CURRICULUM

(Scheme & Syllabi for First and Second Semesters)

FOR

POST GRADUATE DEGREE COURSE

IN

MASTER OF COMPUTER APPLICATIONS
(M.C.A.)

(2 years Post Graduate Programme)

(w.e.f. academic session 2020-21)

Faculty of Computer Science & Information Technology
Deenbandhu Chhotu Ram University of Science & Technology,
Murthal (Sonepat)-131039, Haryana, India
2020

MCA 1st semester to 2nd semester : Approved in 15th meeting of Academic Council held on 14.08.2020. applicable to all students admitted in 2020-21 & onwards.

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)

SCHEME OF STUDIES & EXAMINATIONS

Master of Computer Applications (MCA) 1st Year 1st Semester

Credit Based Scheme w.e.f. 2020-21

Sr. No.	Course No.	Course Title	Teaching Schedule			Marks of Class Work	Examination Marks		Total	Credit	Exam Duration
			L	T	P		Theory	Practical			
1.	MCA101C	Computer Organization. & Architecture	3	0	-	25	75	-	100	3	3
2.	MCA103C	Introduction to DBMS	3	0	-	25	75	-	100	3	3
3.	MCA105C	Programming in 'C'	3	0	-	25	75	-	100	3	3
4.	MCA107C	Software Engineering	3	0	-	25	75	-	100	3	3
5.	MCA109C	Computer Networks	3	0	-	25	75	-	100	3	3
6.	MCA111C	Data Structure using 'C'	3	0	-	25	75	-	100	3	3
7.	MCA123C	Software Lab-I (Based on MCA103C)	-	-	4	25	-	75	100	2	3
8.	MCA125C	Software Lab-II (Based on MCA105C & MCA111C)	-	-	4	25	-	75	100	2	3
9.	HUMT131C	Soft Skill Seminar			2 x 2	25		75	100	2	3
TOTAL			**18**		**12**	**225**	**450**	**225**	**900**	**24**	

Deenbandhu Chhotu Ram University of Science & Technology, Murthal (Sonepat)

SCHEME OF STUDIES & EXAMINATIONS

Master of Computer Applications (MCA) 1st Year 2nd Semester

Credit Based Scheme w.e.f. 2020-21

Sr. No.	Course No.	Course Title	Teaching Schedule			Marks of Class Work	Examination Marks		Total	Credit	Exam Duration
			L	T	P		Theory	Practical			
1.	MCA102C	Object Oriented Programming using JAVA	3	0	-	25	75	-	100	3	3
2.	MCA104C	Operating System	3	0	-	25	75	-	100	3	3
3.	MCA106C	Web Technologies	3	0	-	25	75	-	100	3	3
4.		Elective-I	3	0	-	25	75	-	100	3	3
5.		Elective-II	3	0	-	25	75	-	100	3	3
6.	MCA122C	Software Lab-III (Based on MCA102C)	-	-	4	25	-	75	100	2	3
7.	MCA126C	Software Lab-IV (Based on MCA106C)	-	-	4	25	-	75	100	2	3
TOTAL			**15**		**8**	**175**	**375**	**150**	**700**	**19**	

Elective-I

MCA152C	Introduction to Data Sciences
MCA154C	Software Testing & Quality Assurance
MCA156C	Computer Graphics
MCA158C	System Administration

Elective-II

MCA162C	Soft Computing
MCA164C	Cyber Security
MCA166C	Design and Analysis of Algorithms
MCA168C	Theory of Computation

MCA 1st semester to 2nd semester : Approved in 15th meeting of Academic Council held on 14.08.2020. applicable to all students admitted in 2020-21 & onwards.

MCA101C – COMPUTER ORGANIZATION AND ARCHITECTURE
MCA Semester - I

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:

This course is an introductory course in computer organization and architecture. Topics include basic computer design, CPU design, memory organization and pipelining. Upon completion of this course the student will learn about:

1. The basic concepts and Organization of computer systems and various types of computer instructions.
2. To discuss different types of control unit and there working.
3. The basic hardware for processing, storing, and moving information, and how they are organized within the internal architecture of a computer.
4. To understand the concept of memory and I/O operations.

COURSE CONTENT:

UNIT I

Basic Computer Design: Basic concept of Computer Organization and Computer Architecture, Von Neumann Concept, Instruction codes, Computer Instructions and types, Instruction Set, Instruction Cycle – fetch, indirect, interrupt, execute; Flowchart for Instruction Cycle, Instruction Formats, Addressing Modes, Computer Registers, Bus System and its structure, Register Transfer Language terminology.

Programming in 8086/8088/808x Assembly Language: A/L program structure, segments, registers, instructions, macros, A/L directives.

UNIT II

CPU Design: Micro-operations and its types, General Register Organization, Stack Organization, Control Unit of a basic computer – Timing and Control; Hardwired and Micro-programmed controlled unit, Microinstruction and its types, Microinstruction sequencing,
RISC vs CISC.

UNIT III

Memory organization: Stack Organization: Memory Stack and Register Stack Memory organization:Memory Hierarchy, Main Memory (RAM and ROM chips, Logical and Physical Addresses, Memory, Address Map, Memory Connection to CPU), Associative Memory, Cache Memory: Cache Memory (Initialization of Cache Memory, Writing data into Cache, Locality of Reference, Hit Ratio), Replacement Algorithms (LRU and FIFO). Cache Memory Mapping Techniques: Direct Mapping, Associative Mapping and SetAssociative Mapping

UNIT IV

Pipeline and Vector processing: Parallel Processing, pipelining, arithmetic pipeline, Vector Processing, Array Processors.

Input-Output Organization: Peripheral devices, input-output interface, asynchronous data transfer, modes of data transfer, priority interrupt, direct memory access, input-output processor.

TEXT/REFERENCE BOOKS:

- Mano M, "Computer System and Architecture", (3rd edition) Prentice Hall of India, New Delhi, 1994.
- Pal Chauduri, P., "Computer Organisation and Design", Prentice Hall of India, New Delhi, 1994.
- RajaramanV., and Radhakrishnan, T., "Introduction to Digital Computer Design" (4th edition). Prentice Hall of India, New Delhi, 1997.
- Stallings. W, "Computer Organization and Architecture, (2nd edition) Prentice Hall of India, New Delhi

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES:

By the end of the course, the students will be able to:

1. Understand different instructions, types, formats and addressing modes.
2. Design and analyze the main functional units (control unit) of a computer.
3. Differentiate parallel processors and pipelined designs.
4. Identify various I/O techniques and memory architecture.

MCA103C – INTRODUCTION TO DBMS
MCA Semester - I

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:

In this course student will learn about:

1. Various Data Models, Schemas, Instances, three Schema Architecture and DBMS Component.
2. Conceptual modeling of databases using ER diagrams.
3. Demonstrate SQL for relational database.
4. Refine the scheme of database by applying normal forms and understand transaction management protocols and recovery algorithms

COURSE CONTENT:

UNIT I

DBMS an overview, Advantages of DBMS, Network, Hierarchical and Relational Model, Levels of abstraction, Data Independence, Data Models, Instances and schemes, Data independence Structures of a DBMS, Application Programmers & Data Base administrators – their function, Transaction Management Entity Relationship Model: Entities, Attributes and Entity Sets, Relation and Relationships sets, mapping and participation constraints, Aggregation, Specialization and Generalization, Features of E-R Model.

UNIT II

Relational Model: Introduction to relational model, Integrity constraints over relations, Enforcing Data Integrity, Integrity Constraints, Relational Data, Logical Data Base Design, Reduction of E-R Diagrams to relations, Introduction to views, Querying Relational Algebra and Relational Calculus, Operations on Relational Algebra, Operations on Relational Calculus, Tuple Relational Calculus, Domain Relational Calculus

UNIT III

Database Design, Data Redundancy, Introduction to Schema Refinement, Functional Dependencies, Normal Forms-First, Second, Third, Boyce code, Fourth and Multivalued Dependencies Structured Query Language: Basic SQL Queries, Nested Queries, Aggregate operator, Null Values, implementation of Various Relational Algebra operations.

UNIT IV

Transaction management: ACID Properties, Transaction states.
Concurrency control: Concurrency Control –Overview, Concurrency control problems, Locks, Locking Protocols, Deadlocks, Serializability.
Recovery System: Types of Failures, Recovery Techniques, ARIES

TEXT/REFERENCE BOOKS:

- Korth, Silberschatz, Database System Concepts, 4th Ed., TMH, 2000.
- Date C. J., An Introduction to Database Systems , 7th Ed., Narosa Publishing, 2004
- ElmasriNavathe, Fundamentals of Database Systems, 5th Edition Pearson Education
- Vipin.C.Desai , An introduction to Database System, West Pub. Co.
- Sham Tickoo and Sunil Raina, "Oracle 11g with PL/SQL Approach", Pearson, 2010.
- Ullman, J.D., "Principles of Database Systems", Galgotia Publications. New Delhi.
- Raghurama Krishnan: Data base Management Systems, Johannes Gehrke, Tata McGrawHill, Latest Edition
- P. Radha Krishna: Database Management Systems, HI-TECH Publications.
- Mathew Leon: Data base Management System Leon Vikas.

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COURSE OUTCOMES

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

1. Describe the basic concepts of DBMS and various databases used in real applications.
2. Design relational database using E-R model and normalization
3. Become proficient in using Structured Query Language(SQL).
4. Explain transaction management and recovery management for real applications

MCA105C - PROGRAMMING IN 'C'

MCA Semester - I

L	T	P	Credits
3	1	-	3

Class Work	**: 25 Marks**
Examination	**: 75 Marks**
Total	**: 100 Marks**
Duration of Examination	**: 03 Hours**

COURSE OBJECTIVE

This course aims to familiarize the students with basic concepts of computer programming and developer tools and teach students how to design, write and execute a Program in 'C'.

1. To teach the behavior of basic Data types, Control Structures and Various Programming techniques.
2. To understand and analyze a Problem and then try to write the C-Codes to solve the problem.
3. To make students familiar with basic Computer Programming Array, Pointers, Functions & File Handling in C
4. To present the syntax and semantics of the "C" language as well as data types offered by the language help the students to write their own programs using standard language infrastructure regardless of the hardware or software platform

COURSE CONTENT

UNIT I

Introduction to algorithms, Flow charts, Tracing flow charts, Problem solving methods, Need for computer languages, Reading programs written in C language, C character set, Identifiers and keywords, Data types, Declarations, Expressions, statements and symbolic constants, Input-Output: getchar, putchar, scanf, printf, gets, puts, functions, Pre-processor command: # include, define, ifdef. Preparing and running a complete C program.

UNIT II

Operators and expressions : Arithmetic, unary, logical, bit-wise, assignment and conditional operators, Library functions, Control statements: while, do-while, for statements, nested loops. If else, switch, break, continue and goto statements, comma operator.

UNIT III

Arrays: Defining and processing, Passing to a function, Multi dimensional arrays.
Strings: Strings, operations on strings. Functions: Defining and accessing: passing arguments, Function prototypes, Recursion, Use of library functions, Storage classes: automatic, register, external and static variables,

UNIT IV

Pointers: Declarations. Passing to a function. Operations on pointers. Pointers and arrays. Arrays of pointers. Structures: Defining and processing. Passing to a function. Unions. Data files: Open, close, create.

TEXT AND REFERENCE BOOKS:

1. E. Balaguruswami, Programming in ANSI C, Tata Mcgraw Hill.
2. YashwantKanetker, Let us C, BPB Publications.
3. Gottfried, Programming with C, Tata McGraw Hill.
4. Brian W. Kernighan, Dennis M. Ritchie, The C Programming Language, 2nd Ed., Prentice Hall ofIndia.
5. S.S. Bhatia and Vikram Gupta, Computer Fundamentals, Kalayani Publication.
6. Dennis P. Curtin, Kim Foley, KunalSen, Cathleen Morin, Information technology, TMH.
7. Hutchison, R., "Programming in C". McGraw Hill, New York, 1990.
8. Johnsonbaugh, R., and Kalin, M., "Applications Programming in C", Prentice Hall of India, 1989. Rajaraman, V, "Computer Programming in C", Prentice Hall of India, New Delhi, 1995.

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COURSE OUTCOME

By the end of the course the students will be able to:

1. Design an algorithmic solution for a given problem and draw flowchart for given problem
2. Learn how to write a ‘c’ program with various control structures and looping statements.
3. Introduce modularity using functions and pointers which permit run-time polymorphism
4. Trace the given C program manually and Write C program for simple applications of real life using Functions, Arrays, Pointers, Structures and Files

MCA107C – SOFTWARE ENGINEERING
MCA Semester - I

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03Hours**

COURSE OBJECTIVES:

1. To enable students to apply a systematic application of scientific knowledge in creating and building cost effective software solutions to business and other types of problems.
2. To learn about the design models ,design principles (data design, component design, interface design & architectural design) and different types of software testing.
3. To make students understand project management concepts and their metrics.
4. To understand agile methodology and overview of cloud computing.

