ACHARYA NAGARJUNA UNIVERSITY

A State Government University, Accredited with "A" Grade by NAAC Nagarjuna Nagar - 522 510, Guntur, Andhra Pradesh, India.



MASTER OF COMPUTER APPLICATIONS

SYLLABUS



2022 - 2023 onwards

UNIVERSITY COLLEGE OF SCIENCES

PROGRAM CODE:

MCA



ACHARYA NAGARJUNA UNIVERSITY (ANU)

- A Brief Profile

Acharya Nagarjuna University, a State University established in 1976, has been constantly striving towards achieving progress and expansion during its existence for over four decades, in terms of introducing new courses in the University Colleges, affiliated colleges and professional colleges. Spread over 300 acres of land on the National High Way (NH-16) between Vijayawada and Guntur of Andhra Pradesh, the University is one of the front ranking and fastest expanding Universities in the state of Andhra Pradesh. The University was inaugurated on 11th September, 1976 by the then President of India, Sri Fakruddin Ali Ahmed and celebrated its Silver Jubilee in 2001. The National Assessment and Accreditation Council (NAAC) awarded "A" grade to Acharya Nagarjuna University and also has achieved 108 International ranks, 39 National ranks UI Green Metrics rankings and many more It is named after Acharya Nagarjuna - one of the most brilliant preceptors and philosophers, whose depth of thought, clarity of perception and spiritual insight were such that even after centuries, he is a source of inspiration to a vast number of people in many countries. The University is fortunate to be situated on the very soil where he was born and lived, a soil made more sacred by the aspiration for light and a state of whole someness by generations of students. With campus student strength of over 5000, the University offers instruction for higher learning in 68 UG & PG programs and guidance for the award of M.Phil. and Ph.D. in 48 disciplines spread over six campus colleges and one PG campus at Ongole. It also offers 160 UG programs in 440 affiliated colleges in the regions of Guntur and Prakasam Districts. It has a Centre for Distance Education offering 87 UG & PG programs. Characterized by its heterogeneous students and faculty hailing from different parts of the state and the country, the University provides most hospitable environment for pursuing Higher Learning and Research. Its aim is to remain connected academically at the forefront of all higher educational institutions. The University provides an excellent infrastructure and on- Campus facilities such as University Library with over one lakh books & 350 journals; Computer Centre; University Scientific Instrumentation Centre; Central Research Laboratory with Ultra-modern Equipment; Well-equipped Departmental Laboratories; Career Guidance and Placement Cell; Health Centre; Sports Facilities with Indoor & Outdoor Stadiums and Multipurpose Gym; Sports Hostel; Separate hostels for Boys, Girls, Research Scholars and International Students; Pariksha Bhavan (Examinations Building); Computers to all faculty members; Wi-Fi connectivity to all Departments and Hostels; Canteen, Student Centre & Fast-food Centre; Faculty Club; Dr. H.H. Deichmann & Dr. S.John David Auditorium cum Seminar Hall; Post office; Telecom Centre; State Bank of India; Andhra Bank; Energy Park; Silver Jubilee Park; Fish ponds; internet center; xerox center; cooperative stores; Water harvesting structures.



ACHARYA NAGARJUNA UNIVERSITY

VISION

To generate sources of knowledge that dispels ignorance and establish truth through teaching, learning and research.

MISSION

To promote a bank of human talent in diversified faculties – Commerce & Management Studies, Education, Engineering & Technology, Humanities, Law, Natural Sciences, Pharmacy, Physical Education & Sports Sciences, Physical Sciences and Social Sciences that would become an investment for a prosperous society.

OBJECTIVES

- > To inspire and encourage all who would seek knowledge through higher education and research.
- To provide quality instruction and research for the advancement of science and technology.
- > To promote teaching and research studies in disciplines of societal relevance.
- > To bridge the gap between theory and practice of the principles of higher education.
- > To develop human talent necessary for the industry.
- > To open up avenues of higher education and research through non-formal means.
- To invite and implement collaborations with other institutes of higher learning on a continuous basis for mutual academic progress.
- To motivate and orient each academic department/centre to strive for and to sustain advanced levels of teaching and research so that the university emerges as an ideal institute of higher learning.
- To focus specially on the studies involving rural economy, justifying its existence in the rural setting.



