implement Queries on Group By & Having Clauses, ALIAS, Sequence By, Order By
8) Control Structure
a) Write a PL/SQL block for Addition of Two Numbers
b) Write a PL/SQL block for IF ,IF and else condition
c) Write a PL/SQL block for implementation of loops
d) Write a PL/SQL block for greatest of three numbers using IF and ELSEIF
9) Exception Handling-Implement the following with respect to exception handling. Raising Exceptions, User Defined Exceptions, Pre-Defined Exceptions
10) Write PL/SQL block for an application using exception handling Procedures
a) Write a PL/SQL Procedure using Positional Parameters
b) Write a PL/SQL Procedure using notational parameters
c) Write a PL/SQL Procedure for GCD Numbers
d) Write a PL/SQL Procedures for cursor implementation (explicit and implicit cursors)

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11)   **Functions:**
a)   Write a PL/SQL block to implement factorial using functions
b)   Write a PL/SQL function to search an address from the given database
12)   Write a DBMS program to prepare Pl/SQL reports for an application using   functions.
13)   **Triggers:**
a)   Write a Trigger to pop- up the DML operations
b)   Write a Trigger to check the age valid or not Using Message Alert.
c)   Create a Trigger   to Raise appropriate error code and error message.
d)   Create a Trigger on a table so that it will update another table while inserting values
14)   Write PL/SQL block for an application using cursors and all types of triggers.
15)   Write a PL/SQL block for transaction operations of a typical application using package

Text Books:
1)   Oracle: The Complete Reference by Oracle Press
2)   Nilesh Shah, " Database Systems Using Oracle‖, PHI, 2007
3)   Rick FVander Lans,―Introduction to SQL‖, Fourth Edition, Pearson Education, 2007.

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II Semester		**L**	**T**	**P**	**C**
		0	0	3	1.5
	COMPUTER NETWORKS LAB(MCA2107)				

PART– A

1) Implement the data link layer farming methods such as character stuffing and bit stuffing.
2) Implement on a dataset of characters the three CRC polynomials– CRC12, CRC16 and CRC CCIP.
3) Implement Dijkstra_s algorithm to compute the Shortest path through a graph.
4) Take an examples ubnet graph with weights indicating delay between nodes. Now obtain Routing table art each node using distance vector routing algorithm
5) Take an examples ubnet of hosts. Obtain broadcast tree for it.

PART–B

1) Implement the following forms of IPC.
a. a)Pipes b)FIFO
2) Implement file transfer using Message Queue form of IPC
3) Write a programme to create an integer variable using shared memory concept and increment the variable
4) Simultaneously by two processes. Use semaphores to avoid race conditions
5) Design TCP iterative Client and server application to reverse the given input sentence
6) Design TCP client and server application to transfer file
7) Design a TCP concurrent server to convert a given text in to uppercase using multiplexing system call ―select‖
8) Design a TCP concurrent server to echo given set of sentences using poll functions
9) Design UDP Client and server application to reverse the given input sentence
10) Design UDP Client server to transfer a file
11) Design using poll client server application to multiplex TCP and UDP requests for converting a given text into upper case.
12) Design a RPC application to add and subtract a given pair of integers

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II Semester		L	T	P	C
		0	0	3	1.5
SOFTWARE ENGINEERING AND DESIGN PATTERNS LAB(MCA2108)					

1) Take any real time problem and do the following   experiments

a. Write down the problem statement for a suggested system of relevance. Develop   Flow-Charts to understand and basic problem solving technique

b. Do requirement analysis and develop Software Requirement Specification Sheet (SRS) for suggested system.

c. Using COCOMO model estimate effort.

d. Perform Estimation of effort using FP Estimation for chosen system

e. Analyze the Risk related to the project and prepare RMMM plan.

f. Develop Time-line chart and project table using PERT or CPM project scheduling methods.

g. Draw E-R diagrams, DFD,CFD and structured charts for the project.

h. Design of Test cases based on requirements and design.

i. Prepare FTR

j. Prepare Version control and change control for software configuration items.

2) Using UML/ JAVA, design Abstract Factory design pattern

3) Using UML/JAVA, design Builder design pattern

4) Using UML/ JAVA, design Façade design pattern

5) Using UML/ JAVA, design Bridge design pattern

6) Using UML/JAVA, design Decorator design pattern

7) User gives a print command from a word document. Design to represent this chain of responsibility design pattern

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II Semester		L	T	P	C
		0	0	1	0.5
EMPLOYABILITY SKILLS(MCA2109)					

Course Objectives:
The main of this course is
- To learn how to make effective presentations and impressive interviews
- To learn skills for discussing and resolving problems on the worksite
- To assess and improve personal grooming
- To promote   safety awareness including rules and procedures on the work site
- To develop and practice self management skills for the worksite

Course Outcomes:
By the end of this course, the student
- Recite the soft skills
- Make presentations effectively with appropriate body language
- Be composed with positive attitude
- Apply their core competencies to succeed in professional and personal life

A list of vital employability skills from the stand point of engineering students with discussion how to potentially develop such skills through campus life.
1. Soft Skills: An Introduction–Definition and Significance of Soft Skills; Process, Importance and Measurement of Soft Skill Development.
2. Self-Discovery: Discovering the Self; Setting Goals; Beliefs, Values, Attitude, Virtue.
3. Positivity and Motivation: Developing Positive Thinking and Attitude; Driving out Negativity; Meaning and Theories of Motivation; Enhancing Motivation Levels.
4. Time Management– Concept, Essentials, Tips.
5. Personality Development– Meaning, Nature, Features, Stages, Models; Learning Skills; Adaptability Skills.
6. Decision-Making and Problem-Solving Skills: Meaning, Types and Models, Group and Ethical Decision-Making, Problems and Dilemmas in application of these skills.
7. Conflict Management: Conflict- Definition, Nature, Types and Causes; Methods of Conflict Resolution.
8. Stress Management: Stress - Definition, Nature, Types, Symptoms and Causes; Stress Analysis Models and Impact of Stress; Measurement and Management of Stress
9. Leadership and Assertiveness Skills: A Good Leader; Leaders and Managers; Leadership Theories; Types of Leaders; Leadership Behavior; Assertiveness Skills.

Note: The student shall be instructed to Record a 2 min video and add to profile before and after taking the course. Students are to be involved in Role Play, Team dynamics, Group Discussion and outcomes are to be recorded.

Reference Books:

1. Barun K.Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.
2. S.P.Dhanavel, English and Soft Skills, Orient Blackswan,2010.
3. R.S.Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand& Company Ltd., 2018.
4. Raman, Meenakshi & Sharma, Sangeeta Technical Communication Principles and Practice, Oxford University Press, 2011.
5. Managing Soft Skills for Personality Development – edited by B.N.Ghosh, McGraw Hill India, 2012.
6. English and Soft Skills–S.P.Dhanavel, Orient Blacks wan India,2010

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III Semester		L	T	P	C
		3	0	0	3
MACHINE LEARNING WITH PYTHON (MCA3101)					

Course Objectives:

From the course the student will learn
- To design and analyze various machine learning algorithms and techniques with a modern outlook focusing on recent advances.
- Explore supervised and unsupervised learning paradigms of machine learning.
- To explore Deep learning technique and various feature extractions trategies.

Course Outcomes (CO's):

At the end of the course, student will be able to
- Illustrate and comprehend the basics of Machine Learning with Python
- Demonstrate the algorithms of Supervised Learning and be able to differentiate linear and logistic regressions
- Demonstrate the algorithms of Unsupervised Learning and be able to understand the clustering algorithms
- Evaluate the concepts of binning, pipe line Interfaces with examples
- Apply the sentiment analysis for various case studies

UNIT I:

Introduction to Machine Learning with Python: Introduction to Machine Learning, basic terminology, Types of Machine Learning and Applications, Using Python for Machine Learning: Installing Python and packages from the Python Package Index, Introduction to NumPy, SciPy, matplotlib and scikit-learn, Tiny application of Machine Learning.