COURSE CONTENT:

UNIT I

Introduction: Introduction to Software Engineering, importance of Software, The Software Evolution, Software Characteristics, Software Applications, Software Crisis: Problem and Causes.

Software Development Life Cycle: Waterfall model, Incremental and Evolutionary process models.

Software Requirement Specification: Problem Analysis, Requirement elicitation and Validation, Requirements modeling: Scenarios, Information and analysis classes, flow and behavioral modeling, documenting Software Requirement Specification (SRS).

UNIT II

System Design: Design Concepts, design models for architecture, component, data and user interfaces; Problem Partitioning, Abstraction, Cohesiveness, Coupling, Top Down and Bottom Up design approaches.

Software Testing: Levels of Testing, Functional Testing, Structural Testing, Test Plan, Test Case Specification, Software Testing Strategies, Verification & Validation, Unit, Integration Testing, Top Down and Bottom Up Integration Testing, Alpha & Beta Testing, White box and black box testing techniques, System Testing and Debugging.

UNIT III

Software Quality Assurance: Software Configuration Management, Overview of Software Quality Control and Quality Assurance, ISO 9000 Certification for Software Industry, SEI Capability Maturity Model (CMM) and Comparison between ISO & SEI CMM.

Technical Metrics for Software: A Framework for Technical Software Metrics, Metrics for the Analysis Model, Metrics for Design Model, Metrics for Source Code, Metrics for Testing, Metrics for Maintenance.

UNIT IV

Agile: Introduction to Agile, Value points of Agile, Principle of Agile, Agile comparisons with traditional model of Software Engineering, Agile Team, Agile Implementation, Introduction to Scrum.

Cloud Computing: Introduction to Cloud Computing, Characteristics of Cloud Computing, Advantages of Cloud Computing, Cloud Deployment Model, Service Model, Virtualization, virtualization technique**.**

TEXT /REFERENCE BOOKS:

- Roger S. Pressman, Software Engineering, A Practitioner's Approach, McGraw Hill International Edition (2009) 7th edition.
- Ian Sommerville, Software Engineering, Addison-Wesley Publishing Company, (2006) 8th ed.
- KK Aggarwal, Yogesh Singh, Software Engineering,(2012), 3rd Edition, New Age International.
- James F. Peter, Software Engineering - An Engineering Approach, John Wiley (2004).
- Pankaj Jalote, An integrated Approach to Software Engineering, Narosa (2005).
- Richard Fairley, " Software Engineering Concepts", Tata McGraw Hill Edition, 2008
- Ali Behforroz, Frederick J.Hudson, "Software Engineering Fundamentals", Oxford Indian Reprint, 2012
- Kassem A. Saleh, "Software Engineering", First Edition, J.Ross Publishing, 2009.
- Jibitesh Mishra, Ashok Mohanty, "Software Engineering", Pearson Education, First Edition, 2012

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COURSE OUTCOMES: Students will be able:

1. To understand basic concepts of software engineering, implement Software life cycle models and have knowledge of different estimation models.
2. To understand different design principles of a software and prepare software testing strategies.
3. To understand project management concepts and their metrics.
4. To understand agile methodology and basics of cloud computing.

MCA109C – COMPUTER NETWORKS
MCA Semester - I

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:
In this course student will learn about:

1. Building an understanding of the fundamental concepts of computer networking.
2. Understand Network, routing algorithms and its protocols.
3. Internetworking principles and how the Internet protocols, routing algorithms, and applications operate.
4. Understand network security and its techniques.

COURSE CONTENT

UNIT I
Introduction to Computer Network: Introduction to Computer Networks, Application of Computer Network, Internet, Private Networks, ARPANET, OSI reference model, Functions of each layer, Services and Protocols of each layer, Transmission media: Guided & Unguided, Connectors, Networking Devices: Hub, Switch, Repeater, Bridge, Router, Gateways, Broadcasting, Multicast, Unicast, Transmission Mode, bandwidth, Switching approaches, Circuit Switching, Packet Switching, Virtual Circuit,

UNIT II
LAN and WAN: IEEE 802 standards, Token Passing, Ethernet, Layer 2 & 3 switching, Fast Ethernet and Gigabit Ethernet, Token Ring, Peer-To-Peer network, LAN Protocols: Multiple access communication, Routing, Routing Algorithm, Routing Protocols, ISDN, VLANs, Proxy Servers,
Network Management: Performance Management, Class of Service, Quality of Service

UNIT III
TCP/IP: Layers of TCP/IP, Internet Protocol, IP Addressing, Subnetting, Supernetting, Subnetmask, CIDR, Connection Less and Connection Oriented Service, TCP, UDP, ARP, RARP, ICMP, IPv6, DHCP, Domain Name System, Email – SMTP, POP,IMAP; FTP, NNTP, HTTP, Network port, Socket.

UNIT IV
Network Security : Introduction to Network Security, Need of Network Security, OSI Security Architecture, Network Security Model, Cryptography, Cipher Text, Classical Technique of Cryptography, Stream Cipher, Block Cipher, Symmetric Key and Asymmetric Key, Public Key cryptography, Digital Signature,
Web Security: Secure Socket Layer, https, Firewall

TEXT/REFERENCE BOOKS:

- Forouzan, "Data Communication and Networking", TMH, 4th Edition.
- A.S. Tanenbaum, "Computer Networks", PHI, 4th Edition.
- W. Stallings, "Data and Computer Communication", Macmillan Press.
- Comer, "Computer Networks and Internet", PHI.
- Comer, "Internetworking with TCP/IP", PHI.
- W. Stallings, "Data and Computer Communication", McMillan.
- J. Martin, "Computer Network and Distributed Data Processing", PHI.
- W. Stallings, "Local Networks", McMillan.
- M.Schwertz, "Computer Communication Network Design and Analysis", PHI.
- S. Keshav, "An Engineering Approach to Computer Networking, Pearson", 2001.

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COURSE OUTCOMES:

At the end of this course students should be able to

1. Understand and explain Data Communications System and its components. Different types of network topologies and protocols.
2. Familiarize with Local Area Network and its protocols.
3. Enumerate and explain the layers of the OSI model and TCP/IP model.
4. Understanding of Networking management and routing techniques.
5. Understanding network security and cryptography techniques.

MCA111C – DATA STRUCTURE USING 'C'

MCA Semester - II

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVE

1. To understanding about writing algorithms and step by step approach in solving problems with the help of fundamental data structures.
2. To understand basic concepts about array , stacks, queues. and their applications.
3. To understand Trees, linked list and its types.
4. To understand different searching and sorting techniques.

COURSE CONTENT

UNIT-I

Introduction to Algorithm Design and Data Structures: Design and analysis of algorithm: Algorithm definition, comparison of algorithms. Top down and bottom up approaches to Algorithm design. Analysis of Algorithm; Complexity measures in terms of time and space.

UNIT-II

Arrays: single and multidimensional arrays. Address calculation using column and row major ordering. Various operations on Arrays. Application of arrays: Matrix multiplication, Sparse polynomial representation and addition.
Stacks and Queues: Representation of stacks and queues using arrays and linked-list. Circular queues, Applications of stacks: Conversion from infix to postfix and prefix expressions, Evaluation of postfix expression using stacks.

UNIT-III

Linked list: Singly linked list; operations on list, Linked representation of stacks and queues. Polynomial representation and manipulation using linked lists. Circular linked lists, Doubly linked lists.

UNIT-IV

Trees: Binary tree traversal methods: Preorder, In-order, Post-ordered traversal. Representation of trees. Binary tree representation of a general tree.
Overview of Threaded binary trees. Binary search tree, Height balanced (AVL)tree.
Sorting: Selection sort, Insertion sort, Bubble sort, Quick sort, merge sort, Heap sort, Radix sort and their complexity, Searching: Sequential search, Binary Search.

TEXT/REFERENCE BOOKS

1. Hubbard JR: Schaum's outline of Data Structures with C++, TMH.
2. R. Sedgewick: Algorithms in C++, Pearson Education Asia.
3. Y.Langsam, M.J.Augenstein and A.M.Tanenbaum: Data Structures Using C and C++, Prentice Hall of India.
4. R.Kruse, C.L.Tonodo and B.Leung: Data Structures and Program Design in C, Pearson Education.
5. S.Chottopadhyay, D.Ghoshdastidar & M.Chottopadhyay: Data Structures Through 'C' Language, BPB Publication.
6. G.L. Heileman: Data Structutes, Algorithms and Object Oriented Programming, Tata McGraw Hill.
7. E. Horowitz, Sahni and D. Mehta: Fundamentals of Data Structures in C++, Galgotia Publiction.
8. Lipschutz, "Data Structures" Schaum's Outline Series, TMH
9. Any other book(s) covering the contents of the paper in more depth.

Note: Latest and additional good books may be suggested and added from time to time.

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COURSE OUTCOMES

After completion of this course student will able to

1. Decide the appropriate data type and data structures for a given problem.
2. Write the algorithms for various operations on Arrays, Queues ,Stacks and linked list.
3. Implementation of Arrays, Queues ,Stacks and linked list.
4. Summarize and analysis of searching and sorting techniques.

MCA123C – SOFTWARE LAB-I
(Based on MCA103C)
MCA Semester - I

L	T	P	Credits
-	-	4	2

Class Work	**: 25 Marks**
Practical Examination	**: 75 Marks**
Total	**: 100 Marks**
Duration of Examination	**: 03 Hours**

The lab work includes:

1. Introduction to SQL.
2. To study Basic SQL commands (create database, create table, use, drop, insert) and execute the following queries using these commands:
   - Create a database named ' Employee'.
   - Use the database 'Employee' and create a table 'Emp' with attributes'ename', 'ecity', 'salary', 'enumber', 'eaddress', 'depttname'.
   - Create another table 'Company' with attributes'cname', 'ccity', 'numberofemp', 'empnumber'in the database 'Employee'.
3. To study the viewing commands (select, update) and execute the following queries using these commands:
   - Find the names of all employees who live in Delhi.
   - Increase the salary of all employees by Rs. 5,000.
   - Find the company names where the number of employees is greater than 10,000.
   - Change the Company City to Gurgaon where the Company name is 'TCS'.
4. To study the commands to modify the structure of table (alter, delete) and execute the following queries using these commands:
   - Add an attribute named 'Designation' to the table 'Emp'.
   - Modify the table 'Emp', Change the datatype of 'salary' attribute to float.
   - Drop the attribute 'depttname' from the table 'emp'.
   - Delete the entries from the table ' Company' where the number of employees are less than500.
5. To study the commands that involve compound conditions (and, or, in , not in, between , notbetween , like , not like) and execute the following queries using these commands:
   - Find the names of all employees who live in ' Gurgaon' and whose salary is between Rs.20,000 and Rs. 30,000.
   - Find the names of all employees whose names begin with either letter 'A' or 'B'.
   - Find the company names where the company city is 'Delhi' and the number of employees isnot between 5000 and 10,000.
   - Find the names of all companies that do not end with letter 'A'.
6. To study the aggregate functions (sum, count, max, min, average) and execute the followingqueries using these commands:
   - Find the sum and average of salaries of all employees in computer science department.
   - Find the number of all employees in company 'TCS'.

- Find the maximum and the minimum salary in the HR department.

7. To study the grouping commands (group by, order by) and execute the following queries usingthese commands:
   - List all employee names in descending order.
   - Find number of employees in each department where number of employees is greater than 5.
   - List all the department names where average salary of a department is Rs.10,000.
8. To study the commands involving data constraints and execute the following queries using these commands:
   - Alter table 'Emp' and make 'enumber' as the primary key.
   - Alter table 'Company' and add the foreign key constraint.
   - Add a check constraint in the table 'Emp' such that salary has the value between 0 andRs.1,00,000.
9. To study the commands for aliasing and renaming and execute the following queries using these commands:
   - Rename the name of database to 'Employee1'.
   - Rename the name of table 'Emp' to 'Emp1'.
   - Change the name of the attribute 'ename' to 'empname'.
10. To study the commands for joins (cross join, inner join, outer join) and execute the following queries using these commands:
   - Retrieve the complete record of an employee and its company from both the table using joins.
   - List all the employees working in the company 'TCS'.
11. To study the various set operations and execute the following queries using these commands:
   - List the enumber of all employees who live in Delhi and whose company is in Gurgaon or if both conditions are true.
   - List the enumber of all employees who live in Delhi but whose company is not in Gurgaon.
12. To study the various scalar functions and string functions (power, square, substring, reverse ,upper, lower, concatenation) and execute the following queries using these commands:
   - Reverse the names of all employees.
   - Change the names of company cities to uppercase.
   - Concatenate name and city of the employee.
13. To study the commands for views and execute the following queries using these commands:
   - Create a view having ename and ecity.
   - In the above view change the ecity to 'Delhi' where ename is 'John'.
   - Create a view having attributes from both the tables.
   - Update the above view and increase the salary of all employees of IT department by Rs.1000.
14. Study of Integrity Constraints in SQl.
15. Study of Use of Group By and Having Clause.
16. Study of various types of Views.
17. Study of Indexes in SQL.
18. Study of Aggregate Functions in SQL.