ACHARYA NAGARJUNA UNIVERSITY UNIVERSITY COLLEGE OF SCIENCES

VISION OF THE COLLEGE:

University College of Sciences envisages to be a good team of people with scientific temperament, research bent and a flair for Teaching & Learning for the betterment of the Community, Society, State and the Country at large.

MISSION OF THE COLLEGE:

The College intends to incubate and nurture the Leaders, Mentors, Educators and researchers who can transform the country and contribute to advances in science while addressing the challenges faced by the society for the betterment of human life.





ACHARYA NAGARJUNA UNIVERSITY UNIVERSITY COLLEGE OF SCIENCES DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING MASTER OF COMPUTER APPLICATIONS

VISION OF THE DEPARTMENT:

The vision is to make CS & E as an ideal department for the people to work with, and for the students to feel proud to be associated with the department.

MISSION OF THE DEPARTMENT:

The Mission is to make the students industry ready while they get trained in the department, equally fostering research that is useful for the department and the university at large.



ACHARYA NAGARJUNA UNIVERSITY UNIVERSITY COLLEGE OF SCIENCES DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING MASTER OF COMPUTER APPLICATIONS

Programme Educational Objectives:

PEO1: To provide oppurtunities for the acquisition of knowledge in fundamental concepts and programming skills for comprehensive development.

PEO 2: To nurture with the ability of effective adaptation to evolving trends and career prospects in the field of computer applications.

PEO 3: Promote design, research, product implementation and services in the field of Computer Science and Applications through technical, communication and entrepreneurial skills.

PEO 4: To craft successful entrepreneurs who excel professionally in diverse application skills within the core or related areas of computer science

PEO 5: To facilitate practical application of contemporary tools, technologies, and research to develop systems that address industry-specific problems.

Programme Outcomes (POs):

After the successful completion of the MCA (2 years) Degree Programme, the student will be able to:

PO1: apply the knowledge of mathematical foundations required for problem solving and the concerned analytical skills to analyze the problem at hand.

PO2: identify, analyze, design and investigate the complex problems from the programmer's perspective and formulate a solution using the technical skills obtained all through the program.

PO3: design and conduct experiments, as well as analyze and interpret data, draw conclusions.

PO4: apply current and emerging technologies for the problems at hand to create models at different stages of software development process and convert that into code as well as test

cases. This process gives a chance for getting better exposure to the modern tools and techniques.

PO5: work individually and as a good team player so that this transforms the individual to nurture and sustain the leadership skills.

PO6: function as a committed professional with ethical values, self-confidence, and positive attitude to sustain in a global economic environment.

PO7: communicate effectively, present technical information both verbally and written in the form of a report or mail.

PO8: understand the context based professional, ethical, legal, security and social issues and responsibilities.

PO9: use research, experiment, contemporary issues to solve industrial problems.

PO10: inculcate the habit of lifelong learning so as to match the cutting edge needs of the industry from time to time.

PO11: identify opportunities based on the society needs and convert that into an innovative idea so that the same can be converted into an enterprise.

PO12: understand, management and computing principles with computing knowledge to manage projects in multidisciplinary environments.

Programme Specific Outcomes (PSOs):

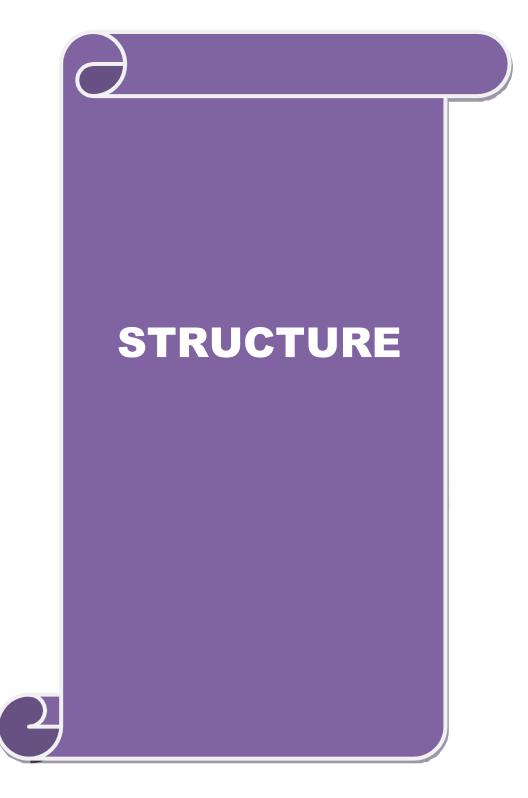
At the end of the programme, student will be able to:

PSO1: Design, develop, test and maintain web, mobile and cross-platform software applications using modern tools, technologies, skills and computing models. All these applications so developed may ultimately be moved on to the cloud.