UNIT II:

Supervised Learning: Types of Supervised Learning, Supervised Machine Learning Algorithms: k- Nearest Neighbors, Regression Models, Naïve Bayes Classifiers, Decision Trees, Ensembles of Decision Trees, Kernelized Support Vector Machines, Uncertainty Estimates from Classifiers.

UNIT III:

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Building good training datasets: Dealing with missing data, Handling categorical data, partitioning a data set into separate training and test datasets, bringing features onto the same scale, selecting meaningful features, assessing feature importance with random forests. **Compressing data via dimensionality reduction**: Unsupervised dimensionality reduction via PCA, Supervised data compression via linear discriminant analysis(Text Book 2)

UNIT IV:

Learning best Practices for Model Evaluation and Hyper parameter tuning: streamlining workflows with pipelines, using k-fold cross validation to assess model performance, debugging algorithms with learning and validation curves, fine tuning machine learning models via grid search, looking at different performance evaluation metrics. **Combining different models for Ensemble learning:** learning with ensembles, combining classifiers via majority vote, bagging-building an ensemble of classifiers from bootstrap samples, leveraging weak learners via adaptive boosting (Text Book 2)

UNIT V:

Working with Text Data (Data Visualization): Types of Data Represented as Strings, Example Application: Sentiment Analysis of Movie Reviews, Representing Text Data as a Bag of Words, Stop Words, Rescaling the Data with tf-idf, Investigating Model Coefficients, Approaching a Machine Learning Problem, Testing Production Systems, Ranking, Recommender Systems and Other kinds of Learning.

Text Books:

1) Introduction to Machine Learning with Python: A Guide for Data Scientists, Andreas C. Muller & Sarah Guido, Orielly Publications, 2019.
2) Python Machine Learning, Sebastian Raschka & Vahid Mirjalili, 3rdEdition, 2019.
3) Machine Learning using Python, Manaranjan Pradhan, U Dinesh Kumar, Wiley,1stEdition, 2019

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Reference Books:

1) Machine Learning, Tom M.Mitchell, McGraw-Hill Publication, 2017
2) Building Machine Learning Systems with Python, Luis Pedro Coelho, Willi Richert,2ndEdition, 2015.
3) Programming and Problem Solving with Python, Ashok Namdev Kamthane, Amit Ashok Kamthane, TMH, 2019.

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III Semester		L	T	P	C
		3	0	0	3
	INTERNET OF THINGS (MCA3102)				

Course Objectives:

- Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
- Formalize a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, as a Markov decision process, etc).
- Design and carry out an empirical evaluation of different algorithms on problem formalization, and state the conclusions that the evaluation supports.

Course Outcomes (COs): At the end of the course, student will be able to
- Explainthedefinitionandusageoftheterm'theinternetofthings'indifferentcontexts
- Discover the various network protocols used in IoT
- Define the role of big data, cloud computing and data analytics in a typical IoT system.
- Compare and contrast the threat environment based on industry and or device type
- Design a simple IoT system made up of sensors, wireless network connection, data analytics and display/actuators, and write the necessary control software

UNIT I:
The Internet of Things: An Overview of Internet of things, Internet of Things Technology, behind Io Ts Sources of the IoTs, M2M Communication, Examples of IoTs, Design Principles For Connected Devices Internet Connectivity Principles, Internet connectivity, **Application Layer Protocols:** HTTP, HTTPS,FTP, Telnet.

UNIT II:
Business Models for Business Processes in the Internet of Things ,IoT/M2M systems LAYERS AND designs standardizations, Modified OSI Stack for the

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IoT/M2M Systems, ETSIM2M domains and High-level capabilities, Communication Technologies, Data Enrichment and Consolidation and Device Management Gateway Ease of designing and affordability

UNIT III:
Design Principles for the Web Connectivity for connected-Devices, Web Communication protocols for Connected Devices, Message Communication protocols for Connected Devices, Web Connectivity for connected-Devices.

UNIT IV:
Data Acquiring, Organizing and Analytics in IoT/M2M, Applications/Services /Business Processes, IOT/M2M Data Acquiring and Storage, Business Models for Business Processes in the Internet Of Things, Organizing Data, Transactions, Business Processes, Integration and Enterprise Systems.

UNIT V:
Data Collection, Storage and Computing Using a Cloud Platform for IoT/M2M Applications/Services, Data Collection, Storage and Computing Using cloud platform Everything as a service and Cloud Service Models, IOT cloud-based services using the Xively (Pachube/COSM), Nimbits and other platforms Sensor, Participatory Sensing, Actuator, Radio Frequency Identification, and Wireless, Sensor Network Technology, Sensors Technology ,Sensing the World.

Text Books:

1) InternetofThings:Architecture,DesignPrinciplesAndApplications,1sted, Rajkamal,McGraw Hill Higher Education, 2017.
2) InternetofThings,1sted,A.BahgyaandV.Madisetti,UnivesityPress,2014

Reference Books:

1) Designing the Internet of Things, 1sted, Adrian Mc Ewen and Hakim Cassimally, Wiley, 2013.
2) Getting Started with the Internet of Things, 1sted, Cuno Pfister,Oreilly,2011.

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III Semester		L	T	P	C
		3	0	0	3
WEB TECHNOLOGIES (MCA3103)					

Course Objectives:

- To Learn PHP language for server side scripting
- To introduce XML and processing of XML Data with Java
- To introduce Server side programming with Java Servlets and JSP
- To introduce Client side scripting with Java Script.

Course Outcomes (COs):

At the end of the course, student will be able to
- Analyze a webpage and identify its elements and attributes.
- To acquire knowledge of xml fundamentals and usage of xml technology in electronic data inter change
- Build dynamic web pages using JavaScript (client side programming).
- To design and develop web based enterprise systems for the enterprises using technologies like jsp, servlet.
- Build web applications using PHP

Unit I:

Web Basics- Introduction, Concept of Internet-History of Internet, Protocols of Internet, World Wide Web, URL, Web Server, Web Browser. **HTML-Introduction**, History of HTML, Structure of HTML Document: Text Basics, Structure of HTML Document: Images and Multimedia, Links and webs, Document Layout, Creating Forms, Frames and Tables, Cascading style sheets.

Unit II:

XML Introduction- Introduction of XML, , Defining XML tags, their attributes and values, Document Type Definition, XML Schemes, Document Object Model, XHTML Parsing XML Data – DOM and SAX Parsers in java.

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Unit III:

Introduction to Servlets: Common Gateway Interface (CGI), Life cycle of a Servlet, deploying a Servlet, The Servlet API, Reading Servlet parameters, Reading Initialization parameters, Handling Http Request &Responses, Using Cookies and Sessions, connecting to a data base using JDBC.

Unit IV:

Introduction to JSP: The Anatomy of a JSP Page, JSP Processing, Declarations, Directives, Expressions, Code Snippets, implicit objects, Using Beans in JSP Pages, Using Cookies and session for session tracking, connecting to database in JSP. Client-side Scripting: Introduction to JavaScript, JavaScript language – declaring variables, scope of variables, functions. event handlers (on Click, on Submit etc.), Document Object Model, Form validation.

Unit V:

Introduction to PHP: Declaring variables, data types, arrays, strings, operators, expressions, control structures, functions, reading data from web form controls like text boxes, radio buttons, lists etc., Handling File Uploads. Connecting to database (MySQL as reference), executing simple queries, handling results, Handling sessions and cookies File Handling in PHP: File operations like opening, closing, reading, writing, appending, deleting etc. on text and binary files, listing directories.