MCA125C – SOFTWARE LAB-II
(Based on MCA105C & MCA111C)
MCA Semester - I

L	T	P	Credits
-	-	4	2

Class Work	**: 25 Marks**
Practical Examination	**: 75 Marks**
Total	**: 100 Marks**
Duration of Examination	**: 03 Hours**

The lab work includes:

1. Find the Simple and Compound Interest.
2. Convert degrees into Fahrenheit and vice versa
3. Calculate the salary of an employee given his basic pay, HRA = 10% of basic pay,TA=5% of his basic pay and deductions IT = 2.5% of his basic pay
4. Write a program to find the largest of three numbers. (if-then-else).
5. Write a program to find the largest number out of n numbers (for-statement).
6. Solve quadratic equations for the given values of a,b,c.
7. Generate all Armstrong numbers up to n.
8. Write a program to concatenate two strings
9. Write a program to check that the input string is a palindrome or not.
10. Write a menu driven C program to Insert an element into an array and Delete an element from the array (first occurrence) .
11. Program for insertion and deletion in an array.
12. Implement linear search.
13. Implement binary search.
14. Sort the given numbers in ascending order using bubble sort.
15. Sort the given list suing selection.
16. Write a program to Add, subtract and multiply two matrices.
17. Create a structure Complex Number having real and imaginary part as properties. Write functions to add and subtract the two complex numbers.
18. Define a structure called student having the properties of student_id, student name and branch of the student with a sub structure of marks of 3 subjects. Write a Menu Driven C Program to
    a. Add new student detail.
    b. Delete a student detail.
    c. Display all student details.
    d. Display the student name with best mark.
19. Write a Programme to implement a stack using array.
20. Write a Programme to implement a stack using linked list
21. Write a Programme to implement a queue using array.
22. Write a Programme to implement a queue using linked list
23. Write a Programme to implement a circular queue using array
24. Write a Programme to implement a simple linked list
25. Program to traverse a tree.

HUMT131C – SOFT SKILL SEMINAR

MCA Semester - I

L	T	P	Credits		
-	-	4	2	**Class Work**	**: 50 Marks**
				Practical Examination	**: 50 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

The following course content is prescribed for the Communication and presentations Lab:

- Oral Presentations – JAM, elevator pitch
- Functional English - starting a conversation – responding appropriately and relevantly – using the right body language – role play in different situations.
- Group Discussion – dynamics of group discussion, intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.
- Making power point presentations.
- Interview Skills – concept and process, pre-interview planning, opening strategies, answering, strategies, practicing mock-interviews.

MCA102C – OBJECT ORIENTED PROGRAMMING USING JAVA
MCA Semester - II

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:

In this course student will learn about:

1. The basics of JAVA and concepts of Object Oriented programming .
2. Concept and implementation of basic OOPS features.
3. Implementation of interface and inheritance.
4. To understand exceptional handling and multi-threading concepts and implementation using Applets.

COURSE CONTENT

UNIT I

Object Oriented programming and java: Introduction to Object Oriented Programming, Comparison with procedural programming, OOPS languages, **OOPS Concepts** : Class and objects, Encapsulation, Abstraction, Polymorphism, Inheritance, Java as a OOPS Language, Features of Java, Application of Java, Run-Time Environment of Java, Java Virtual Machine, JDK, Bytecode, Java Program Structure, Compile and Running of Program in Java, Data Types, String, Array, Control Statement, Command Line Arguments, Libraries of Java, Input/ Output using Scanner Class.

UNIT II

Implementation of OOPS feature in Java: Class and its Objects, Members of Class: Data member and Methods, Calling members of class. Parameter passing, return type. Method Overloading, Constructor, Constructor Overloading, this keyword, static keyword, Passing object as parameter, Returning object. Inner Class (Nested Class), static class.

UNIT III

Inheritance: Use of multiple classes, base class, sub-class, extending the class, multilevel inheritance, method overriding, abstract class, super keyword, final keyword, calling base class constructor. Packages, Access modifier: class level and member level, Inheritance with packages.
Interface: creating and implementation of interface in class, interface and abstract class.
Exceptions Handling: Exception, Handling of Exception, Using try-catch, Catching Multiple Exceptions, Using finally clause, Types of Exceptions, Throwing Exceptions.

UNIT IV

Multithreading Programming: The Java Thread Model, Understanding Threads, the Main Thread, Creating a Thread, Creating Multiple Threads, Thread Priorities.
AWT: Introduction, Components AWT, Applets in Java: Applet Basics, Applet Architecture, Applet Life Cycle, Simple Applet Display Methods, The HTML APPLET Tag Passing Parameters to Applets.

TEXT/REFERENE BOOKS

- The Complete Reference JAVA, TMH Publication.
- Beginning JAVA, Ivor Horton, WROX Public.
- JAVA 2 UNLEASHED, Tech Media Publications.
- JAVA 2(1.3) API Documentations.
- Herbert Schildt," The Complete Reference Java J2SE", 7th Edition, TMH, New Delhi,2009.
- Cay Horstmann, John Wiley and Sons, "Big Java 2nd Edition", John Wiley and Sons, Pearson
- Edu,2006.
- H.M.Dietel and P.J.Dietel," Java How to Program" , Sixth Edition, Pearson Education/PHI,2007.
- R.Krishna Murthy-"Java and Internet Programming"
- Somasundaram, Jaico, "Java.
- Y.Daniel Liang, "Introduction to Java programming", Pearson,2012.
- Latest and additional good books may be suggested and added from time to time.

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES:
By the end of the course the students will be able to:

1. Write Java programs using object-oriented programming techniques including classes, objects, methods, instance variables, interface etc.
2. Construct programs using basic concepts of OOPS.
3. Implement interface and inheritances
4. Design and implementation programs of Exception handling, Multithreading and applets.

MCA104C – OPERATING SYSTEM
MCA Semester - II

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:

The objectives of this course are to:

1. Help students become familiar with the fundamental concepts of operating system and to study the process management and scheduling.
2. To understand the concepts of Memory management and virtual memory.
3. To understand file system and synchronization.
4. To understand deadlock and its Detection, Avoidance and Prevention methods.

UNIT-I

Operating System Introduction- Functions, Characteristics, Structures - Simple Batch, Multi programmed, timeshared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating-System services, System Calls, Virtual Machines.

Process and CPU Scheduling - Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Interposes Communication Scheduling Criteria, Scheduling Algorithm, Multiple-Processor Scheduling, Real-Time Scheduling.

UNIT-II

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Demand Paging, Performance of Demanding Paging, Page Replacement, Page Replacement Algorithm, Allocation of Frames, Thrashing.

UNIT-III

File System Interface and Implementation -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management, Directory Management, Directory Implementation, Efficiency and Performance.

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.

UNIT-IV

Deadlocks - System Model, Dead locks Characterization, Methods for Handling Deadlocks Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

I/O Management – I/O software and its types, Disk Scheduling.

Shell Programming: Concept of shell, Types of shell, Editors for shell programming (e.g. vi), basics of Shell programming.

Case Study- UNIX, LINUX, and Windows NT.

TEXT/ REFERENCE BOOKS:

- Silberschatz & Galvin: Operating System Concept, Wiley.
- Milan Milenkovic: Operating Systems, Tata McGraw – Hill.
- William Stallings: Operating Systems, PHI.
- Yashawant Kanetkar: Unix Shell Programming, BPB.
- A.S. Tanenbaum: Modern Operating Systems, Pearson/PHI.
- Dhamdhere: Operating Systems, Tata McGraw Hill.
- Harvey M Deital, "Operating Systems", Addison Wesley ,1999.
- Stuart .E. Madnick & John. J. Donovon , "Operating System"

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES

By the end of the course the students will be able to:

1. Understand the process management policies and scheduling of processes by CPU
2. Describe and analyze the memory management and its allocation policies.
3. Evaluate the requirement for process synchronization and coordination handled by operating system
4. Understand the concepts of deadlock in operating systems and how they can be managed / avoided.

MCA106C –WEB TECHNOLOGIES
MCA Semester - II

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:

1. To understand basic concept of internet and HTML.
2. To learn CSS and JavaScript.
3. To understand ASP.net.
4. To understand advanced technology concepts.

COURSE CONTENT:

UNIT I

Basic Concept of Internet and Web Technology: Introduction to the Internet, Internet Infrastructure, Web-Sites, WWW, web-server, client-server on internet, web-browser, Internet Protocol: http, https, File Transfer Protocol, Telnet, ssl. Email, Domain Name, DNS, URL, Client-side and Server-side programming languages. Static & Dynamic Web Sites, Responsive Web Sites, cookies, working of Search Engine. Hyper Text Markup Language (HTML), HTML-Tags: meta, head, body tags, image tag, ref tag, li-ul tag, video-tag, Text formatting tags, div tag, frame tag, Forms creation in HTML

UNIT II

CSS and JavaScript: CSS(Cascading style sheet), Advantages of CSS, CSS Syntax: Selector, Property, Value, Embedded CSS, Inline CSS, External CSS, Imported CSS, CSS-Colors, Text Formatting, Positioning.

Scripting Language: Java Script, Application of JavaScript, Placement in JavaScript : HTML head, HTML body, Java Script in External File, variables & data type, reserved words, operators, java script functions, java script objects method, user defined objects, Java Script Form Validation: password validation, number validation, email validation, Java Script Frame Work.

UNIT III

Active Server Pages: Platform independent languages, importance of platform independent languages in internet programming, Introduction to Microsoft . Net Technology, .net languages.
Introduction to ASP.net, ASP.net Applications, Page Life Cycle, Application & Session Events, Page & Control Events, Server Side development: Request and Response, ASP Server Control, Introduction to ADO.Net, DataSet class, DataRow Class, DataTable class, DataAdapter, DataReader class, DbConnection and DbCommand class.

UNIT IV

Advance Technologies: Introduction to AJAX, Introduction JSON, SOAP and REST protocol, Introduction to Service Oriented Architecture, Web 1.0, 2.0, 3.0 standards, Content Management System, Open Source CMS, features of CMS, Introduction to various CMS (WordPress, Joomla, Drupal, Magento) . Building simple web-site in WordPress, plug-in, configuring server, creating database in WordPress. Introduction to Digital Marketing, Overview of SEO .

TEXT/ REFERENCE BOOKS:

- Jon Duckett "Beginning Web Programming" WROX.
- Marty Hall and Larry Brown "Core Servlets and Java Server pages Vol. 1: Core
- Technologies", Pearson.
- DanWoods and Gautam Guliani,"Open Source for the Enterprise: Managing Risks,
- Reaping Rewards", O'Reilly, Shroff Publishers and Distributors, 2005.
- Sebesta,"Programming world wide web" Pearson.
- Murach,"Murach's beginning JAVA JDK 5", SPD
- Wang,"An Introduction to web Design and Programming",Thomson

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES:

The outcome of this course includes:

1. Have a Good understanding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.
2. Students will be able to develop a webpage using HTML and perform validation thru java script.
3. Students will be familiar with ASP.net.
4. Students will be able to explain different advance web technologies and Digital Marketing constructs.

MCA152C – INTRODUCTION TO DATA SCIENCE
MCA Semester - II

L	T	P	Credits
3	0	-	3

Class Work	**: 25 Marks**
Examination	**: 75 Marks**
Total	**: 100 Marks**
Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:

1. To understand the basic concepts of Data science and data pre-processing.
2. To analyze data using Statistics and Probability techniques.
3. To understand the basic concepts of clustering and classification techniques.
4. To understand of the key techniques and theory used in visualization, including data models, graphical perception and techniques for visual encoding and interaction.

COURSE CONTENT:

UNIT I

Introduction : Benefits and uses of data science and big data , Facets of data , Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management , data science process, Data pre-processing: Data Cleaning, Data Integration, Data Reduction, Data Transformation and Data Discretization.

UNIT II

Data analysis: Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance, Distribution properties and arithmetic, Samples/CLT Probability: Random experiments, trial, sample space, events. Approaches to probability - classical, empirical, subjective and axiomatic. Theorems on probabilities of events. Addition rules of probability. Conditional probability, independence of events and multiplication rule of probability.