PSO2: apply security mechanisms for computer applications.

PSO3: work with latest computing technologies and pursue careers in IT industry/ consultancy/ research and development, teaching and allied areas.

Master of Computer Applications, 2022-23 onwards – College of Sciences, ANU



ACHARYA NAGARJUNA UNIVERSITY UNIVERSITY COLLEGE OF SCIENCES DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING MASTER OF COMPUTER APPLICATIONS COURSE STRUCTURE

SEMESTER-I

S.	As per	Course	Title of the Course		ctions l er Wee		Credits		Evaluati	on	Total Marks	
No	NEP	Code		L	Т	Р		CIA		SEE		
				P.	10	-	100	Marks	Marks	Duration		
1	C	MCA 101	Data Structures with C++	2	1	1	5	30	70	3 Hours	100	
2	С	MCA 102	Database Management Systems	2	1	1	5	30	70	3 Hours	100	
3	C	MCA 103	Operating Systems	3	1	0	4	30	70	3 Hours	100	
4	CF	MCA 104	Probability and Statistics	3	1	0	4	30	70	3 Hours	100	
5	EF	MCA 105.1 MCA 105.2 MCA 105.3	Computer Organization Digital Logic Design Discrete Mathematical Structures	3	14	0	4	30	70	3 Hours	100	
6	P-1	MCA 106	Data Structures LAB			6	3	30	70	3 Hours	100	
7	P-II	MCA 107	Database Management Systems LAB	10	÷.,	6	3	30	70	3 Hours	100	
8	SEC	MCA 108	Communication Skills	1	3	~	2	50	-		50	
			Total	C Down	35	Ten.	30	260	490		750	
	1	1	C - Mandatory Core CF – Compulsory Foundat EF – Elective Foundation SEC – Skill Enhancement P - Practical		2° 8'				nternal As d Examina			

S.	As	Course		-	nstruct urs per	tions [.] Week	Credits		Evaluatio	n	Total Marks
No	per NEP	Code	Title of the Course					CIA	S	EE	
	NEP			L	Т	Р		Marks	Marks	Duration	
1	С	MCA 201	Software Engineering	3	1	0	4	30	70	3 Hours	100
2	C	MCA 202	Computer Networks	3	1	0	4	30	70	3 Hours	100
3	C	MCA 203	Web Technologies	2	1	1	5	30	70	3 Hours	100
4	CF	MCA 204	Artificial Intelligence	3	1	0	4	30	70	3 Hours	100
5	EF	MCA 205.1	Programming and Problem Solving using Python	2	1	1	5	30	70	3 Hours	100
		MCA 205.2	Introduction to R Programming	1		- Cen					
6	P – I	MCA 206	Python Programming / R Programming LAB	1 de	Ł.J.	6	3	30	70	3 Hours	100
7	P – II	MCA 207	Web Technologies LAB	1		6	3	30	70	3 Hours	100
8	SEC	MCA 208	Seminar		3		2	50	-		50
9			Skill Development Course	-	-	- 3	4	èr -	-		
			Total	1	35		34	260	490		750
			C - Mandatory Core CF – Compulsory Foundation EF – Elective Foundation SEC – Skill Enhancement C P - Practical				CIA – Co SEE – Se				

SEMESTER-II

Exit Policy: Students who can exit after first year (i.e., after II Semester) shall be awarded with a PG Diploma in Computer Applications certificate.