Text Books:

1) Web Technologies, Uttam KRoy, Oxford University Press.
2) The Complete Reference PHP—Steven Holzner, Tata McGraw-Hill.

Reference Books:

1) Web Programming, building internet applications, Chris Bates 2[nd]edition,Wiley Dreamtech.
2) Java Server Pages—HansBergsten, SPDO'Reilly.
3) JavaScript, D.Flanagan
4) Beginning Web Programming- Jon Duckett WROX.

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III Semester		L	T	P	C
		3	0	0	3
	CRYPTOGRAPHY AND NETWORK SECURITY (MCA3104)				

Course Objectives:

- To learn various crypto graphic algorithms including ecret key cryptography, hashes and message digests, public key algorithms,
- To Familiar in design issues and working principles of various authentication protocols and various secure communication standards including Kerberos, IPsec, and S/MIME

Course Outcomes:

At the end of the course, student will be able to
- Explain Basic Principles, different security threats, counter measures, foundation course of cryptography mathematics and Symmetric Encryption.
- Classify the basic principles of Asymmetric key algorithms and operations of asymmetric key cryptography.
- Design Cryptographic Hash Functions as SHA-3 and Digital Signatures as Elgamal
- Explain the concept of Revise Key Management and Distribution and User Authentication
- Determine the knowledge of Network and Internet Security Protocols such as S/MIME

UNIT I:

Basic Principles: Security Goals, Cryptographic Attacks, Services and Mechanisms, Mathematics of Cryptography. **Symmetric Encryption:** Mathematics of Symmetric Key Cryptography, Introduction to Modern Symmetric Key Ciphers, Data Encryption Standard, Advanced Encryption Standard.

UNIT II:

Asymmetric Encryption: Mathematics of Asymmetric Key Cryptography-Primes, primality Testing, Factorization, Asymmetric Key Cryptography-RSA

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Cryptosystem, Rabin Cryptosystem, ElGamal Cryptosystem, Elliptic Curve Cryptosystem

UNIT III:

Cryptographic Hash Functions: Applications of Cryptographic Hash Functions, Two Simple Hash Functions Requirements and Security Hash Functions Based on Cipher Block Chaining, Secure Hash Algorithm (SHA), SHA-3.**Digital Signatures:** Elgamal Digital Signature Scheme, Schnorr Digital Signature, NIST Digital Signature Algorithm

Unit IV:

Key Management and Distribution: Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Distribution of Public Keys, X.509 Certificates. **User Authentication:** User Authentication, Remote User-Authentication Principle, Remote User-Authentication Using Symmetric Encryption, Kerberos, Remote User-Authentication Using Asymmetric Encryption

Unit V: Network and Internet Security

Electronic Mail Security: Internet Mail Architecture, Email Formats, Email Threats and Comprehensive Email Security, S/MIME.**IP Security:** IP Security Policy, Encapsulating Security Payload, Combining Security Associations Internet Key Exchange

Text Books:

1) Cryptography and Network Security, 3rd Edition Behrouz A Forouzan, Deb deep Mukhopadhyay, McGraw Hill,2015
2) Cryptography and Network Security, William Stallings, Global Edition, 7ePearson, 2017

Reference Books:

1) Network Security and Cryptography, First Edition, Bernard Meneges, Cengage Learning,2018

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III Semester		L	T	P	C
		3	0	0	3
	SOFT COMPUTING(MCA3105)				

Course Objectives:

- Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.
- Introduce students to artificial neural networks and fuzzy theory from an engineering perspective

Course Outcomes:

- Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory.
- Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic
- To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications and their limitations
- Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications
- Reveal different applications of these models to solve engineering and other problems.

UNIT I:

Fuzzy Set Theory: Introduction to Neuro, Fuzzy and Soft Computing, Fuzzy Sets, Basic functionand Terminology, Set-theoretic Operations, Member Function Formulation and Parameterization, Fuzzy Rules and Fuzzy Reasoning, Extension Principle and Fuzzy Relations, Fuzzy If-Then Rules, Fuzzy Reasoning, Fuzzy Inference Systems, Mamdani Fuzzy Models, Sugeno Fuzzy Models, Tsukamoto Fuzzy Models, Input Space Partitioning and Fuzzy Modeling.

UNIT II:

Optimization: Derivative based Optimization, Descent Methods, and The

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Method of Steepest Descent, Classical Newton's Method, Step Size Determination, Derivative-free Optimization, Genetic Algorithms, Simulated Annealing, and Random Search, Downhill Simplex Search.

UNIT III:
Artificial Neural Networks: Introduction and ANN Structure, Biological neurons and artificial neurons. Model of an ANN, Activation functions used in ANNs, Typical classes of network architectures, Single layer perceptrons, Structure and learning of perceptrons. Feed forward ANN, Structures of Multi-layer feed forward networks, back propagation algorithm, Back propagation - training and convergence.

UNIT IV:
Neuro Fuzzy Modeling: Adaptive Neuro-Fuzzy Inference Systems, Architecture Hybrid Learning Algorithm, Learning Methods that Cross-fertilize ANFIS and RBFN Coactive Neuro Fuzzy Modeling, Framework Neuron Functions for Adaptive Networks Neuro Fuzzy Spectrum.

UNITV:
Applications Of Computational Intelligence: Printed Character Recognition, Inverse Kinematics Problems, Automobile Fuel Efficiency Prediction, Soft Computing for Coloripe Prediction.

Text Books:

1) "Neuro-Fuzzy and Soft Computing", J.S.R.Jang, C.T.Sun and E.Mizutani, PHI, 2004, Pearson Education 2004
2) Satish Kumar, "Neural Networks: A class room approach" , Tata McGrawHill,2004.
3) "Artificial Intelligence and Intelligent Systems", N.P.Padhy, Oxford University Press, 2006

Reference Books:

1) Artificial Intelligence, Second Edition, Elaine Rich &Kevin Knight, Tata McGraw Hill Publishing Comp., New Delhi, , 2nd edition-2006
   "Fuzzy Logic with Engineering Applications",TimothyJ

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III Semester		L	T	P	C
		3	0	0	3
	SOFTWARE PROJECT MANAGEMENT (MCA3105)				

Course Objectives:

At the end of the course, the student shall be able to:
- To describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project
- To compare and differentiate organization structures and project structures
- To implement a project to manage project schedule, expenses and resources with the application of suitable project management tools

Course outcomes:

Upon the completion of the course students will be able to:-
- Apply the process to be followed in the software development life-cycle models
- Apply the concepts of project management & planning
- Implement the project plans through managing people, communications and change
- Conduct activities necessary to successfully complete and close the Software projects
- Implement communication, modeling, and construction & deployment practices in software development

UNIT-I :

Conventional Software Management: The waterfall model, conventional software Management performance.
Evolution of Software Economics: Software Economics, pragmatic software cost estimation. **Improving Software Economics:** Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.
The old way and the new: The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

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UNIT-II:

Life cycle phases: Engineering and production stages, inception, Elaboration, construction, transition phases.
Artifacts of the process: The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

UNIT-III:

Model based software architectures: A Management perspective and technical perspective.
Work Flows of the process: Software process work flows, Iteration workflows.
Checkpoints of the process: Major mile stones, Minor Milestones, Periodic status assessments. **Iterative Process Planning:** Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.