UNIT III

Classification Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy, Support Vector Machines, Lazy Learners (or Learning from Your Neighbors)
Cluster Analysis: Basic Concept and Methods Cluster Analysis, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Evaluation of Clustering, Clustering High-Dimensional Data, Clustering Graph and Network Data.

UNIT IV

Data visualization: Introduction, Types of data visualization, Data for visualization: Data types, Data encodings, Retinal variables, Mapping variables to encodings, Visual encodings

TEXT / REFERENCE BOOKS:

- Davy Cielen Arno D. B. Meysman Mohamed Ali "Introducing data Science, "
- Rachel Schutt and Cathy O'Neil, "Doing Data Science"
- Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to DataMining", Person Education, 2007.
- K.P. Soman, Shyam Diwakar and V. Ajay ", Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2016.
- Gupta, " Introduction to Data Mining with Case Studies", EasterEconomyEdition, Prentice Hall of India, 2006.

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES:

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

1. To perform the pre-processing of data and apply mining techniques on it.
2. To analyze data using data using Statistics and Probability techniques
3. To perform clustering and classification techniques.
4. To present analyzed data using visualization techniques/tools.

MCA154C – SOFTWARE TESTING AND QUALITY ASSURANCE
MCA Semester - II

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVE:

1. To discuss software testing background and to introduce software testing techniques.
2. To explain different types of testing to understand realistic problem.
3. To develop analyzing techniques through automation testing tool.
4. To create awareness about the process part as per as software testing is concern.

COURSE CONTENT:

UNIT I

Software Testing Fundamentals: Testing-Related Terminology, Key Issues: Test selection criteria/Test adequacy criteria, Testing effectiveness/Objectives for testing, Testing for defect identification, Theoretical and practical limitations of testing, the problem of infeasible paths, Testability, Relationship of Testing with other activities, Testing Levels: Unit Testing, Integration Testing, System Testing, Acceptance Testing.

UNIT II

Testing Techniques: Based on the software engineer's intuition and experience, Ad hoc testing, Exploratory testing, Specification-based techniques, Equivalence partitioning, Boundary-value analysis, Decision Table Testing, Testing with Formal Specifications, Finite State Machine based, Code Based, Data Flow Based, Mutation Testing, Techniques based on nature of the application: Object-oriented testing, Component-based testing, Web-based testing, GUI testing, Testing of concurrent programs, Protocol conformance testing, Testing of real-time systems, Testing of safety-critical Systems, Selecting and combining techniques.

UNIT III

Software Quality: Software Engineering Culture and Ethics, Value and Cost of Quality, Models and Quality Characteristics: Software Engineering Process Quality, Software Product Quality, Quality Improvement, Software Quality Management Processes: Quality assurance process, Verification process, Validation process, Review process, Audit process, Practical Considerations: Software Quality Requirements, Dependability, Integrity levels of software, Defect Characterization.
Quality Assurance: Inputs, Quality Management Plan, Results of Quality Control Measurements, Operational Definitions, Quality Planning tools and techniques, Quality Audits, Quality Improvements.

UNIT IV

Software Quality Management: Techniques, Software Quality Measurement, ISO 9000: 2000 Quality management systems - Fundamentals and vocabulary, ISO 9001:2000 Quality management systems –Requirements, ISO 9004:2000 Quality management systems --Guidelines for performance improvements, Quality Management Processes: Quality Planning, Quality Assurance, Quality Control.
Quality Planning: Inputs, Tools and Techniques, Outputs.
Quality Control: Inputs, Tools and Techniques: Inspection, Control Charts, Pareto Diagrams, Statistical Sampling, Flowcharting, Trend Analysis, Outputs: Quality Improvements, Acceptance Decisions, Rework, Completed Checklist, Process Adjustments.

TEXT / REFERENCE BOOKS:

- Boris Beizer, Software Testing Techniques, John Wiley & Dreamtech (2002).
- William Perry, Effective Methods for Software Testing, John Wiley & Sons, Inc. (2006) 3rd edition.
- Aditya P. Mathur, Foundations of Software Testing, Pearson Education (2008).
- Kamna Malik, Praveen Choudhary, Software Quality - A Practitioner's Approach, Tata McGraw Hill (1999).
- Daniel Galin, Software Quality Assurance from Theory to Implementation, Pearson Education (2003).
- Watts Humphery, A discipline for Software Engineering, Addison Wesley.
- Roger S. Pressman, Software Engineering a Practitioners Approach, McGraw Hill.

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES

By the end of the course the students will be able to:

1. Explain various Software Testing techniques.
2. Use Software Testing Strategies and Metrics for Software testing.
3. Explore different Object Oriented Testing strategies.
4. Use Software Reliability, and Software Quality Assurance mechanisms and have Knowledge of Quality management standards and methods as well.

MCA156C – COMPUTER GRAPHICS
MCA Semester - II

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

Course Objective:-

The main objective of this module is to

1. Introduce to the students the concepts of computer graphics.
2. Give an overview of interactive computer graphics, two dimensional system and mapping.
3. To implement drawing algorithm, two-dimensional transformation.
4. To understand Clipping, filling and an introduction to 3-D graphics.

UNIT I

Introduction to Graphics: Introduction to Computer Graphics and its applications, Components and working of Interactive Graphics;
Video Display Devices: Raster scan and Random Scan displays, Display Processors; Resolution, Aspect Ratio, Refresh CRT, Interlacing; Color CRT monitors, LookUp tables, Plasma Panel and LCD monitors, Interactive Input and Output Devices: keyboard, mouse, trackball, joystick, light pen, digitizers; image scanners, Touch Panels; Voice systems; printers, plotters; Graphics Software.

UNIT II

Drawing Geometry: Symmetrical and Simple DDA line drawing algorithm, Bresenham's line Algorithm; Symmetrical DDA for drawing circle, Polynomial method for Circle drawing; circle drawing using polar coordinates, Bresenham's circle drawing; Polynomial method for Ellipse Drawing; Trignometric method for Ellipse Drawing
Filled-Area Primitives: Flood fill algorithm, Boundary fill algorithm, Scan-line polygon fill algorithm.

UNIT III

2-D Transformations: translation, rotation, scaling, matrix representations and homogeneous coordinates, composite transformations, Shearing; Reflection.
2-D Viewing: window, viewport; 2-D viewing transformation, zooming, panning; Clipping operations: point and line clipping, Cohen-Sutherland line clipping, mid-point subdivision line clipping, Sutherland-Hodgman polygon clipping;
Input Techniques: Pointing and positioning techniques; rubber band technique; dragging.

UNIT IV

3-D Graphics: 3-D modeling of objects, 3D transformation matrices for translation, scaling and rotation
Projections: parallel projection: Orthographic and oblique projection; perspective projection;
Hidden surface removal: Z-buffer, depth-sorting, area subdivision
Shading: Modelling light intensities, Gouraud shading, Phong shading; **Animation:** Introduction to Animation, Tweening, Morphing, Fractals;

TEXT/REFERENCE BOOKS:

- Donald Hearn, M. Pauline Baker, Computer Graphics, Pearson Education.
- Foley etc., Computer Graphics Principles & Practice, Pearson Education.
- D.P. Mukherjee, Fundamentals of Computer Graphics and Multimedia, PHI.
- Newmann & Sproull, Principles of Interactive Computer Graphics, McGraw Hill.
- Rogers, Procedural Elements of Computer Graphics, McGraw Hill.
- Anirban Mukhopadhyay, Arup Chattopadhyay, Introduction to Computer Graphics and Multimedia, Vikas Publications.
- Zhigang Xiang, Roy Plastock, Computer Graphics, Tata McGraw Hill.
- Malay. K. Pakhira, Computer Graphics, Multimedia and Animation, PHI

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES:
Students will be able to:
1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics.
2. Use of geometric transformations on graphics objects and their application in composite form.
3. Extract scene with different clipping methods and its transformation to graphics display device.
4. Explore projections and visible surface detection techniques for display of 3D scene on 2D screen.

MCA158C – SYSTEM ADMINISTRATION
MCA Semester - II

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURE OBJECTIVES:

1. To understand basic architecture of Unix/Linux.
2. Familiarization of various Linux commands.
3. To understand various administration commands.
4. Overview of shell programming.

UNIT I

Linux introduction and file system: Basic Features, Advantages, Installing requirement, Partitioning the Hard drive for Linux, Installing the Linux system, System startup and shut-down process, init and run levels. Basic architecture of Unix/Linux system, Kernel, Shell. Linux File system-Boot block, super block, Inode table, data blocks, file storage, file access, Linux standard directories. Commands for files and directories, creating and viewing files using cat, file comparisons – cmp&comm, View files, disk related commands, checking disk free spaces.

UNIT II

Essential linux commands, Understanding shells, Processes in linux-process fundamentals, connecting processes with pipes, tee, Redirecting input output, manual help, Background processing, managing multiple processes, changing process priority with nice, scheduling of processes at, cron, batch, time, kill, ps, who, sleep, Printing commands, find, sort, touch, file, file related commands-ws, sat, cut, dd, etc. Mathematical commands- bc, expr, factor, units. Creating and editing files with vi, joe& vim editor, network files, security, privileges, authentication, Password administration, archiving.

UNIT III

System administration: Common administrative tasks, identifying administrative files: configuration and log files, Role of system administrator, Managing user accounts-adding & deleting users, changing permissions and ownerships, Creating and managing groups, modifying group attributes, Temporary disable user's accounts, creating and mounting file system, checking and monitoring system performance file security & Permissions, becoming super user using su. Getting system information with uname, host name, disk partitions & sizes, users, kernel. Backup and restore files, reconfiguration hardware with kudzu, installing and removing packages with rpm command. Configure X-windows desktop, starting & using X desktop. KDE & Gnome graphical interfaces, changing X settings.

UNIT IV

Shell programming: Basic of shell programming, Various types of shell available in Linux, comparisons between various shells, shell programming in bash, read command, conditional and looping statements, case statements, parameter passing and arguments, Shell variables, system shell variables, shell keywords, Creating Shell programs for automate system tasks. Simple filter commands – pr, head, tail, cut, paste, sort, uniq, tr. Filter using regular expressions – grep, egrep, and sed. awk programming – report printing with awk.

TEXT AND REFERENCE BOOKS:

- UNIX – Concepts & Applications (Third Ed.) – Sumitabha Das, Tata McGraw Hill Publications.
- E. Nemeth, G. Snyder, S. Seebass and T.R.Hein, "UNIX System Administration
- Handbook", Pearson Education, 3rd ED.
- Goodheart B. Cox J, "The Magic Garden Explained", Prentice Hall of India.
- Leffler S.J., MCAkusick M.K., Karels M.J. and Quarterman J.S.,"The Design and Implementation of the 4.3 BSD Unix Operating System", Addison Wesley.
- Behrouz A.Forouzan , Richard Gilberg, " Unix & Shell programming ", Thomson Asia, 2003

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES:

By the end of the course the students will be able to:

1. Explain how a modern Unix-based system is constructed and will have the basic knowledge and skills required to start working as a system administrator.
2. Design, implement and maintain a computer system suitable for a small office or company;
3. Troubleshoot services and other functionality in a small computer system;
4. Be able to demonstrate a system, including the services provided by the system, to show that system requirements have been met;

MCA162C – SOFT COMPUTING
MCA Semester - II

L	T	P	Credits
3	0	-	3

Class Work	**: 25 Marks**
Examination	**: 75 Marks**
Total	**: 100 Marks**
Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:

1. Develop the skill to gain of basic understanding of neural network theory .
2. To understand genetic and Fuzzy logic theory.
3. Introduce students to artificial neural networks and its applications.
4. To understand various applications of soft computing.

COURSE CONTENT

UNIT-I

Introduction: Introduction to soft computing, introduction to biological and artificial neural network; introduction to fuzzy sets and fuzzy logic systems.
Introduction to Genetic Algorithm: Genetic Operators and Parameters, Genetic Algorithms in Problem Solving, Theoretical Foundations of Genetic Algorithms, Implementation Issues.

UNIT-II

Artificial neural networks and applications: Different artificial neural network models; learning in artificial neural networks; neural network applications in control systems. Neural Nets and applications of Neural Network.

UNIT-III

Fuzzy systems and applications: fuzzy sets; fuzzy reasoning; fuzzy inference systems; fuzzy control; fuzzy clustering; applications of fuzzy systems.
Neuro-fuzzy systems: neuro-fuzzy modeling; neuro-fuzzy control.

UNIT-IV

Applications: Pattern Recognitions, Image Processing, Biological Sequence Alignment and Drug Design,Robotics and Sensors, Information Retrieval Systems, Share Market Analysis, Natural Language Processing.