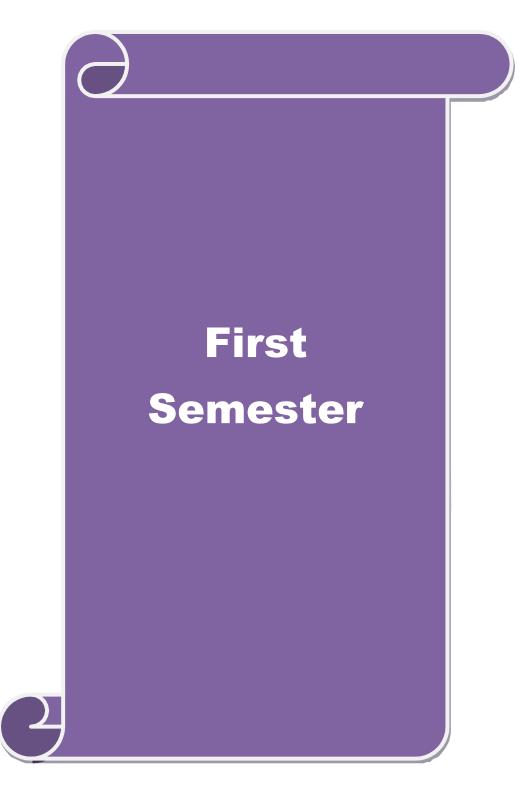
S.	As	Course			istruct Iours Weel	per	Credits		Evaluatio	on	Total
No	per NEP	Code	Title of the Course				Credits	CIA	5	Marks	
				L	T	Р		Marks	Marks	Duration	
1	C	301	Data Mining and Big Data	3	1	0	5	30	70	3 Hours	100
2	C	302	Cloud Computing	3	1	0	4	30	70	3 Hours	100
3	C	303	Machine Learning	2	1	1	4	30	70	3 Hours	100
4	E - I	304.1 304.2	Cryptography & Network Security Cyber Security	2	1	1	5	30	70	3 Hours	100
5	E – II	305.1 305.2 305.3	Mobile Computing with Android Block Chain Technology Microsoft Dynamics	3	1	0	4	30	70	3 Hours	100
6	P –I	306	Data Mining and Big Data LAB	1	1	6	3	30	70	3 Hours	100
7	P – II	307	Cryptography & Network Security LAB	1		6	3	30	70	3 Hours	100
8		308	Technical Report Writing		3		2	50	-		50
9	SEC		Skill Enhancement Course	-	2-0)	-	4	- //-	-		
			Total	1	35		34	260	490		750
		·	C - Mandatory Core Subject E – Elective P – Practical SEC – Skill Enhancement Course		RA				nternal As d Examina		·

SEMESTER-III

SEMESTER-IV

S.	As	Course	Title of the Course			er Week		1	Total			
No	per NEP	Code	Title of the Course	L	Т	Р	Credits	CIA	SEE		Marks	
								Marks	Marks	Duration		
1	SEC	401	Project Work			4	16		150	3 Hours	150	
			Total		4	1	16		150		150	
			SEC – Skill Enhancer	ment	Cours	se						

Master of Computer Applications, 2022-23 onwards – College of Sciences, ANU



ACHARYA NAGARJUNA UNIVERSITY

UNIVERSITY COLLEGE OF SCIENCES

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

MASTER OF COMPUTER APPLICATIONS

SEMESTER-I

SEMESTER	MCA 101 DATA STRUCTURES	L	Т	Р	С
Ι	MCA 101 DATA STRUCTURES with C++	2	1	1	5

Learning Objectives (LO):

The course is designed to meet the objectives of:

LO1	To explain the concepts of object-oriented programming
LO2	Understand how to apply the object-oriented concepts like data abstraction, encapsulation and inheritance
LO3	Implement the concepts of pointers, constructors and destructors
LO4	Elucidate the implementation of the six data structures using C++

Course Outcomes (CO):

Students successfully completing this course will be able to:

CO1	Illustrate the implementation of linked lists and Recursion	
CO2	Analyse search algorithms and hashing technique	
CO3	Apply Stacks and Queues for real world tasks	
CO4	Make use of trees and graphs in solving complex problems	

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

CO		РО												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	3	2	2							2			2		1	
CO2	3	2	2							2			1		2	
CO3	3	2	3							3			3		3	
CO4	2	3	2							3			3		3	

MCA 101: DATA STRUCTURES with C++

<u>Unit – I</u>

Software Engineering Principles and C++ Classes: Classes: Variable - Accessing Class members – Operators – Functions and Classes – Reference parameters and Class Objects – Implementation of member function – Constructors – Destructors; Data Abstraction, Classes and ADT – Information Hiding.