UNIT-IV:

Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations.
Process Automation: Automation Building blocks, The Project Environment.
Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

UNIT-V:

Agile Methodology, adapting to Scrum, Patterns for Adopting Scrum, Iterating towards Agility. **Fundamentals of DevOps:** Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOps ecosystem. DevOps adoption in projects: Technology aspects, Agiling capabilities, Tool stack implementation, People aspect, processes

Text Books:

1) Software Project Management, Walker Royce, PEA, 2005.
2) Succeeding with Agile: Software Development Using Scrum, Mike Cohn, Addison Wesley.

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3) The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, Gene Kim, John Willis , Patrick Debois, Jez Humb,1st Edition, O'Reilly publications, 2016.

Reference Books:

1) Software Project Management, Bob Hughes,3/e, Mike Cotterell, TMH
2) Software Project Management, Joel Henry, PEA
3) Software Project Management inpractice, Pankaj Jalote,PEA,2005,
4) Effective Software Project Management, Robert K.Wysocki,Wiley,2006
5) Project Management in IT, Kathy Schwalbe,Cengage
6) Quality Software Project Management, Futrell, Donald F.Shafer, Donald I.Shafer, PEA

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III Semester		L	T	P	C
		3	0	0	3
	CLOUD COMPUTING (MCA3105)				

Course Objectives:

The main objective of the course is to implement Virtualization, Task Scheduling algorithms, apply Map-Reduce concept to applications, building Private Cloud and to know the impact of engineering on legal and societal issues involved

Course Outcomes:

At the end of the course, student will be able to
- Interpret the key dimensions of the challenge of Cloud Computing
- Examine the economics, financial, and technological implications for selecting cloud computing for own organization
- Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications
- Evaluate own organizations' needs for capacity building and training in cloud computing- related IT areas
- Illustrate Virtualization for Data-Center Automation

UNIT–I:
Systems modeling, Clustering and virtualization: Scalable Computing over the Internet, Technologies for Network based systems, System models for Distributed and Cloud Computing, Software environments for distributed systems and clouds, Performance, Security And Energy Efficiency.

UNIT–II:
Virtual Machines and Virtualization of Clusters and Data Centers: Implementation Levels of Virtualization, Virtualization Structures/ Tools and mechanisms, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data Centre Automation.

UNIT–III:
Cloud Platform Architecture: Cloud Computing and service Models,

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Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.

UNIT–IV:

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, Parallel & Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments. **Storage Systems**: Evolution of storage technology, storage models, file systems and database, distributed file systems, general parallel file systems. Google file system, Apache Hadoop, Big Table, Megastore, Amazon Simple Storage Service(S3).

UNIT-V:

Cloud Resource Management and Scheduling : Policies and Mechanisms for Resource Management Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds. Coordination of Specialized Autonomic Performance Managers, Resource Bundling, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines, Scheduling Map Reduce Applications Subject to Deadlines.

Text Books:

1. Distributed and Cloud Computing, Kai Hwang, Geoffry C.Fox, Jack J.Dongarra MKElsevier.
2. Cloud Computing, Theory and Practice, Dan C Marinescu, MKEl sevier.
3. Cloud Computing, A Hands on approach, Arshadeep Bahga, Vijay Madisetti, University Press

Reference Books:

1. Cloud Computing: A Practical Approach. Anthony T.Velte. Toby J.VeFte, Robert Elsenpeter. Tata McGraw Hill. rp2Oll.
2. Enterprise Cloud Computing Gautam Shroif, Cambridge University Press.2010.
3. Cloud Computing: Implementation, Management and Security, John W.Rittinouse, JamesF Ransome. CRC Press, rp2012.
4. Cloud Application Architectures: Building Applications and

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Infrastructure in the Cloud. George Reese, O'Really SPD, rp2Oll.

5. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Ktriara swamy, Shahed Latif, O'Redç SPD, rp2Oll.

Note: The students shall register in any of the Clouds like AWS/Azure, etc and learn about cloud services.

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III Semester		**L**	**T**	**P**	**C**
		3	0	0	3
	OPTIMIZATION TECHNIQUES (MCA3105)				

Course Objectives:

- To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems.
- To develop and promote research interest in applying optimization techniques in problems of Engineering and Technology.
- To apply the mathematical results and numerical techniques of optimization theory to concrete Engineering problems.

Course Outcomes (COs):

At the end of the course, student will be able to
- Describe clearly a problem, identify its parts and analyze the individual functions
- Feasibility study for solving an optimization problem
- Becoming a mathematical translation of the verbal formulation of an optimization problem
- To design algorithms, the repetitive use of which will lead reliably to finding an approximate solution
- Discovery, study and solve optimization problems
- Investigate, study, develop, organize and promote innovative solutions for various applications

UNIT I:

Development: Definition, Characteristics and Phrases, scientific method. Types of models, general methods for solving, operations research modes, **Allocation:** introduction linear programming formulation, graphical solution, simplex methods, artificial variable technique, duality principle,

UNIT II:

Transportation problem: Formulation, optimal solution, unbalanced transportation, **Assignment problem:** formulation, optimal solution, variations

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problem, degeneracy i.e. non square MXN) matrix, restrictions, **Sequencing:** Introduction, optimal solution for processing each of n jobs through three machines, travelling salesman problem (i.e.) shortest acyclic route models.

UNIT III:

Replacement: Introduction, replacement of items that deteriorate when money value is not counted and counted, and replacement of items that fail completely (i.e.) group replacements, **Waiting lines:** Introduction, single channel, Poisson arrivals, exponential service time infinite population and unrestricted queue.

UNIT IV:

Inventory: Introduction, single item, deterministic models, production is instantaneous or at a constant rate, shortages are allowed or not allowed and with drawls from stock is continuous, purchase inventory model with one price break, shortages are not allowed, instantaneous production demand production or purchase cost is relevant, stochastic models, simple problems.

UNIT V:

Theory of Games: Introduction, min max (maximum), criterion and optimal strategy solution of games with saddle points, rectangular without saddle points. **Dynamic programming:** Introduction, Bellman's Principle of optimality, solutions for simple problems, **Project Management:** PERT and CPM, difference between PERT and CPM, PERT/CPM network components and precedence relations, Time Estimates for activities

Text Books:

1) Operations Research, 2nd Edition, S.D.Sharma, Ramnath, &Kedarnathco, Meerut, 2009
2) Operations Research, An introduction, 8th Edition, Taha, Pearson,2008

Reference Books:

1) Operations Research, Revised edition,P.K.Gupta,D.S.Hira,S.Chand,2014
2) Operations Research, Problems & solutions, 2nd Edition, JK Sharma, Macmillan, 2003
3) Operations Research, 2nd Edition, Panneerselvam, PHI, 2004

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III Semester		L	T	P	C
		3	0	0	3
	CYBER SECURITY(MCA3105)				

Course Objectives:

- To familiarize various types of cyber-attacks and cyber-crimes
- To give an over view of the cyber laws
- To study the defensive techniques against these attacks.

Course Outcomes:

At the end of the course, student will be able to understand
- cyber-attacks, types of cybercrimes,
- cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.

UNIT I:

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motiveofattackers,activeattacks,passiveattacks,Softwareattacks,hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defense, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

UNIT II:

Cyber space and the Law& Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing

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UNIT III:

Cyber crime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, OrganizationalMeasuresforHandlingMobile,OrganizationalSecurityPoliciesandM easuresinMobile Computing Era, Laptops

UNIT IV:

Cyber Security: Organizational Implications: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations. **Cyber crime and Cyber terrorism:** Introduction, intellectual property in the cyberspace, the ethical dimension of cyber crimes the psychology, mindset and skills of hackers and other cyber criminals.

UNIT V:

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.