TEXT/REFERENCE BOOKS:

- M. Mitchell: An Introduction to Genetic Algorithms, Prentice-Hall.
- J.S.R.Jang, C.T.Sun and E.Mizutani: Neuro-Fuzzy and Soft Computing, PHI, Pearson
- Education.
- Timothy J.Ross: Fuzzy Logic with Engineering Applications, McGraw-Hill.
- Davis E.Goldberg: Genetic Algorithms: Search, Optimization and Machine Learning,
- Addison Wesley.
- S. Rajasekaran and G.A.V.Pai: Neural Networks, Fuzzy Logic and Genetic Algorithms,
- PHI.
- D. E. Goldberg: Genetic Algorithms in Search, Optimization, and Machine Learning,
- Addison-Wesley.
- Note: Latest and additional good books may be suggested and added from time to time

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES:

After completion of this course, students will be able to:

1. Understand basic concept of soft computing and genetic algorithms.
2. Comprehend the fuzzy logic and its applications.
3. Understand the concept of neural network ,its models and applications.
4. Reveal different application of these models to solve various problems.

MCA164C – CYBER SECURITY
MCA Semester - II

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:

1. To understand cyber crime and its laws.
2. To work with tools and methods used in cyber crime.
3. To understand the life cyber of digital forensics.
4. To learn and understand web threats, challenges and protection policies.

UNIT- I

Introduction To Cybercrime:- Cybercrime and Information Security, Classifications of Cybercrimes, The need for Cyber laws, The Indian IT Act Challenges to Indian Law and Cybercrime Scenario in India, Weakness in Information Technology Act and it consequences, Digital Signatures and the Indian IT Act, Cybercrime and Punishment; Technology, Students and Cyber law; Survival tactics for the Netizens, Cyber-offenses: Cybers talking, Cyber cafe and Cyber crimes, Botnets, Attack Vector, Cloud Computing.

UNIT- II

Tools And Methods Used In Cybercrime:- Proxy Servers and Anonymizers, Phishing and identity theft, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Stenography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow; Cybercrime: Mobile and Wireless Devices: Trends in Mobility, Attacks on Wireless Networks, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones.

UNIT- III

Understanding Computer Forensics:- The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Digital Forensics Life Cycle, Chain of Custody Concept, Network Forensics, Computer Forensics and Stenography, Relevance of the OSI 7 Layer Model to Computer Forensics, Forensics and Social Networking Sites: The Security/Privacy Threats, Challenges in Computer Forensics, Forensics Auditing, Anti forensics.

UNIT- IV

Cyber security Organizational Implications:- Cost of Cybercrimes and IPR Issues, Web Threats for Organizations, Security and Privacy Implications from Cloud Computing, Social Media Marketing, Social Computing and the Associated Challenges for Organizations, Protecting People's Privacy in the Organization, Organizational Guidelines for Internet Usage, Safe Computing Guidelines and Computer Usage Policy, Incident Handling, Forensics Best Practices, Media and Asset Protection, Importance of Endpoint Security in Organizations.

TEXT /REFERENCE BOOKS:

- "Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Nina Godbole, Sunit Belapur, Wiley India Publications, April, 2011.
- Digital Privacy and Security Using Windows: A Practical Guide By Nihad Hassan, Rami Hijazi, Apress
- Digital Forensics, DSCI - Nasscom, 2012.

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES:

After completion of this course, students will be able to:

1. Demonstrate cyber crime, its laws and related terms.
2. Work with SQL injection, DOS attacks etc.
3. Explain computer forensic, Network forensic cyber forensic.
4. Understand safe computing guidelines, usage policies and incident handling.

MCA166C –DESIGN AND ANALYSIS OF ALGORITHMS
MCA Semester - II

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:

1. To understand various searching and sorting techniques.
2. To understand different paradigm of problem solving.
3. To analysis the asymptotic performance of the algorithms.
4. To understand the concept of NP hard and NP complete.

COURSE CONTENT:

UNIT I
Brief Review of Graphs, Sets and disjoint sets, union, sorting and searching algorithms and their analysis in terms of space and time complexity.
Divide and Conquer: General method, binary search, merge sort, qick sort, selection sort, Strassen's matrix multiplication algorithms and analysis of algorithms for these problems.

UNIT II
Greedy Method: General method, knapsack problem, job sequencing with dead lines, minimum spanning trees, single source paths and analysis of these problems.
Dynamic Programming: General method, optimal binary search trees, O/I knapsack, the traveling salesperson problem.

UNIT III
Back Tracking: General method, 8 queen's problem, graph colouring, Hamiltonian cycles, analysis of these problems.
Branch and Bound: Method, O/I knapsack and traveling salesperson problem, efficiency considerations. Techniques for algebraic problems, some lower bounds on parallel computations.

UNIT IV
NP Hard and NP Complete Problems: Basic concepts, Cook's theorem, NP hard graph and NP scheduling problems some simplified NP hard problems.

TEXT BOOKS/ REFERENCE BOOKS:

- Fundamental of Computer algorithms, Ellis Horowitz and SartajSahni, 1978, Galgotia Publ.,
- Introduction To Algorithms, Thomas H Cormen, Charles E Leiserson And Ronald L Rivest: 1990, TMH
- The Design and Analysis of Computer Algorithm, Aho A.V. Hopcroft J.E., 1974, Addison Wesley.

- Algorithms-The Construction, Proof and Analysis of Programs, Berlion, P.Bizard, P., 1986. Johan Wiley & Sons,
- Introduction to Design and Analysis of Algorithm, Goodman, S.E. &Hedetnieni, 1997, MGH.
- Introduction to Computers Science- An algorithms approach , Jean Paul Trembley, Richard B.Bunt, 2002, T.M.H.

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES:

After completion of this course, students will be able to:

1. Compute time complexity of various searching sorting algorithms.
2. Describe divide and conquer paradigm for problem solving and understand greedy approach, and dynamic programming method.
3. Differentiate back tracking and branch & bound technique.
4. Describe NP hard and NP complete Graph problems.

MCA168C – THEORY OF COMPUTATION
MCA Semester - II

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:

1. To give an overview of the theoretical foundations of computer science from the perspective of formal languages
2. To illustrate finite state machines to solve problems in computing
3. To explain the hierarchy of problems arising in the computer sciences.
4. To familiarize Regular grammars, context frees grammar.

COURES CONTENT:

UNIT I

String, Language, Basic operations on language, Union, Concatenation, Kleene closure, Regular Expressions, Deterministic Finite Automata, Non- deterministic Finite Automata, Equivalence of Deterministic and Non-Finite Automata, Properties of the Languages Accepted by Finite Automata. Moore and Mealy Machines.

UNIT-II

Grammars: Definition, Context free and Context sensitive grammar, Parse trees, Ambiguity in grammars, Reduced forms, Removal of useless Symbols and unit production, Chomsky Normal Form (CNF), Greibach Normal Form (GNF).

UNIT-III

Pushdown Automata: Definitions, Moves, Instantaneous Description, Deterministic Pushdown Automata, Equivalence of Pushdown Automata and CFL, Pumping lemma for CFL, Applications of Pushdown Automata.

UNIT-IV

Turing Machines: Turing Machine as a model of computation, Design of T.M, Universal Turing machine, Language Acceptability, Halting problem. Computability: Basic concepts, Primitive Recursive Functions.

TEXT/REFERENCE BOOKS:

- Introduction to automata theory, language & computations- Hopcroaft & O.D.Ullman, R.Mothwani, 2001, AW.
- Daniel I.A. Cohen, Introduction to Computer Theory, Second Edition, John Wiley, 1997.
- Theory of Computer Sc. (Automata, Languages and computation): K.L.P.Mishra & N.Chandrasekaran, PHI.

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES:

At the end of the course students will be able to:

1. Use basic concepts of formal languages of finite automata techniques
2. Design Finite Automata's for different Regular Expressions and Languages
3. Construct context free grammar for various languages
4. Solve various problems of applying normal form techniques, push down automata and Turing Machines

MCA122C – SOFTWARE LAB III
(Based on MCA102C)
MCA Semester - II

L	T	P	Credits		
-	0	4	2	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

The lab work includes:

1. Write a program to print ―Hello World‖ on the screen
2. Write a Java program that prints all real solutions to the quadratic equation ax 2 +bx+c = 0. Read in a, b, c and use the quadratic formula. If the discriminate b2 -4ac is negative, display a message stating that there are no real solutions?
3. Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome?
4. Write a Java program to multiply two given matrices?
5. Write a Java program illustrating string handling functions.
6. Write an application that accepts radius of a circle as its command line argument display the area.
7. WAP that describes a class person. It should have instance variables to record name, age and salary. create a person object. set and display its instance variables
8. Write a program that creates a class circle with instance variables for the centre and the radius. initialize and display its variables using constructor.
9. Write a program that implements method overloading.
10. Write a program that shows passing object as parameter.
11. Write a program that keep track of all the objects created from a particular class and prints the number of object created whenever an object is created.
12. Write a program to illustrate all types of inheritance
13. Write a program that illustrates method overriding
14. Write a Java program to implement Multiple Inheritance (Interface).
15. Write a java program to create an abstract class named Shape that contains two integers and an empty method named printArea(). Provide three classes named Rectangle, Triangle and

Circle such that each one of the classes extends the class Shape. Each one of the classes contain only the method printArea( ) that prints the area of the given shape.

16. Write an application that shows how to create a user-defined exception.
17. Write an application that creates a package p1. Add some classes in it..
18. Write an application that uses the package p1 created in the program given before it.
19. Write a Java program that works as a simple calculator for the digits and for the +, -,*, % operations. Handle any possible exceptions like divide by zero.
20. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number..

MCA126C – SOFTWARE LAB IV
(Based on MCA106C)
MCA Semester - II

L	T	P	Credits		
-	-	4	2	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

The Lab work includes:

- Basic HTML Tags, Table Tags, List Tags, Image Tags, Forms .
- Implement forms using HTML, FRAMES, CSS.
- Install the following on local machine
- Apache web server
- Tomcat application server locally,
- Install MySQL

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SCHEME OF STUDIES & EXAMINATIONS

Master of Computer Applications (MCA) 2nd Year 3rd Semester

Credit Based Scheme w.e.f. 2021-22

Sr. No.	Course No.	Course Title	Teaching Schedule			Marksof Class Work	Examination Marks		Total	Credit	Exam Duration
			L	T	P		Theory	Practical			
1.	MCA201C	Artificial Intelligence with Python	3	0	-	25	75	-	100	3	3
2.	MCA203C	Advanced Java	3	0	-	25	75	-	100	3	3
3.	MCA205C	Business Management & Entrepreneurship	3	0	-	25	75	-	100	3	3
4.		Elective-III	3	0	-	25	75	-	100	3	3
5.		Elective-IV	3	0	-	25	75	-	100	3	3
6.	MCA221C	Artificial intelligence and Machine Learning LAB using Python(Based on MCA201C)	-	-	4	25	-	75	100	2	3
7.	MCA223C	Advanced JAVA Lab (Based onMCA203C)	-	-	4	25	-	75	100	2	3
TOTAL			**15**		**8**	**175**	**375**	**150**	**700**	**19**	

Elective-III

MCA251C	Data preparation and Analysis
MCA253C	Software Validation, Verification & Testing
MCA255C	Digital Image Processing
MCA257C	Internet of Things

Elective -IV

MCA261C	Cloud Computing
MCA263C	Network Security and Cryptography
MCA265C	Optimization Techniques
MCA267C	Compiler Design

DeenbandhuChhotu Ram University of Science & Technology, Murthal (Sonepat)

SCHEME OF STUDIES & EXAMINATIONS

Master of Computer Applications (MCA) 2nd Year 4th Semester

Credit Based Scheme w.e.f. 2021-22

Sr. No.	Course No.	Course Title	Teaching Schedule			Marksof Class Work	Examination Marks		Total	Credit	Exam Duration
			L	T	P		Theory	Practical			

1.	MCA202C	PROJECT	-	-	-	50	-	100	150	20	3
TOTAL						**50**		**100**	**150**	**20**	

MCA201C – Artificial Intelligence and Python
MCA Semester - III

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVE

1. To understand the various search algorithm and its implementation in Python.
2. Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
3. To understand the techniques for uncertainty management and fuzzy logic.
4. To understand the concept of machine learning and its implementation in Python using various libraries.

UNIT I

Introduction to Artificial Intelligence: Introduction, Historical Perspective, AI applications areas, types of Knowledge, Relation between Knowledge & Intelligence,

Search Algorithm and implementation using Python: Uniformed & informed search & its type, depth first, breadth first, depth first with iterative deepening, best first search, A* algorithm, Hill Climbing algorithm & Min-Max algorithm.