Pointers and Array based Lists : Pointer Data types and Pointer variables: Declaring Pointer Variables – Address of Operator – Dereferencing Operator - Classes, Structures and Pointer Variables – Initializing Pointer Variables – Dynamic Variables – Operators on Pointer Variables.

<u>Unit – II</u>

Linked Lists : Linked List – Properties – Item Insertion and Deletion – Building a Linked List – Linked List as an ADT – Ordered Linked Lists – Doubly Linked Lists – Linked Lists with header and trailer nodes – Circular Linked Lists.

Recursion: Recursive Definitions – Problem solving using recursion – Recursion or iteration - Recursion and Backtracking: n- Queens Puzzle.

Search Algorithms: Search Algorithms: Sequential – Binary search – Performance of binary search – insertion into ordered list; Hashing: Hash functions – Collision Resolution – Hashing: Implementation using Quadratic Probing – Collision Resolution: Chaining.

<u>Unit – III</u>

Stacks: Stack operations – Implementation of stacks as arrays – Linked implementation of stacks – Application of stacks.

Queues: Queues: Queue operations – Implementation of Queues as arrays; Linked implementation of Queues; Priority Queue; Application of Queues.

Sorting Algorithms: Selection Sort – Insertion Sort – Quick Sort – Merge Sort – Heap Sort.

<u>Unit – IV</u>

Trees: Binary Trees – Binary Tree Traversal – Binary Search Tree – Non recursive Binary Tree Traversal Algorithms – AVL Trees.

Graphs: Graph Definitions and Notations – Graph Representation – Operations on graphs – Graph as ADT – Graph Traversals – shortest path

Algorithm – Minimal Spanning Tree.

Prescribed Book:

D.S.Malik, "Data Structures using C++", Cengage Learning India Edition (2008).

Reference Books:

1. Mark Allen Weiss, "Data structures and Algorithem Analysis in C++", Third Edition, Pearson Education (2008).

2. Adam Drozdek , "Data Structures and Algorithms in C++" , Cengage Learning , India Edition .

SEMESTER	MCA 102 DATABASE MANAGEMENT	L	Т	Р	C
Ι	SYSTEMS	2	1	1	5

Learning Objectives (LO):

The course is designed to meet the objectives of:

LO1	The purpose of a database management system (DBMS)
LO2	The role of the database administrator
LO3	Data consistency, data integrity, data redundancy and data independence
LO4	The concept of entity relationships and data normalization
L05	The concept of a client/server database
LO6	The relevant advantages of a client/server database over a non-client/server database

Course Outcomes (CO):

Students successfully completing this module will be able to:

CO1	Explain about database, different operations, queries performed for management
	system problems
CO2	Demonstrate the significance of ER-diagram in DBMS
CO3	Make use of different normalizations for database size reduction and removal of
	redundancy
CO4	Apply PL/SQL, SQL injection, procedures etc

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

CO						Р	0						PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2		2							1			2		1
CO2	2		3							2					2
CO3	2		2							2			2		2
CO4	2		3							3			2		3

MCA 102: DATABASE MANAGEMENT SYSTEMS

<u>Unit–I</u>

Databases and Database Users: Introduction, Characteristics of the Database Approach, Actors on the Scene, Workers behind the scene, Advantages of the using the DBMS Approach.

Database System Concepts and Architecture: Data Models, Schemas and Instances, Three Schema architecture and Data Independence, Database Languages and Interfaces, Centralized and Client/Server Architecture for DBMS, Classification of Database Management Systems.

Disk Storage, Basic File Structures and Hashing: Introduction, Secondary Storage Devices, Buffering of Blocks, Placing file Records on Disk, Operations on Files, Files of Unordered Records, Files of Ordered Records, Hashing Techniques, Other Primary File Organizations, Parallelizing Disk Access using RAID Technology.

Indexing Structures for Files: Types of Single-Level Ordered Indexes, Multilevel Indexes and Dynamic Multilevel Indexes Using B-Trees and B^+ Trees, Indexes on Multiple Keys, Other Types of Indexes.

Data Modeling Using the ER Model: Conceptual Data models, Entity Types, Entity Sets, Attributes and Keys, Relationship types, Relationship sets, roles and structural Constraints, Weak Entity types, Relationship Types of Degree Higher than Two, Refining the ER Design for the COMPANY Database.