Text Books:

1. Nina God bole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley
   B.B.Gupta, D.P.Agrawal, HaoxiangWang,
2. Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

Reference Books:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRCPress.
2. Introduction to Cyber Security, Chwan-Hwa(john)Wu, J.DavidIrwin, CRC Press T&F Group

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III Semester		L	T	P	C
		0	0	3	1.5
MACHINE LEARNING WITH PYTHON LAB(MCA3106)					

Course Objectives:

- Make use of Data sets in implementing the machine learning algorithms
- Implement the machine learning concepts and algorithms in any suitable language of choice.
- Design Python programs for various Learning algorithms.

Course Outcomes(COs):

At the end of the course, student will be able to
- Implement procedures for the machine learning algorithms
- Design Python programs for various Learning algorithms
- Apply appropriate data sets to the Machine Learning algorithms
- Identify and apply Machine Learning algorithms to solve real world problems

Note: Consider any data set from kaggle

Experiment 1:

Installation of Python and its packages (Pandas, NumPy, SciPy, mat plot lib and scikit-learn) (Install Anaconda, Jypyter Notebook, Programs covering basic concepts in Python Programming)

Basics of Python:
a. Write a program to read two numbers from user and display there sult using bitwise &, | and
b. Write a program to calculate the sum of numbers from 1 to 20 which are not divisible by 2,3 or 5.
c. Write a program to find the maximum of two numbers using functions.
d. Implement slicing operation on strings and lists.

Experiment2:

a. Implement python program to load structured data on to Data Frame and perform exploratory data analysis

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b. Implement python program for data preparation activities such as filtering, grouping, ordering and joining of datasets.

Experiment 3:

Implement Python program to prepare plots such as bar plot, histogram, distribution plot, box plot, scatter plot.

Experiment 4:

Implement Simple Linear regression algorithm in Python
Implement Gradient Descent algorithm for the above linear regression model

Experiment 5:

Implement Multiple line arregression algorithm using Python.

Experiment 6:

Implement Python Program to build logistic regression and decision tree models using the Python package stats model and sklearn APIs.

Experiment 7:

Implement Python Program to perform the activities such as
- Splitting the data set into training and validation data sets
- Building model using Python package on training data set and test on the validation data set

Experiment 8:

Write a Python program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions.

Experiment 9:

Implement Support vector Machine algorithm on any data set

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Experiment 10:

Write a program to implement the naïve Bayesian classifier fora sample training data setstoredasa.csv file. Compute the accuracy of the classifier, considering few test data sets.

Experiment 11:

Write a Python 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.

Experiment 12:

Assuming a set of documents that need to be classified, use the naive 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.

Experiment 13:

Implement PCA on any Image dataset for dimensionality reduction and classification of images into different classes

Experiment 14:

Implement then on-parametric Locally Weighted Regression algorithm in order to fit data points. Select appropriate data set for your experiment and draw graphs.

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III Semester		L	T	P	C
		0	0	3	1.5
IoT LAB (MCA3107)					

Course Objectives:

Students will understand the concepts of Internet of Things and can able to build IoT applications

Course Outcomes:

1. Interpret the impact and challenges posed by IoT networks leading to new architectural models.
2. Compare and contrast the deployment of smart objects and the technologies to connect them to network.
3. Appraise the role of IoT protocols for efficient network communication.
4. Elaborate the need for Data Analytics and Security in IoT.
5. Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.

List of Experiments:

1) Familiarization with Arduino / Raspberry Pi and perform necessary software installation.
2) To interface LED/ Buzzer with Arduino / Raspberry Pi and write a program to turn ON LED for1 sec after every 2 seconds.
3) To interface Push button / Digital sensor (IR/LDR) with Arduino / Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
4) To interface DHT11sensor with Arduino / Raspberry Pi and write a program to print temperature and humidity readings.
5) To interface motor using relay with Arduino / Raspberry Pi and write a program to turn ON motor when push button is pressed.
6) To interface OLED with Arduino / Raspberry Pi and write a program to print temperature and humidity readings on it.
7) To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smart phone using Bluetooth.
8) To interface Bluetooth with Arduino / Raspberry Pi and write a

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program to turn LEDON/OFF when '1'/'0' is received from smart phone using Bluetooth.

9) Write a program on Arduino / Raspberry Pi to upload temperature and humidity data to thing speak cloud.

10) WriteaprogramonArduino/RaspberryPitoretrievetemperatureandhu miditydatafrom thing speak cloud.

11) To install My SQL data base on Raspberry Pi and perform basic SQL queries.

12) Write a program on Arduino / Raspberry Pito publish temperature data to MQTT broker.

13) Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data and print it.

14) Write a program to create TCP server on Arduino/Raspberry Pi and respond with humidity data to TCP client when requested.

15) Write a program to create UDP server on Arduino/Raspberry Pi and respond with humidity data to UDP client when requested.

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III Semester		L	T	P	C
		0	0	4	2
WEB TECHNOLOGIES LAB(MCA3108)					

Course Objectives:

- To implement the web pages using HTML and apply styles.
- Able to develop a dynamic web page by the use of java script.
- Design to create structure of webpage, to store the data in web document, and transport information through web.
- Able to write a well formed /valid XML document.

Course Outcomes(COs):

At the end of the course, student will be able to
- Create dynamic and interactive web pages using HTML, CSS & JavaScript
- Experiment with Learn and implement XML concepts
- Develop web applications using PHP
- Show the Install Tomcat Server and execute client-server programs
- Implement programs using Ruby programming

Experiment 1:

Develop static pages (using HTML and CSS) of an online book store. The pages should resemble: www.flipkart.com The website should consist the following pages.
       a) Home page
       b) Registration and user Login
       c) User Profile Page
       d) Books catalog
       e) Shopping Cart
       f) Payment By credit card
       g) Order Conformation

Experiment 2:

Create and save an XML document on the server, which contains 10 users information. Write a program, which takes User Id as an input and returns the user details by taking the user information from the XML document.

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Experiment 3:

Write a PHP script to merge two arrays and sort the mas numbers, in descending order.

Experiment 4:

Write a PHP script the treads data from one file and write in to another file.

Experiment 5:

Write a PHP script to print prime numbers between 1-50.

Experiment 6:

Validate the Registration, user login, user profile and payment by credit card pagesusing Java Script.

Experiment 7:

Write a PHP script to:
a. Find the length of a string.
b. Count no of words in a string
c. .Reverse a string.
d. Search for a specific string.

Experiment 8:

Install TOMCAT web server. Convert the static web pages of assignments 2 into dynamic web pages using servlets and cookies. Hint: Users information (user id, password, credit card number) would be stored in web.xml. Each user should have a separate Shopping Cart.

Experiment 9:

Redo the previous task using JSP by converting the static web pages of assignments2 into dynamic web pages. Create a database with user information and books information. The books catalogue should be dynamically loaded from the database. Follow the MVC architecture while doing the website.

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Experiment 10:

Install a database (Mysql or Oracle). Create a table which should contain at least the following fields: name, password, email-id, phone number (these should hold the data from the registration form). Practice 'JDBC' connectivity. Write a java program / servlet / JSP to connect to that database and extract data from the tables and display them. Experiment with various SQL queries. Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page.

Experiment 11:

Write a JSP which does the following job: Insert the details of the 3 or 4 users who register with the web site (week9) by using registration form. Authenticate the user when he submits the login form using the user name and password from the database.

Experiment 12:

Create a simple visual bean with a area filled with a color. The shape of the area depends on the property shape. If it is set to true then the shape of the area is Square and it is Circle, if it is false. The color of the area should be changed dynamically for every mouse click.

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IV Semester		L	T	P	C
		3	0	0	3
DIGITAL MARKETING (MCA4101)					

Course Objectives:

Digital marketing aims at being SMART (Specific, Measurable, Achievable, Relevant and Time Related) so that people can withstand against competitors.