Unit II

Knowledge Representation: Cycle of Knowledge Representation, Techniques of Knowledge Representation in AI, prepositional logic, FOPL, wff, conversion to clausal form, Inference Rules, Resolution Principle, Unification,Structured Knowledge Representations

Knowledge Acquisition: Different forms of learning: learning from examples, learning by analogy, Discovery as learning, explanation based learning, Rote learning, learning by induction, Genetic Algorithm. Expert System, Introduction to Neural Network.

Unit III

Handling Uncertainty: Handling Inconsistent and Incomplete Knowledge, Basic Probability Theory, Truth Maintenance Systems, Reasoning Techniques, Concept of Uncertainty, Bayesian reasoning, Certainty Factors, Dempster-Shafter Theory

Fuzzy Logic: Fuzzy Sets, Fuzzy Operators & Arithmetic, Membership Functions, Fuzzy Relations.

Unit IV

Machine Learning using Python: Introduction to Machine Learning, Types of Machine Learning, Supervised Learning: Classification, Regression .Unsupervised Learning: clustering, association. K-means,K-Nearest-Neighbors,Apriori algorithm, Decision Trees and Random Forests

Trained & Test Model, NumPy, Pandas, MatPlotLib, ScikitLearn libraries of Python,

TEXT / REFERENCE BOOKS

- Artificial Intelligence by Elaine Rich, Kevin Knight and Nair ISBN-978-0-07- 008770-5, TMH,
- Artificial Intelligence by SarojKausik ISBN:- 978-81-315-1099-5, Cengage Learning
- Artificial Intelligence and Intelligent Systems by Padhy, Oxforfd University Press.
- Kevin Murphy," Machine Learning: A Probabilistic Perspective", MIT Press, 2012.
- EthemAlpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)‖, Third Edition, MIT Press, 2014.
- Tom M Mitchell, ―Machine Learning‖, First Edition, McGraw Hill Education.
- Let us Python by YashvantKenetkar, Aditya Kanetkar, BPB Publication
- Python: The Complete Reference by Martin C Brown, McGraw Hill Publication

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES:

After completing the course, students will able to:

1. Understand the importance, the basic concepts and the Applications of AI and able to apply various search algorithm.
2. Apply the knowledge representation and acquisition and also understand the phases and the architecture of various advanced system like Expert System.
3. Apply the method of handling uncertainty in the various field of problem solving and also understand the fuzzy logic.
4. Able to implement the various algorithm of machine learning in Python.

MCA203C – ADVANCED JAVA
MCA Semester - III

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVE

Upon completion of the syllabus students will be able:

1. To familiar with the design and development of GUI screens using Swings.
2. To develop web application by embedding and using Java code with HTML.
3. To connect the web application with some RDBMS database and to perform operations on it.
4. To have hand on practice on developing commercial software.

COURSE CONTENT

UNIT-I

Advanced Java Basics: Difference between AWT Controls & Swing Controls, JButton, Checkboxes, Radio Button, JComboBox, Text Boxes, JFrame, JApplets, Event Driven Programming. Java Collection: ArrayList, LinkedList, Stack, ArrayDeque, HashSet. Java Stream Classes,
Applications of Advance Java Programming. Client Server Technology, Installation and understand various Java editors and server.

UNIT-II

Database Connectivity: Design of JDBC, Structured Query Language, JDBC Installation, Basic JDBC Programming Concepts, Query Execution, Scrollable and Updatable Result Sets, Row sets.
Networking in Java: Connection oriented and connection less protocol and its classes & interface, Socket, ServerSocket, DatagramPacket, DatagramSocket.

UNIT-III

Servlets: Uses of the Servlet, Lifecycle of a Servlet, The Servlet API,Servlet Request & Response, HTML & Servlet, JavaScript & Servlet, thejavax.servlet.http package, get and post method, Handling Http Request & Responses,

UNIT-IV

Java Server Pages : JSP Architecture, JSP Life Cycle, comparison of JSP and Sevlet, basic structure of JSP code file, JSP & HTML, JSP API, JSP Scriptlet, JSP Implicit Object, JSP page directive, include directive, Introduction to Model View Control in JSP, CRUD in JSP, JSP Request and Response

TEXT / REFERENCE BOOKS

1. Dietel and Nieto: Internet and World Wide Web – How to program?, PHI/Pearson Education Asia.
2. Patrick Naughton and Herbert Schildt: The Complete Reference Java, Tata McGraw-Hill.
3. Hans Bergstan: Java Server Pages.
4. Bill Siggelkow, S P D O'Reilly: Jakarta Struts, Cookbook.
5. Murach: Murach's beginning JAVA JDK 5, SPD.
6. Wang-Thomson: An Introduction to Web Design and Programming.
7. Knuckles: Web Applicat ions Technologies Concepts- John Wiley.
8. Sebesta: Programming world wide web, Pearson.
9. Building Web Applications-NIIT,PHI.4. JAVA 2(1.3) API Documentations.

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES

At the end of course the students should be able to:

1. Design GUI screen using Swings.
2. Understanding the development of web application using servlets / JSP along with HTML.
3. Develop the program using Java program to connect to RDBMS and perform necessary operations on it.
4. Develop commercial web application.

MCA205C – BUSINESS MANAGEMENT & ENTREPRENEURSHIP
MCA Semester - III

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:

1. To introduce the concepts and forms of business organization and expose the students to basic concepts of management and to enable them to gain appreciation for emerging ideas, techniques, procedures and practices in the field of management.
2. To acquaint the students with basic tenets of management with help of SPM.
3. To gain knowledge about various financial institutions including regulatory institutions.
4. To expose the students to the growth of entrepreneurship in developing countries and acquaint with the establishment and running of a new enterprise.

COURSE CONTENT

UNIT- I

Business – Nature, purpose and scope; Business as a system; Objectives of business; Structure of business – Classification of business activities; **Management:** Definition, nature, functions, levels of management, Types of managers, managerial roles, managerial skills and competencies, Evolution and various schools to management thought, Social responsibility of business & business ethics, contemporary issues and challenges.

UNIT- II

SPM-Definition of a Software Project (SP), SP Vs. other types of projects activities covered by SPM, categorizing SPs, project as a system, management control, requirement specification, information and control in organization.

Financial Management: Introduction, significance, scope, functions, objectives of financial management; **Marketing Management**: Introduction, Definition, Importance and Scope of Marketing, Philosophies of Marketing Management, Elements of Marketing; **Production Management**: Introduction, evolution, major long term and short term decisions; objectives, importance and activities;**Human Resource Management** – meaning, definition, objectives and scope of HRM, evolution of HRM, HRM functions.

UNIT- III

Regulatory Framework: FII, Government Regulation Board, FICCI, RBI,Development of Financial Institutions: IFCI, ICICI, IDBI, SIDBI, EXIM Bank, State Development Banks, State Financial Corporations;

UNIT- IV

Entrepreneurship: Concept and nature; Classification and Types of Entrepreneurs;Entrepreneurship's Challenges; Myths concerning Entrepreneurship; Factor affecting Entrepreneurial Growth – Economic &Non Economic Factors;Women Entrepreneurship Development in India,Process of setting up a business enterprise; feasibility and preparation business plan , Why Business plan Fails, Specimen of Project Report.

TEXT/ REFERENCE BOOKS:

- Tulsian, P.C., Business Organization and Management, Pearson Education.
- Roy Rajeev, Entrepreneurship 2/e, Oxford University Press.
- Vasant Desai, "Entrepreneurial Development and Management", Himalaya Pub. House, New Delhi.
- Aswathappa, K., "Essentials of Business Environment", Himalaya Publishing House, New Delhi.
- PravinDurai, Principles of Management, Pearson Education.
- Software Project Management, Walker Royce, 1998, Addison Wesley.
- Software project management in practice by PankajJalote, Pearson Education

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES:

Upon successful completion of the course, students will be able to

1. Explain the basic fundamentals of the business organizational theory,Students will get familiar with the basic concepts applied in contemporary management practice and many of the concepts learnt will form the foundation for subsequent courses in strategy.
2. The student will understand the basic tenets of management - will acquaint himself with management process, functions and principles.
3. The students will learn the framework of Indian Financial System and get an idea about the various financial institutions that have impact and influence on business organizations and its functioning.
4. Ability to identify entrepreneurial opportunities and leverage managerial & leadership skills for founding, leading & managing startups as well as professionalizing.Developing basic understanding of entrepreneurship. Inculcating analytical skills in order to identify business opportunities, enabling to identify the elements of success of entrepreneurial ventures.

MCA251C – Data preparation and Analysis
MCA Semester - III

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVE

1. To Study the basic concepts of Data pre-processing and data quality.
2. To Study how data is collected and stored
3. To understand Descriptive and Comparative statistics to analyze data
4. To study various visualization techniques for visualizing Big data

UNIT I

Task of data preparation ,types of data, types of measurement, Discretization of Continuous Variables, Outliers, Data Transformation, Missing Data, Handling Redundancy, Sampling and Unbalanced Datasets

UNIT II

Data collection and management: Introduction, Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management, Using multiple data sources

UNIT III

Exploratory Analysis: Descriptive and comparative statistics, Clustering and association, Hypothesis generation

UNIT IV

Data visualization techniques :
Basics: Line Charts, Bar Charts, Scatter Plots, Pie and Donut Charts, Visualizing Big Data: Handling Large Data Volumes, Visualizing Semi structured and Unstructured Data Using Word Clouds and Network Diagrams, Visualization with Correlation Matrices, Auto charting, Automated Forecasting Techniques

TEXT / REFERENCE BOOK

1. Making sense of Data : A practical Guide to Exploratory Data Analysis and Data Mining, by Glenn J. Myatt
2. Data Mining Concepts and Techniques (Third Edition) : Jiawei Han

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student

will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOME:

After completion of course, students would be:

1. Able to extract the quality data for performing the Analysis
2. Able to collect and store the data for analysis
3. Able to analyze data using Descriptive and Comparative statistics
4. Able to learn various visualization techniques for visualizing Big data

MCA253C – SOFTWARE VALIDATION, VERIFICATION& TESTING
MCA Semester - III

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:

1. This course makes students understand the concepts and theory related to software testing.
2. To understand different testing techniques used in designing test plans, developing test suites, and evaluating test suite coverage.
3. To understand how software developers can integrate a testing framework into code development in order to incrementally develop and test code.
4. To learn and explore the different kinds of testing techniques.

UNIT-I

Introduction: Terminology, evolving nature of area, Errors, Faults and Failures, Correctness and reliability, Testing and debugging, Static and dynamic testing, Exhaustive testing: Theoretical foundations: impracticality of testing all data, impracticality of testing all paths, no absolute proof of correctness.

UNIT-II

Software Verification and Validation Approaches and their Applicability: Software technical reviews: Software testing: levels of testing - module, integration, system, regression, Testing techniques and their applicability - functional testing and analysis, hybrid approaches, integration strategies, transaction flow analysis, stress analysis, failure analysis, concurrency analysis, performance analysis, Proof of correctness, simulation and prototyping, Requirement tracing.

UNIT-III

Test Case Generation: Test generation from requirements, Test generation paths, Data flow analysis, Finite State Machines models for flow analysis, Regular expressions based testing, Test Selection, Minimizations and Prioritization of test cases, Regression Testing.

UNIT-IV

Program Mutation Testing: Introduction, Mutation and mutants, Mutation operators, Equivalent mutants, Fault detection using mutants, Types of mutants, Mutation operators for C and JAVA.

TEXT/REFERENCE BOOKS

1. Software Verification and Validation: An Engineering and Scientific Approach, Marcus S. Fisher, Springer, 2007
2. Foundations of Software Testing, Aditya P. Mathur, Pearson Education, 2008

3. Software Testing: Principles and Practices, Srinivasan Desikan, GopalaswamyRamesh, Pearson Education India, 2006

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES

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

1. Comprehend the concepts relate to theoretical foundations of testing and debugging.
2. Know and demonstrate software verification and validation approaches and their applicability.
3. Formulate and generate test cases from specifications.
4. Exemplify program mutation testing strategies using programming language.

MCA255C – DIGITAL IMAGE PROCESSING
MCA Semester - III

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:

1. To study the image fundamentals and mathematical transforms necessary for image processing.
2. To study the image enhancement techniques
3. To study image restoration procedures.
4. To study the image compression procedures.

COURES CONTENT

UNIT I

Introduction and Fundamental to Digital Image Processing: What is Digital Image Processing, Origin of Digital Image Processing, Examples of Digital Image Processing, Fundamental steps in Digital Image Processing, Components of Digital Image Processing System, Image sensing and acquisition, Image sampling, quantization and representation, Basic relationship between pixels.