The Enhanced Entity-Relationship Model: Sub classes, Super classes and Inheritance, Specialization and Generalization, Constraints and Characteristics of Specialization and Generalization Hierarchies, Modeling of Union Types using Categories, An Example University ERR Schema, Design Choices and Formal Definitions.

<u>Unit-II</u>

The Relational Data Model and Relational Database Constraints: Relational Model Concepts, Relational Model Constraints and Relational Database Schemas, Update Operations, Transactions and Dealing with Constraint Violations.

The Relational Algebra and Relational Calculus: Unary Relational Operations: SELECT and PROJECT, Relational Algebra Operations from set Theory, Binary Relational Operations: JOIN and DIVISION, Additional Relational Operations, Examples, The Tuple Calculus and Domain Calculus.

SQL-99: Schema Definition, Constraints, Queries and Views: SQL Data Definitions and Data Types, Specifying Constraints in SQL, Schema Change Statements on SQL, Basic Queries in SQL, More Complex SQL Queries, INSERT, DELETE and UPDATE statements in SQL, Triggers and Views.

<u>Unit-III</u>

Functional Dependencies and Normalization for Relational Databases: Informal Design Guidelines for Relation Schemas, Functional dependencies, Normal Forms Based in Primary Keys, General Definitions of Second and Third Normal Forms, Boyce-Codd Normal Form.

Relational Database Design Algorithms and Further Dependencies: Properties of Relational Decompositions, Algorithms fro Relational Database Schema Design, Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Inclusion Dependencies, Other Dependencies and Normal Forms.

<u>Unit-IV</u>

Introduction to Transaction Processing Concepts and Theory: Introduction to Transaction Processing, Transaction and System Concepts, Desirable Properties of Transactions, Characterizing Schedules Based on Recoverability, Characterizing schedules Based on Serializability.

Concurrency Control Techniques: Two Phase Locking Techniques for Concurrency Control, Concurrency Control Based on Timestamp Ordering, Multiversion Concurrency control techniques, Validation concurrency control Techniques, Granularity of Data Items and multiple Granularity Locking.

Distributed Databases and Client Server Architectures: Distributed Database Concepts, Data Fragmentation, Replication, and allocation Techniques for Distributed Database Design, Types of Distributed Database Systems, An Overview if 3 Tier Client Server Architecture.

Prescribed Text :

RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education (2007)

Reference Books :

- 1. Peter Rob, Carlos Coronel, "Database Systems" Design, Implementation and Management, Eigth Edition, Thomson (2008).
- 2. C.J. Date, A.Kannan, S. Swamynathan, "An Introduction to Database Systems", VII Edition Pearson Education (2006).
- 3. Raman A Mata Toledo, Panline K. Cushman, "Database Management Systems", Schaum's Outlines, TMH (2007).
- 4. Steven Feuerstein, "Oracle PL/SQL Programming", 10th Anniversary Edition, OREILLY (2008).

SEMESTER	MCA 103 OPERATING SYSTEMS		Т	Р	С
Ι	MCA 105 OPERATING SYSTEMS	3	1	0	4

Learning Objectives (LO):

The course is designed to meet the objectives of:

L01	Appreciating the role of an operating system
LO2	Making aware of the issues in management of resources like processor, memory and input-
	output
LO3	Selection of appropriate productivity enhancing tools or utilities for specific needs like
	filters or version control
LO4	Obtaining some insight into the design of an operating system.

Course Outcomes (CO):

Students successfully completing this module will be able to:

Explain what is an operating system and the role it plays
Infer high level understanding of the structure of operating systems, applications, and the
relationship between them
How to gather knowledge of the services provided by operating systems
Compare the exposure to some details of major OS concepts.

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

CO		PO							PSO						
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	1			2	16		se à	a) et	10				2		2
CO2	3			2									2		2
CO3	2			2									2		2
CO4	2			2									2		3

MCA 103: OPERATING SYSTEMS

UNIT-I:

Introduction : What Operating Systems Do – Computer System Orgranization – Computer system Architecture – Operating System Structure – Operating System Operations – Process

Management – Memory Management – Storage Management – Protection and Security – Distributed Systems – Special purpose Systems – Computing Environments.

System Structure: Operating System Services – User Operating System Interface – System Calls – Types of System Calls – System Programs – Operating System Design and Implementation – Operating System Structure – Virtual Machine – Operating System Generation – System Boot.