Course Outcomes(COs):

At the end of the course, student will be able to
- Explain about web pages with basic HTML5, DHTML tags using CSS and XML, the overview of W3C DOM.
- Discuss the key elements of a digital Java Scripts.
- Apply search engine optimization techniques to a web site.
- Illustrate how the effectiveness of a digital marketing campaign can be measured
- Demonstrate advanced practical skills in common digital marketing tools such as SEO,SEM, Social media and Blogs

UNIT I:
HTML: Introduction, HTML5, Audio Elements, Video Elements, Organizing Elements. **Scripting Documents:** Dynamic Document content, Document properties, Legacy DOM, Document Collections, Overview of the W3C DOM, Traversing a Document, Finding Elements in a Document, Modifying a Document, Adding Content to a Document Example

UNIT II:
Cascading Style Sheets and Dynamic HTML: Overview of CSS, CSS for DHTML Scripting inline Styles, Scripting computed styles, Scripting CSS Classes, Scripting Style Sheets, **Java Script and XML:** Obtaining XML Documents, Manipulating XML with the DOM API, Transforming XML with XSLT querying XML with X path, Serializing XML, Example, XML and Web services.

UNIT III:
Search Engine Optimization (SEO): Searching Engine Marketing, Search Engine Optimization, Measuring SEO Success, Mapping with SEO Journey, **Search Advertising:** Online Advertising Payment Models, Search Advertising

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(Desktop& Mobile Devices), Planning& Executing a search Advertising Camping, Strategic Implications of Advertising on the search Network.

UNIT IV:
Search Media Marketing: What is Social Media? Social Media Marketing, Social Media Marketing Strategy, Adopting Social Media in Organizations: Internal Learning, Paid-Owned-Earned Media, Social CRM, **Mobile Marketing:** Mobile Internet in India,What is Mobile Marketing? Email Marketing Strategy, Forms of Mobile Marketing, Mobile Advertising, M-Commerce.

UNIT V:
E-Mail Marketing: E-Mail Marketing in India, What is E-Mail Marketing? E-Mail Marketing Strategy, Executing E-Mail Marketing, **Internet Marketing:** Internet Marketing Strategy, Content Marketing, Content Marketing in India.

Text Books:

1. The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable Online Campaigns, Ian Dodson, Wiley, 2016
2. Programming the World Wide Web, Robet WSebesta, Pearson, 8thedition,2015

Reference Books:

1. Fundamentals of Digital Marketing, Second Edition, Pearson Paper back,2019
2. Internet Marketing- A Practical approach in the India Context by Moutusy Maity, Oxford
3. Java Script: The Definite Guide David Flanagan, O'Reilly Publisher

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IV Semester		L	T	P	C
		3	0	0	3
HUMAN RESOURCE MANAGEMENT(MCA4101)					

Course Objectives:

- Contribute to the development, implementation, and evaluation of employee recruitment, selection, and retention plans and processes.
- Administer and contribute to the design and evaluation of the performance management program.
- Develop, implement, and evaluate employee orientation, training, and development programs.
- Facilitate and support effective employee and lab our relations in both non-union and union environments.

Course Outcomes (COs):

At the end of the course, student will be able to
- Explain the importance of human resources and their effective management in organizations
- Demonstrate a basic understanding of different tools used in fore casting and planning, human resource need.
- Describe the meanings of terminology and tools used inmanaging employees effectively
- Make use of Record governmental regulations affecting employees and employers
- Analyze the key issues related to administering the human elements such as motivation, compensation, appraisal, career planning, diversity, ethics, and training

UNIT I:
HRM: Significance - Definition and Functions – evolution of HRM- Principles - Ethical Aspects of HRM- - HR policies, Strategies to increase firm performance - Role and position of HR department – aligning HR strategy with organizational strategy - HRM at global perspective -challenges – cross- cultural problems – emerging trends in HRM.

UNIT II:
Investment perspectives of HRM: HR Planning – Demand and Supply forecasting - Recruitment and Selection- Sources of recruitment - Tests and

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Interview Techniques - Training and Development – Methods and techniques – Training evaluation - retention - Job Analysis – job description and specifications - Management development - HRD concepts.

UNIT III:
Wage and Salary Administration: Concept- Wage Structure-Wage and Salary Policies- Legal Frame Work- Determinants of Payment of Wages- Wage Differentials - Job design and Evaluation- Incentive Payment Systems. Welfare management: Nature and concepts – statutory and non-statutory welfare measures – incentive mechanisms.

UNIT IV:
Performance Evaluation: Importance – Methods– Traditional and Modern methods – Latest trends in performance appraisal - Career Development and Counseling- Compensation, Concepts and Principles- Influencing Factors- Current Trends in Compensation- Methods of Payments - compensation mechanisms at international level.

UNIT V:
Managing Industrial Relations: Trade Unions - Employee Participation Schemes-Collective Bargaining–Grievances and disputes resolution mechanisms – Safe tyat work – nature and importance– work hazards – safety mechanisms - Managing work place stress.

Text Books:

1) KAswathappa: "Human Resource and Personnel Management", Tata McGraw Hill, New Delhi, 2013
2) N.Sambasiva Rao and Dr.Nirmal Kumar:"Human Resource Management and Industrial Relations", Himalaya Publishing House, Mumbai
3) Mathis, Jackson, Tripathy:"Human Resource Management: A south-Asin Perspective",Cengage Learning, New Delhi, 2013
4) Subba RaoP: "Personnel and Human Resource Management-Text and Cases",Himalaya Publications, Mumbai, 2013.
5) MadhurimaLall,SakinaQasimZasidi:"HumanResourceManagement",ExcelBooks,NewDelhi, 2010

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IV Semester		L	T	P	C
		3	0	0	3
DEEP LEARNING(MCA4101)					

Course Objectives:

- Demonstrate the major technology trends driving Deep Learning
- Build, train and apply fully connected deep neural networks
- Implement efficient (vectorized) neural networks
- Analyze the key parameters and hyper parameters in a neural network's architecture

Course Outcomes:

- Demonstrate the mathematical foundation of neural network
- Describe the machine learning basics
- Compare the different architectures of deep neural network
- Build a convolution al neural network
- Build and train RNN and LSTMs

UNIT I:

Linear Algebra: Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis.

Probability and Information Theory: Random Variables, Probability Distributions, Marginal Probability, Conditional Probability, Expectation, Variance and Covariance, Bayes' Rule, Information Theory. Numerical Computation: Overflow and Underflow, Gradient-Based Optimization, Constrained Optimization, Linear Least Squares.

UNIT II:

Machine Learning :Basics and Under fitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood, Bayesian Statistics, Supervised and Unsupervised Learning, Stochastic Gradient Descent, Challenges Motivating Deep Learning. Deep Feed forward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

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UNIT III:

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop and Manifold Tangent Classifier. Optimization
for Training Deep Models: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta-Algorithms.

UNIT IV:
Convolution Networks: The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolution Networks.

UNIT V:
Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Echo State Networks, LSTM, Gated RNNs, Optimization for Long-Term Dependencies, Auto encoders, Deep Generative Models.

Text Books:

1) I an Good fellow, Yoshua Bengio, Aaron Courville, "Deep Learning", MITPress, 2016.
2) Josh Patterson and Adam Gibson, "Deep learning: Apractitioner's approach", O'Reilly Media, First Edition, 2017.

Reference Books:

1) Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O'Reilly, Shroff Publishers,

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2019.