UNIT II

Image Enhancement: Image Enhancement in the Spatial Domain & Frequency domain: Background, Basic gray level transformation, Histogram processing, Basics of spatial filtering, Smoothing and Sharpening Spatial filters, Introduction to Fourier Transform and the Frequency Domain, Discrete Fourier Transform. Smoothing and Sharpening Frequency-Domain filters.

UNIT III

Image Restoration: Image Degradation/Restoration Process, Noise models, Restoration in presence of noise, Inverse Filtering, Minimum Mean Square Filtering, Geometric mean filter, Geometric transformations.
Color Image Processing: Color Fundamentals, Color models, Basis of full color image processing, Color transformations.

UNIT IV

Image Compression: Fundamentals, Image compression models, Error free compression, Lossy compression.
Image Segmentation: Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region oriented segmentation.
Representation, Description and Recognition: Representation-chain codes, polygonal approximation and skeletons, Boundary descriptors-simple descriptors, shape numbers, Regional descriptors- simple, topological descriptors, Pattern and Pattern classes-Recognition based on matching techniques.

TEXT/REFERENCE BOOKS:

- Digital Image Processing by Rafael C.Gonzalez& Richard E. Woods –2002, Pearson Education .
- Gonzalez R.C., Woods R.E., "Digital Image Processing", Pearson Education.
- Vipula Singh, "Digital Image Processing with MATLAB and LABVIEW", Elsevier India.
- Ganzalez R.C., "Digital Image Processing with MATLAB", Tata McGraw Hill.
- Sonka Milan, "Image Processing Analysis and Machine vision", Cengage Learning.
- William K. Pratt, "Digital Image Processing", Wiley India Pvt. Ltd.
- Chanda B., Majumder D. Dutta, "Digital Image Processing and Analysis", PHI Learning.
- Jain A.K., "Fundamental of Digital Image Processing", PHI Learning.
- Jayaraman S., Esakkirajan S., Veerakumar T., "Digital Image Processing", Tata McGraw Hill.
- Annadurai, "Digital Image Processing", Pearson Education
- **Note:** Latest and additional good books may be suggested and added from time to time.

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

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COURSE OUTCOMES:

1. Understand the fundamental concepts of a digital image processing system.
2. Evaluate the techniques for image enhancement and image restoration.
3. Categorize various compression techniques.
4. Interpret image segmentation and representation techniques.

MCA257C – INTERNET OF THINGS
MCA Semester - III

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:

1. Understand the definition and significance of the Internet of Things
2. Discuss the architecture, operation, and business benefits of an IoT solution
3. Examine the potential business opportunities that IoT can uncover
4. Identify how IoT differs from traditional data collection systems

UNIT -I
Introduction to IoT Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Four Pillars of IoT, Communication models & APIs.
IoT&M2M : Machine to Machine, Difference between IoT and M2M, Software define Network

UNIT- II
IoT protocols:-Wireless communication protocols: Wifi, IPV4/IPV6, 6LOWPAN, ZigBee(IEEE802.15.4), Bluetooth, Bluetooth Low Energy(BLE)
Application layer protocols: MQTT/MQTTS, CoAP, REST/HTTP,XMPP, SCADA Authentication Protocols; IEEE 802.15.4., comparison of the different IoT protocols, advantages and disadvantages (limitations) of these IoT protocols.

UNIT -III
IOT Enabling Technologies:- Introduction to Big Data Analytic, Embedded Systems, Cloud Computing- Cloud Service Management and IOT - Connecting IOT to cloud – Cloud Storage for Iot ,Wireless Sensor Networks- Industrial sensors, Integrated IoT Sensors, Sensors' Swarm

UNIT -IV
Applications of IoT And Research Perspective:- IoT Strategic Research and Innovation Directions , Domain specific applications of IoT, Home automation, Surveillance applications, Industrial IoT,IoT in Energy, IoT in Healthcare, Internet of Robotic Things, Green IoT, home, infrastructures, buildings, security, Industries, Home appliances,Internet of Nano Things,IoT application in Drones, Internet of Vehicles(IoV),Internet of Everything(IoE)

TEXT / REFERENCE BOOKS
1. The Internet of Things in the Cloud: A Middleware Perspective - Honbo Zhou – CRC Press.
2. Architecting the Internet of Things - Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.) – Springer.

3. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press.
4. The Internet of Things: Applications to the Smart Grid and Building Automation by – Olivier Hersent, Omar Elloumi and David Boswarthick – Wiley.
5. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley.

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES

By the end of the course the students will be able to:

1. To identify the vision of IoT and its future roadmap.
2. To examine prototypes for Internet of Things.
3. To judge the applications of IoT ,BigData and cloud.
4. To understand the application areas of IOT.

MCA261C – CLOUD COMPUTING
MCA Semester - III

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:

1. To understand basic concept of cloud and cluster.
2. To learn different cloud computing services.
3. Describe the key components of Amazon web Service
4. The study fundamental concepts of Cloud computing software security.

COURSE CONTENT

UNIT-I

Cloud Computing Fundamentals: Cloud Computing definition: private, public and hybrid cloud; Evolution of Cloud Computing; Characteristics of Cloud, Cloud Types; Cloud Computing Benefits and Limitations, Cloud Architecture; Cloud computing vs. Cluster computing vs. Grid computing; Applications: Technologies and Process required when deploying Web services; Deploying a web service from inside and Outside of a Cloud.

UNIT II

Cloud Computing service models: Introduction to Cloud Services: : SaaS, IaaS, PaaS; Storage As a Service, Communication As a Service; Cloud-based big data/real time analytics, Understanding SOA; Improving Performance through Load Balancing. Virtualization Basics: Objectives, Benefits of Virtualization, Emulation, Virtualization for Enterprise, VMware, Server Virtualization, Data Storage Virtualization.

UNIT III

Cloud vendors and Service Management: Amazon cloud, AWS Overview, Installation of AWS, Google app engine, azure cloud, salesforce. Service Management in Cloud Computing: Service Level Agreements(SLAs), Billing & Accounting, Comparing Scaling Hardware: Traditional vs. Cloud, Economics of scaling: Benefitting enormously , Managing Data: Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud , Large Scale Data Processing

UNIT IV

Security Concepts: Cloud security challenges, Cloud security approaches: encryption, tokenization/obfuscation, cloud security alliance standards, cloud security models and related patterns, Cloud security in mainstream vendor solutions, Mainstream Cloud security offerings: security assessment, secure Cloud architecture design, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations.

TEXT/REFERENCE BOOKS

- Cloud Computing: A Practical Approach by Anthony T. Velte Toby J. Velte, Robert Elsenpeter, The McGraw-Hill.
- Cloud Computing: SaaS, PaaS, IaaS, Virtualization and more. by Dr. Kris Jamsa.
- Tim Mather, SubraKumaraswamy, ShahedLatif, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, O'ReillyMedia Inc.
- Cloud Computing Bible, Barrie Sosinsky, Wiley-India.
- Jason Venner,ProHadoop,Apress.
- Cloud Computing: Principles and Paradigms, Editors: RajkumarBuyya, James Broberg, Andrzej M. Goscinski, Wile.
- Cloud Computing: Principles, Systems and Applications, Editors: Nikos Antonopoulos, Lee Gillam, Springer, 2012
- Cloud Security: A Comprehensive Guide to Secure Cloud Computing, Ronald L. Krutz, Russell Dean Vines, Wiley-India. Note: Latest and additional good books may be suggested and added from time to time

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES:

1. Compare cloud from cluster and grid based on their architecture.
2. Deploy web services from inside as well as from outside the cloud.
3. Design the cloud by proposing different services provided by a cloud: SaaS, IaaS and PaaS.
4. Explain the security issues of cloud computing.

MCA263C – NETWORK SECURITY & CRYPTOGRAPHY
MCA Semester - III

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES

1. Understand basic concept of security and cryptography.
2. Encrypt and decrypt messages using cryptography techniques.
3. Acquire background on hash functions; authentication; firewalls; intrusion detection techniques.
4. Understand vulnerability analysis of network security.

UNIT – I

Introduction: Need of **s**ecurity in computer network, OSI Security Architecture, Security Attacks, Security Services, Security Mechanism, Network Security Model. **Cryptography:** Plain Text, Cipher Text, Classical Encryption Techniques: Substitution and Transposition, Stream Cipher, block cipher, Symmetric & Asymmetric key cryptography:

UNIT - II

Cryptography Technique: Stream Cipher Technique: Rotor based system, shift register based system,Block Ciphers Technique: Data Encryption Standard, Triple DES, Advanced Encryption Standard. Asymmetric Key Cryptography: Public Key Cryptography, RSA Algorithm, Knapsack Algorithm, Diffie-Hellman KeyExchange,

UNIT – III`

Digital Signature: Hash Function, Secure Hash Algorithm, Message Authentication Code, Digital Signature, Digital Signature Standard, Requirement of Digital Signature.

User Authentication: Mutual Authentication, One Way Authentication, Network Authentication Protocol: Kerberos, Identity Management.

UNIT – IV

Network & Internet Security : Network Access Control**,** ElectronicMail Security: PGP,Web Security, Intruders, Intrusion Detection, Firewall, Firewall Design principles, **Cloud Computing Security** : Basics of Cloud Computing, Cloud Computing Features, Cloud Computing Security Risk, Data Protection in Cloud Computing, Cloud Security as a Service,

TEXT / REFERENCE BOOKS

- "Cryptography and Network Security Principles and practices" by William Stallings 4th Edition, Prentice
- Hall.
- "Fundamentals of Network Security" by Eric MaiwaldDreamtech press
- "Principles of Information Security", by Whitman, Thomson
- ."Network Security: the complete reference", by Robert Bragg, Mark Rhodes,TMH
- "Introduction to Cryptography" by Buchmann, Springer.

Note: Examiner will be required to set NINE questions in all. Question Number 1 will be compulsory (short-answer type questions), covering the entire syllabus. In addition to the compulsory question, Examiner will set two questions from each Unit i.e. Unit-I to Unit-IV. Student will be required to attempt FIVE questions in all. Question Number 1 will be compulsory. In addition to compulsory question, student will have to attempt four more questions selecting one question from each Unit.

COURSE OUTCOMES

After the completion of this course, prospective engineers will have the ability to

1. Identify and classify computer and security threats and develop a security model to prevent, detect and recover from attacks.
2. Encrypt and decrypt messages using block ciphers.
3. Implement various cryptographic techniques that provide information and network security.
4. Evaluate the security of communication systems, networks and protocols based on a multitude of security metrics.

MCA265C – OPTIMIZATION TECHNIQUES
MCA Semester - III

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:

1. The reasoning and techniques used in formulating and solving deterministic problems in operations research.
2. The concepts of operations research by way of modeling real-world problems as Linear Programming (LP).
3. Different techniques of analyzing the time involved in completing a project and the related costs are presented after defining the prerequisites of networks under project management.
4. The optimality in Dynamic programming.

UNIT - I

Development: Characteristics and Phases scientific method, Types of models, General methods for solving OR problems,Operations Research models, Significance of operations research.

Linear Programming: Introduction to Linear Programming, Two phase Simplex method, Big-M method,Duality, Interpretation,Applications.

UNIT - II

Transportation Problem: Introduction, Optimal solution, Un-balanced transportation problem, Degeneracy, Assignment problem:formulation optimal solution, variations. 1. a non-square (mxn) matrix, Restrictions.

Sequencing Model: Classification of self-problems, processing of n jobs through two machines, three machines, processing of twojobs through m machines.

UNIT - III

Network optimization Models: Shortest path problem, Minimum spanning tree problem, Maximum flow problem, Minimum cost flow problem, The project management with PERT/CPM, Scheduling a problem with PERT/CPM, Dealing with uncertain activity durations, Considering time cost trades Offs, Scheduling and Controlling, Projects costs, Evaluation of PERT/CPM, calculation of floats.

UNIT - IV

Dynamic Programming:

Sequential optimization; Representation of multistage decision process; Types of multistage decision problems; Concept of sub optimization and the principle of optimality. Recursive equations – Forward and backward recursions; Computational procedure in dynamic programming (DP) Discrete versus continuous dynamic programming; Multiple state variables; curse of dimensionality in DP.

TEXT / REFERENCE BOOKS

1. Paneerselvam, Operations Research, Prentice Hall of India, N. Delhi.
2. Taha, Operations Research: An Introduction, Prentice Hall of India, N. Delhi.
3. Kapoor, V.K., Operations Research; Sultan Chand & Sons, New Delhi.
4. Kalavathy, Operations Research, Vikas Publishing House, New Delhi.
5. Sharma, J. K. "Operation Research", Macmillan Publisher
6. Anderson, Sweeny and Williams, "Quantitative Methods for Business", Thomson learning
7. Hillier, F.S. and Lieberman, G.J., "Operations Research", Tata McGraw Hill, New Delhi.
8. Barry Render, Ralph Stair and Michael Hanna, "Quantitative Analysis", Pearson Education, New Delhi.
9. Frederick Hillier and Gerald Lieberman, "Operations Research", Tata McGraw Hill, New Delhi. 10. Natarajan, Balasubramani and Tamilarasi, "Operations Research", Pearson Education, New Delhi.