Process Concept:Overview – Process Scheduling – Operations on Processes – Interprocess Communication – Examples of IPC Systems – Communication in Client Server Systems.

<u>UNIT-II</u>:

Multithreaded Programming : Overview – Multithreading Models – Thread Libraries – Threading Issues – Operating System Examples.

Process Scheduling: Basic Concepts – Scheduling Criteria – Scheduling Algorithms – Multiple Processor Scheduling – Thread Scheduling.

Synchronization: Background – The Critical Section Problem – Peterson's solution – Synchronization Hardware – Semaphores – Classic Problem of Synchronization – Monitors – Synchronization Examples – Atomic Transaction.

UNIT-III:

Deadlocks : System Model – Deadlock Characterization – Methods for Handling Deadlocks – Deadlock Prevention – Deadlock Avoidance – Deadlock Detection – Recovery from Deadlock.

Memory Management Strategies: Background – Swapping – Contiguous Memory Allocation – Paging – Structure of the Page Table – Segmentation – Example: The Intel Pentium.

Virtual Memory Management: Background – Demand Paging – Copy on Write – Page Replacement – Allocation of Frames – Thrashing.

<u>UNIT–IV:</u>

File System : File Concept – Access Methods – Directory Structure – File System Mounting – File Sharing – Protection.

Implementing File Systems :File System Structure – File System Implementation – Directory Implementation – Allocation Methods – Free Space Management – Efficiency and Performance – Recovery – Log structured File Systems.

Secondary Storage Structure : Overview of Mass – Storage Structure – Disk Structure – Disk Attachment – Disk Scheduling – Disk Management – Swap Space Management – RAID structure.

I/O Systems: Overview – I/O Hardware – Application I/O Interface – Kernal I/O Interface – Transforming I/O requests to Hardware Operations – Streams – Performance.

Prescribed Book:

Abraham Silberschatz, Peter Baer Galvin, Greg Gagne. "Operating System Principles", Seventh Edition, Wiley.

Reference Book:

- 1. William Stallings, "Operating Systems Internals and Design Principles", Fifth Edition, Pearson Education (2007)
- 2. Achyut S Godbole, "Operating Systems", Second Edition, TMH (2007).
- 3. Flynn/McHoes, "Operating Systems", Cengage Learning (2008).
- **4**. Deitel&Deitel, "Operating Systems", Third Edition, Pearson Education (2008)

SEMESTER	MCA 104 DOODADILITY AND STATISTICS	L	Т	Р	C
Ι	MCA 104 PROBABILITY AND STATISTICS	3	1	0	4

Learning Objectives (LO):

The course is designed to meet the objectives of:

LO1	Students will add new interactive activities to fill gaps that we have identified by
	analysing student log data
LO2	Collecting input from other college professors on where students typically have
	difficulties
LO3	Students will add new simulation-style activities to the course in Inference and
	Probability

Course Outcomes (CO):

Students successfully completing this module will be able to:

CO1	Show confidence in manipulating and drawing conclusions from data and provide
	them with a critical framework for evaluating study designs and results
CO2	Explain the basic notions of probability laws and develop them to the stage where one can begin to use
CO3	Explain the basic notions of probability laws and develop them to the stage where one can begin to use
CO4	Summarize the study of stochastic processes,

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

CO		РО									PSO				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C01	3	2	3												
CO2	2	2	1												
CO3	3	2	2												
CO4	2	2	2												

MCA 104: PROBABILITY AND STATISTICS

<u>Unit I:</u>

Some probability laws: Axioms of Probability, Conditional Probability, Independence of the Multiplication Rule, Bayes' theorem

Discrete Distributions: Random Variables, Discrete Probability Densities, Expectation and distribution parameters, Binomial distribution, Poisson distribution, simulating a Discrete distribution,

Continuous distributions: continuous Densities, Expectation and distribution parameters, exponential distribution, Normal distribution, Weibull distribution and Reliability.

UNIT II:

Estimation: Point estimation, interval estimation and central limit theorem.

Inferences on the mean and the Variance of a distribution: Hypothesis Testing, significance testing, Hypothesis and significance test on the mean, Hypothesis tests on the Variance

Inferences on proportions: estimating proportions, testing hypothesis on a proportion, Comparing two proportions: estimation, comparing two proportions: hypothesis testing.