2) Deep learning Cook Book, Practical recipes to get started Quickly, Douwe Osinga, O'Reilly, Shroff Publishers, 2019.

e-Resources:

1) https://keras.io/datasets/
2) http://deeplearning.net/tutorial/deeplearning.pdf
3) https://arxiv.org/pdf/1404.7828v4.pdf
4) https://github.com/lisa-lab/DeepLearningTutorials

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IV Semester		L	T	P	C
		3	0	0	3
AD-HOC AND SENSOR NETWORKS(MCA4101)					

Course Objectives:

- From the course the student will learn
- Architect sensor networks for various application setups
- Devise appropriate data dissemination protocols and model links cost
- Understanding of the fundamental concepts of wireless sensor networks and has a basic knowledge of the various protocols at various layers
- Evaluate the performance of sensor networks and identify bottle necks

Course Outcomes:

- Evaluate the principles and characteristics of mobile adhoc networks(MANETs) and what distinguishes them from infrastructure-based networks
- Determine the principles and characteristics of wireless sensor networks
- Discuss the challenges in designing MAC, routing and transport protocols for wireless ad-hoc sensor networks
- Illustrate the various sensor network Platforms, tools and applications
- Demonstrate the issues and challenges in security provisioning and also familiar with the mechanisms for implementing security and trust mechanisms in MANETs and WSNs

UNIT I:

Introduction: Fundamentals of Wireless Communication Technology, The Electromagnetic Spectrum, Radio propagation Mechanisms ,Characteristics of the Wireless channel mobile ad hoc networks (MANETs), **Wireless Sensor Networks (WSNs):**concepts and architectures, Applications of Ad Hoc and Sensor Networks, Design Challenges in Ad hoc and Sensor Networks.

UNIT II:

MAC Protocols For Ad Hoc Wireless Networks: Issues in designing a MAC Protocol, Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks, Design Goals of a MAC Protocol for Ad Hoc Wireless Networks, Classification of MAC Protocols, Contention based protocols, Contention based protocols with

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Reservation Mechanisms, Contention based protocols with Scheduling Mechanisms, Multi channel MAC - IEEE 802.11.

UNIT III:

Routing Protocols And Transport Layer In Ad Hoc Wireless Networks: Routing Protocol: Issues in designing a routing protocol for Adhoc networks, Classification, proactive routing, reactive routing(on- demand), hybrid routing, Transport Layer protocol for Ad hoc networks, Design Goals of a Transport Layer Protocol for AdHoc Wireless Networks, Classification of Transport Layer solutions- TCP over Ad hoc wireless, Network Security, Security in Ad Hoc Wireless Networks, Network Security Requirements.

UNIT IV:

Wireless Sensor Networks (WSNS) and Mac Protocols: Single node architecture - hardware and software components of a sensor node, **WSN Network architecture:** typical network architectures, data relaying and aggregation strategies, **MAC layer protocols:** self-organizing, Hybrid TDMA/FDMA and CSMA based MAC -IEEE 802.15.4.

UNITV:

WSN Routing, Localization & Qos: Issues in WSN routing, OLSR, Localization, Indoor and Sensor Network Localization, absolute and relative localization, triangulation, QOS in WSN, Energy Efficient Design, Synchronization.

Text Books:

1) "AdHoc Wireless Networks: Architectures and Protocols" ,C. Siva Ram Murthy, and B.S. Manoj, Pearson Education, 2008
2) "Wireless Adhoc and Sensor Networks",Labiod.H,Wiley,1stedition-2008
3) "Wireless ad -hoc and sensor Networks: theory and applications", Li, X, Cambridge University Press, fifth edition-2008.

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Reference Books:

1) "Ad Hoc & Sensor Networks: Theory and Applications", 2ndedition,CarlosDe Morais Cordeiro, Dharma Prakash Agrawal ,World Scientific Publishing Company, 2011

2) "Wireless Sensor Networks", FengZhao and Leonides Guibas, Elsevier Publication2nd edition- 2004

3) "Protocols and Architectures for Wireless Sensor Networks", Holger Karl and Andreas Willig,Wiley, 2005 (soft copy available)

4) "Wireless Sensor Networks Technology, Protocols, and Applications", KazemSohraby, Daniel Minoli, & Taieb Znati, John Wiley, 2007. (soft copy available)

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IV Semester		L	T	P	C
		3	0	0	3
	NETWORK PROGRAMMING (MCA4102)				

Course Objectives:

- Student able to learn about the protocols which are using in the current scenario.
- To learn and understand client server relations and OSI programming Implementation of the socket and IPC.

Course Outcomes:

- Explain OSI Model and Standard Internet Protocols
- How to handle server process termination
- Acquire the knowledge of Elementary TCP sockets and I/O Multiplexing and socket
- Demonstrate the concepts of FIFOs streams messages and Remote logins.

UNIT I:

Introduction to Network Programming: OSI model, Unix standards, TCP and UDP& TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

UNIT II:
TCP client server: Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.

UNIT III:
Sockets: Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets–Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.
I/O Multiplexing and socket options: I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, get sock opt and set sock opt functions. Socket states, Generic socket option IPV6 socket optionICMPV6

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socket option IPV6 socket option and TCP socket options.

UNIT IV:

Elementary UDP sockets: Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining out going interface with UDP.

Elementary name and Address conversions: DNS, get host by Name function, Resolver option, Function and IPV6 support, uname function, other networking information.

UNIT V:

IPC : Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC, Message queues, Semaphores. **Remote Login:** Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

Text books:

1) UNIX Network Programming, Vol. I, Sockets API, 2nd Edition.- W. Richard Stevens, Pearson Edn. Asia.
2) UNIX Network Programming,1stEdition,-W.Richard Stevens.PHI.

References Books:

1) UNIX Systems Programming using C++ T CHAN, PHI.
2) UNIX for Programmers and Users, 3rd Edition Graham GLASS, Kingabls, Pearson Education
3) Advanced UNIX Programming 2nd Edition M.J.ROCHKIND, Pearson Education

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IV Semester		L	T	P	C
		3	0	0	3
BLOCK CHAIN TECHNOLOGIES(MCA4102)					

Course Objectives:

- Impart strong technical understanding of Block chain technologies.
- Develop familiarity of current technologies, tools, and implementation strategies
- Introduce application areas, current practices, and research activity.

Course Outcomes(Cos):

At the end of the course, student will be able to
- Demonstrate the foundation of the Block chain technology and understand the processes in payment and funding.
- Identify the risks involved in building Block chain applications.
- Review of legal implications using smart contracts.
- Choose the present landscape of Block chain implementations and Understand Cryptocurrency markets.
- Examine how to profit from trading crypto currencies.

UNIT I:

The consensus problem, Asynchronous Byzantine Agreement, AAP protocol and its analysis, Nakamo to Consensus on permission-less, nameless, peer-to-peer network, Abstract Models for BLOCKCHAIN, GARAY model, RLA Model, Proof of Work (PoW) as random oracle, formal treatment of consistency, liveness and fairness - Proof of Stake (PoS) based Chains, Hybrid models (PoW + PoS).

UNIT II:

Crypto graphic basics for crypto currency, A short overview of Hashing, signature schemes, encryption schemes and elliptic curve cryptography

UNIT III:

Bit coin, Wallet, Blocks, Merkley Tree, hardness of mining, transaction verifiability, anonymity, forks, double spending, mathematical analysis of properties of Bit coin.

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UNIT IV:

Ethereum: Ethereum Virtual Machine (EVM),Wallets for Ethereum, Solidity, Smart Contracts, some attacks on smart contracts

UNIT V:

(Trends and Topics): Zero Knowledge proofs and protocols in Block chain, Succinct non interactive argument for Knowledge (SNARK), pairing on Elliptic curves ,Zcash.