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COURSE OUTCOMES:

At the end of this course student will be able to

1. Identify and develop operational research models from the verbal description of the real system.
2. Build and solve transportation and assignment problems using appropriate method.
3. Construct the network diagrams. Determine critical path and floats associated with non-critical activities and events along with total project completion time.
4. Understand the principle of optimality in dynamic programming.

MCA267C –COMPILER DESIGN
MCA Semester - III

L	T	P	Credits		
3	0	-	3	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

COURSE OBJECTIVES:

1. Study concepts of language translation and phases of compiler design.
2. Design and conduct experiments for Intermediate Code Generation in compiler.
3. Demonstrate intermediate code using technique of syntax directed translation.
4. Illustrate the various optimization techniques for designing various optimizing compilers.

COURSE CONTENT

UNIT-I

Introduction: Compilers and translators need of translators, structure of compiler: its different phases, Compiler construction tools.

Lexical Analysis: Role of lexical analyzer; Design of lexical analyzer; Regular expressions ;Specification and recognition of tokens; Input buffering; Finite automata; Conversion from regular expression to finite automata, and vice versa; Minimizing the number of states of DFA, Implementation of lexical analyzer.

UNIT-II

Syntactic Techniques & Parsing: Context free Grammars; Derivations & parse trees; Capabilities of CFGs; Role of parsers, Shift- Reduce Parsing ; Operator precedence parsing; top down parsing; predictive parsing, LR parsers; LR(0) items SLR, LALR and Canonical LR parser.

UNIT-III

Syntax Directed Translation , Symbol Table & Error Handling : Syntax directed definition, construction of syntax trees, syntax directed translation scheme, implementation of syntax directed translation, Intermediate Code ;Parse trees & Syntax trees; Three address code, quadruples and triples; Translation of Boolean Expressions. Symbol tables, its contents and data structure for symbol tables; trees, arrays, linked lists, hash tables; Operations on symbol table; Errors (lexical phase error, syntactic phase error, semantic error).

UNIT-IV

Code Optimization & Code Generation: Sources of code optimization; Loop optimization (Denominators, Reducible flow graphs, depth first search, loop invariant computation, Induction variable elimination) ; Directed acyclic representation of basic blocks Code generation, forms of objects code, machine dependent code, register allocation for temporary and user defined variables; Problems in code generation; Peephole optimization.

TEXT / REFERENCE BOOKS

- Compilers Principle, Techniques & Tools - Alfread V. AHO, Ravi Sethi& J.D. Ullman; - 1998Addison Wesley.
- Theory and practice of compiler writing, Tremblay & Sorenson, 1985, Mc. Graw Hill.
- System Software by Dhamdhare, 1986, MGH.
- Principles of Compiler Design, Alfred V Aho , Jeffery D. Ullman , Narosa Publication
- Modern Compiler construction in C, Andrew W.Appel Cambridge University Press.
- Compiler Construction, LOUDEN, Thomson
- Compiler Design by O.G. Kakde, 1995, Laxmi Publ.
- Elements of Compiler Design, A.Meduna, Auerbach Publications, Taylor and Francis Group.
- Principles of Compiler Design, V.Raghavan, TMH.
- Engineering a Compiler, K.D.Cooper, L.Torczon, ELSEVIER. 8. Principles of Compiler Design, N.Prasad K.S, ELSEVIER

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COURSE OUTCOMES:

At the end of this course student will be able to

1. Understand the basic concepts and application of Compiler Design
2. Understand the concepts of different Parsing techniques and Construction of syntax trees
3. Get the concepts of Type checking and Run time environments
4. Get the concepts of Intermediate code generation, Code optimization and Code generations.

MCA221C – Artificial intelligence and Machine Learning LAB using Python
(Based on MCA201C)

MCA Semester - III

L	T	P	Credits		
0	0	4	2	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

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1. Write a function in python to implement uninformed search algorithm - Depth First Search.
2. Write a function in python to implement uninformed search algorithm - Breadth First Search.
3. Write a function in python to implement informed search algorithm - A* Algorithm.
4. Write a function in python to implement Min-max algorithm of Game Theory.
5. Write a Program to analyze data and display in the form of a bar graph for two departments of a company having employee id numbers on X-axis and their salaries on Y axis.
6. Write a program to analyze and draw a line graph to show the profits of a company in various years.
7. Make a minor ML project on Clustering
8. Make a minor ML project on Classification using python.
   (You may use iris flowers classification and can download data set for iris flowers from UCI Machine Learning Repository: Iris Data Set)
9. Make a minor ML project on Prediction.
   (You may download data set GitHub - shrikant-temburwar/Loan-Prediction-Dataset for loan prediction)
10. Make a minor ML project on Fake News Detection.
    (You may download data set Fake and real news dataset | Kaggle)

MCA223C –ADVANCED JAVA LAB
(Based on MCA203C)

MCA Semester - III

L	T	P	Credits		
0	0	4	2	**Class Work**	**: 25 Marks**
				Examination	**: 75 Marks**
				Total	**: 100 Marks**
				Duration of Examination	**: 03 Hours**

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1. Write two separate program in AWT and Swing that have two text box and a add button which add two number input through both text box and display the result. Find the difference in making user interface using AWT and Swing.

2. Write a program in Swing to create a login form, which accept user name and password from user. If entered user name and password match with the particular constant user name and password, which is store in two string variables, in the code, it will display message "login successful" otherwise it will display "login failure".

3. Write a program in Swing to create a form which accept name, age, gender and programming languages which you already studied till now. After submit button it will display the message "Hello Mr. ABC you are the expert in these languages C, C++, Java" if gender is male and "Hello Ms. ABC you are the expert in these languages C, C++, Java" if gender is female.

4. Write a program to create a stack using java collection. Stack store list of books. Perform the operations push, pot and traverse on the stack.

5. Write a program to create a linked list using collection and store some value in the liked list. Perform these operations on the linked list: insert, remove, and traverse in ascending order and descending order.

6. Write a program to display the name, city and salary from an existing employee table in database like Oracle/MySQL. Use JDBC for database connectivity.

7. Write a program in to create a login form which have user name, password and submit button. Compare that username and password with the username and password already existing in user table. If there is match found print the message Login Successful otherwise print the message Wrong username & password.

8. Write a program to create the user registration form which have name, Age, Address, Username, Password, Confirm Password field. Password and confirm password must be same. Store all the information provided by the user in user table. Also check that whether username is already existed in the table. If it is already existing, print the message username is already exist otherwise print the message registrations successful.

9. Create a client and server application. Client gives some input as two numeric integers and sends it to the server. Server will perform some mathematical operation on these two integers and sends back to client. Client will print the result it receives from server.

10. Write a program to access the record of an employee by entering her emp_id from the HTML page. Employee Records are stored in server. Access the record using Servlet and httpServlet.

11. Write a program to create an online job application form page using JSP. Validate the application page using form validation and store the record in database using servlet.

12. Create an online login page to authenticate the valid user. If login is successful open the online welcome web page. Use JSP and servlet to create and validate the user. All username and password store in database.

Master of Computer Applications (MCA) 2nd Year 4th Semester
Credit Based Scheme w.e.f. 2021-22

MCA-202C

DEENBANDHU CHHOTU RAM UNIVERSITY OF SCIENCE AND TECHNOLOGY

GUIDELINES FOR PROJECT

(MASTER OF COMPUTER APPLICATIONS-Final Semester)

GUIDELINES FOR PROJECT WORK TO BE CARRIED OUT IN AN INDUSTRY/RESEARCH LAB

- The Department/Training and Placement (T&P) officer of the Institution will arrange training slots for the students, however, the student in consultation with the Department /T&P cell can arrange for industrial training slot in reputed Industry/Research labs.
- At least one faculty member from the Department is to be associated with each student and designated as teacher-in-charge.
- The student is required to send his/her joining report, duly signed by the industry coordinator, to the Department. Through his/her teacher-in-charge within two weeks of joining.
- The teacher-in-charges will visit the industries at least twice in the semester. First visit is to be made within first two months of the commencement of Project work. The second visit is to be made in the last month of the Project duration.

GUIDELINES FOR PROJECT REPORT

1. Project Report (MCA -202C)

- **The project proposal should be prepared in consultation with your guide.** The project proposal should clearly state the project objectives and the environment of the proposed project to be undertaken. **The project work should compulsorily include the software development.** The project proposal should contain complete details in the following form:

- Synopsis of the project proposal (15-20 pages) covering the following aspects may be prepared:
  - (i) Title of the Project
  - (ii) Introduction and Objectives of the Project
  - (iii) Project Category
    - Technology Used: (RDBMS/OOPS/Networking/Multimedia/Artificial Intelligence/Expert Systemsetc.)
    - Tools/Platform, Hardware and Software Requirementspecifications
  - (iv) Introduction &Description about the organization
  - (v) Training Letter from the organization

2. A **photocopy of the complete Project Proposal** submitted to the university should be retained by the student for future reference.

3. The evaluated project proposal proforma along with the details of Approved/Disapproved will be sent to the student within 4-6 weeks after the university receives the proposal. In case if it is disapproved, the suggestions for reformulating the project will be communicated to the student. Revised project proposal proforma, should be sent along with the original copy / photocopy of the non-approved proforma of the earlier project proposal, to the University.

4. The project is a part of your final Year curriculum..

5. Violation of the project guidelines will lead to the rejection of the project at anystage.

PREPARATION FOR THE PROJECT REPORT

1. Project ReportFormulation:

The project report **should** contain the following:

i) Projectdocumentation

ii) A CD consisting of the executable file(s) of the complete project should be attached on the last page of the project report. In no case, it should be sentseparately.

2. The **project documentation** may be about 100 to 125 pages (excluding coding). The project documentation details should not be too generic in nature. Appropriate project report documentation should be done, like, **how the analysis has been done, design, coding, use of testing techniques / strategies, etc.,** in respect of the project**.** To be more specific, whatever the theory in respect of these topics is available in the reference books should be avoided as far as possible. **The project documentation should be in respect of your project only.** The project documentation should include the topics given below. Each and every component shown below carries certain weightage in the project reportevaluation.

- Cover Page / Title Page
- Training Certificate issued from college
- Training completion certificate from company
- Acknowledgement
- Table of Contents / Index with pagenumbering
- List of Tables
- List of Figures
- List of Symbols, Abbreviations and Nomenclature
- Introduction
  - About the Organization
  - Aims / Objectives of Organization
- Project Selection: About Project
- System Study/ Analysis
  - Identification of Need
  - Preliminary Investigation
  - Feasibility Study

- Project Planning
- Project Scheduling
- Software requirement specifications(SRS)
- Software Engineering Paradigm applied
- Data model, Control Flow diagrams, state Diagrams/Sequence diagrams ERD's/Class Diagrams/CRC Models/Collaboration Diagrams/Use-case Diagrams/Activity Diagrams depending upon your project requirements.

- Project Monitoring system
  - Pert Chart / Gantt chart
- Requirement Specification
  - System Requirement (System analysis)
  - Software Req.
  - Hardware Requirement
- System design
  - Database design
  - System flowchart design
  - DFD / UML Modelling /Design
  - Program Design
  - Screen Design
  - Report Design
- System Testing
  - Test Data Preparation
  - Type of testing applied
  - Implementation of Testing
- System Implementation
  - In what manner system will be implemented.
- Documentation
  - Operational Document
  - User Manual
- Further Scope of project-Where the project can be further extended
- Bibliography & references
  - List of references at the end of a text, whether cited or not. It will include texts you made use of, not only texts you referred to, but your own additional background reading, and any other

articles that proved helpful in exploring the project.

Note: Students need to make 3 copies of Project Report– all should be hard bound (Spiral binding will not be accepted)

Attach a copy of the CD containing the executable file(s) of the complete project.

3. The project report should normally be printed with 1.5 line spacing on A4 paper (one side only). All the pages, tables and figures must be numbered. Tables and figures should containtitles.

4. If any project report is not according to the guidelines, it will be summarily rejected and returned to the student for Compliance.

5. **Two copies of the original project report** in the bound form along with the CD (containing the executable file(s) of the project should be enclosed in the last page) is to be submitted to the College. **One photocopy** of the same Project Report and the CD containing the executable file(s) must be retained by the student, which should be produced before the examiner at the time ofviva-voce.

6. A photocopy of the project report is **not acceptable** for submission.

7. Title of the project should be kept the same throughout theproject.