Text Books:

1) Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Gold feder. Bit coin and crypto currency technologies: a comprehensive introduction. Princeton University Press, 2016. (Free download available)

Reference Books:

1) Joseph Bonneau et al, SoK: Research perspectives and challenges for Bit coin and crypto currency, IEEE Symposium on security and Privacy, 2015 (article available for free download) {curtain raiser kind of generic article, written by seasoned experts and pioneers}.
2) J.A.Garay et al, The bit coin backbone protocol - analysis and applications EUROCRYPT 2015 LNCS VOl 9057, (VOLII), pp 281-310. (Also available at eprint.iacr.org/2016/1048). (serious beginning of discussions related to formal models for bit coin protocols).
3) R.Passetal, Analysis of Block chain protocol in A synchronous networks, EUROCRYPT 2017,(eprint.iacr.org/2016/454) . A significant progress and consolidation of several principles).

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IV Semester		L	T	P	C
		3	0	0	3
SOFTWARE TESTING METHODOLOGIES(MCA4102)					

Course Objectives:

- To study fundamental concepts in software testing and discuss various software testing issues and solutions in software unit, integration, regression and system testing
- To learn how to plan a test project, design test cases and data, conduct testing, manage software problems and defects, generate a test report
- Toexposetheadvancedsoftwaretestingconceptssuchasobject-orientedsoftwaretesting methods, web-based and component-based software testing
- To understand software test automation problems and solutions
- To learn how to write software test documents and communicate with engineers in various forms

Course Outcomes:

By the end of the course, the student should have the ability to:
- Identify and understand various software testing problems, apply software testing knowledge and engineering methods and solve these problems by designing and selecting software test models, criteria, strategies, and methods
- Design and conduct a software test process for a software project
- Analyze the needs of software test automation
- Use various communication methods and skills to communicate with their teammates to conduct their practice-oriented software testing projects
- Basic understanding and knowledge of contemporary issues in software testing, such as component-based, web based and object oriented software testing problems
- Write test cases for given software to test it before delivery to the customer and write test scripts for both desktop and web based applications

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UNIT I:

Software Testing: Introduction, Evolution, Myths & Facts, Goals, Psychology, definition, Model for testing, Effective Vs Exhaustive Software Testing.
Software Testing Terminology and Methodology: Software Testing Terminology, Software Testing Life Cycle, Software Testing Methodology.
Verification and Validation: Verification & Validation Activities, Verification, Verification of Requirements, High level and low level designs, verifying code, Validation

UNIT II:

Dynamic Testing-Black Box testing techniques**:** Boundary Value Analysis, Equivalence class Testing, State Table based testing, Decision table based testing, Cause-Effect Graphing based testing, Error guessing
White-Box Testing: need, Logic Coverage criteria, Basis Path testing, Graph matrices, Loop testing, data flow testing, mutation testing

UNIT III:

Static Testing: Inspections, Structured Walk throughs, Technical Reviews
Validation activities: Unit testing, Integration Testing, Function testing, system testing, acceptance testing
Regression testing: Progressives Vs regressive testing, Regression test ability, Objectives of regression testing, Regression testing types, Regression testing techniques

UNIT IV:

Efficient Test Suite Management: growing nature of test suite, Minimizing the test suite and its benefits, test suite prioritization, Types of test case prioritization, prioritization techniques, measuring the effectiveness of a prioritized test suite. Software Quality Management: Software Quality metrics, SQA models Debugging: process, techniques, correcting bugs.

UNIT V:

Automation and Testing Tools: need for automation, categorization of testing tools, selection of testing tools, Cost incurred, Guidelines for automated testing, overview of some commercial testing tools such as Win Runner, Load Runner, Jmeter and JUnit . Test Automation using Selenium tool.
Testing Object Oriented Software: basics, Object oriented testing Testing Web

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based Systems: Challenges in testing for web based software, quality aspects, web engineering, testing of web based systems, Testing mobile systems

Text Books:

1) Software Testing, Principles and Practices, Naresh Chauhan, Oxford.
2) Software Testing- Yogesh Singh, CAMBRIDGE.

Reference books:

1) Foundations of Software testing, Aditya PMathur,2ed,Pearson.
2) Software testing techniques– Baris Beizer, Dream tech, second edition.
3) Software Testing, Principles, techniques and Tools, MGLimaye,TMH
4) Effective Methods for Software testing, WillianEPerry,3ed,Wiley

e-   Resources:

https://www.tutorialspoint.com/software_testing_dictionary/test_tools.htm

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IV Semester		L	T	P	C
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BIG DATA ANALYTICS(MCA4102)					

Course 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 Outcomes(COs):

At the end of the course, student will be able to
- Identify the need-based tools, viz., Pig and Hive and to handle and formulate an effective strategy to implement a successful Data analytics project
- Organize the existing technologies and the need of distributed files systems to analyze the big data
- To Discuss the cluster and classification techniques
- Analyze the concepts of strem memory and spark models.
- Explain the use of NoSQL database in data analytics.

UNIT I:

Introduction to Big Data-Evolution of Big data, Best Practices for Big data Analytics, Big data characteristics, Validating, The Promotion of the Value of Big Data, Big Data Use Cases, Characteristics of Big Data Applications, Perception and Quantification of Value, Understanding Big Data Storage, A General Overview of High, Performance Architecture, HDFS, Map Reduce and YARN, Map Reduce Programming Model

UNIT II:

Frame works- Applicationson Big Data Using Pig and Hive, Data processing operators in Pig, Hive services, HiveQL, Querying Data in Hive, fundamentals of HBase and Zoo Keeper, IBM Info Sphere Big Insights and Streams

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UNIT III:

Clustering and Classification-Advanced Analytical Theory and Methods: Overview of Clustering, K-means, Use Cases - Overview of the Method, Determining the Number of Clusters, Diagnostics, Reasons to Choose and Cautions. Classification: Decision Trees, Overview of a Decision Tree, The General Algorithm, Decision Tree Algorithms, Evaluating a Decision Tree, Decision Trees in R, Naïve Bayes, Baye'sTheorem, Naïve Bayes Classifier.

UNIT IV:

Stream Memory and Spark- Introduction to Streams Concepts, Stream Data Model and Architecture, Stream Computing, Sampling Data in a Stream, Filtering Streams, Counting Distinct Elements in a Stream, Introduction to Spark Concept, Spark Architecture and components, spark installation, spark RDD(Resilient Distributed Dataset), spark RDD operations.

UNIT V:

NoSQL Data Management for Big Data and Visualization-NoSQL Databases: Schema-less Models: Increasing Flexibility for Data Manipulation, Key Value Stores, Document Store, Tabular Stores, Object Data Stores, Graph Databases Hive, Sharding, Hbase, Analyzing big data with twitter, Big data for E- Commerce Big data for blogs, Review of Basic Data Analytic Methods usingR.

Text Books:

1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
2. DavidLoshin,"Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", Morgan Kaufmann/El sevier Publishers, 2013.

Reference Books:

1. Michael Berthold, David J.Hand, "Intelligent Data Analysis",Springer,2007.
2. Tom White "Hadoop: The Definitive Guide"Third Edition,O'reilly Media,2012.
3. Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, PaulZikopoulos, "Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill Publishing,2012.

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4. BillFranks,"Taming the Big Data Tidal Wave: Finding Opportunities in Huge DataStreamswith Advanced Analytics", John Wiley& sons,2012.

5. GlennJ.Myatt,"MakingSenseofData",JohnWiley&Sons,2007.

6. PeteWarden,"BigDataGlossary",O'Reilly,2011.

7. Jiawei Han, MichelineKamber "Data Mining Concepts and Techniques", 2nd Edition, Elsevier, Reprinted2008.