UNIT III:

Comparing two means and two variances: point estimation: independent samples, Comparing variances: the F-distribution,

Comparing means: variances equal,

Analysis of Variance: One-way classification fixed effects model, comparing variances, pair wise comparisons, randomized complete block design

UNIT IV:

Simple linear regression and correlation : model and parameter estimation, inferences about slope, inferences about intercept, Co-efficient of determination

Multiple linear regression models: least square procedures for model fitting, a matrix approach to least squares, interval estimation.

Prescribed book:

J Susan Milton and Jesse C. Arnold: "Introduction to Probability and Statistics", Fourth edition, TMH,(2007).

Reference book:

William Mendenhall, Robert J Beaver, Barbara M Beaver: Introduction to Probability and Statistics, Twelth edition, Thomson.

SEMESTER	MCA 105.1 COMPUTER ORGANIZATION	L	Т	Р	С
Ι	MCA 105.1 COMPUTER ORGANIZATION	3	1	0	4

Learning Objectives (LO):

The course is designed to meet the objectives of:

LO1	Help the students to develop an understand the nature and characteristics of the organisation and design of the modern computer systems
LO2	Explain the students about the basic computer organization
L03	Focus on the organisation & operation of the CPU

Course Outcomes (CO):

Students successfully completing this module will be able to:

CO1	Explain the key concepts that are likely to be included in the design of any modern
	computer system
CO2	Make use of the basic metrics by which new and existing computer systems may be
	evaluated
CO3	Outline the impact that languages, their compilers and underlying operating systems
	have on the design of computer systems

CO4	How to evaluate the impact that peripherals, their interconnection and underlying data operations have on the design of computer systems
CO5	Demonstrate the techniques needed to conduct the design of a computer

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

CO		РО								PSO					
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2			1									1		
CO2	2			2		4							1		
CO3	3			2	No.	*	(\mathbf{O})	*	1						
CO4	2			2		X				11			2		

MCA 105.1: COMPUTER ORGANIZATION

<u>Unit-I</u>

Digital Logic Circuits: Digital Computers, Logic Gates, Boolean Algebra, Map Simplification, Combinational Circuits, Flip-Flops, Sequential Circuits.

Digital Components: Integrated Circuits, Decoders, Multiplexers, Registers, Shift Registers, Binary Counters, Memory Unit.

Data Representation: Data Types, Complements, Fixed Point Representation, Floating Point Representation, Other Binary Codes, error Detection Codes.

<u>Unit-II</u>

Register Transfer and Microoperations: Register Transfer Languages, Register Transfer, Bus and Memory Transfer, Arithmetic Micro Operations, Logic Micro Operations, Shift Micro Operations, Arithmetic Logic Shift Unit

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input-Output and Interrupt.

<u>Unit-III</u>

Microprogrammed Control: Control Memory, Address Sequencing, Micro Program Example, Design of Control Unit.

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Format, Addressing Modes, Data Transfer and Manipulation, Program Control.

Unit-IV

Computer Arithmetic: Addition, Subtraction, Multiplication, Division Algorithms, Floating Point Arithmetic Operations.

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associative Memory, Cache Memory.

Prescribed Book:

M.Morris Mano, "Computer System Architecture", 3rd Edition, Pearson Education (2008).

Reference Books:

- 1. V. Rajaraman, T. Radha Krishnan, "Computer Organization and Architecture", PHI
- 2. BehroozParhami, "Computer Architecture", Oxford (2007)
- 3. ISRD group, "Computer Organization", ace series, TMH (2007)
- 4. William Stallings, "Computer Organization and Architecture Designing for Performance", Pearson Education (2005)
- 5. P.Chakraborty, "Computer Architecture and Organization", Jaico Books (2008)

SEMESTER	MCA 105.2 DIGITAL LOGIC DESIGN	L	Т	Р	С
Ι	MCA 105.2 DIGITAL LOGIC DESIGN	3	1	0	4

Learning Objectives (LO):

The course is designed to meet the objectives of:

LO1	To understand basic number systems, codes and logical gates.						
LO2	To understand the concepts of Boolean algebra						
LO3	To understand the use of minimization logic to solve the Boolean logic expressions						
LO4	To understand the design of combinational and sequential circuits						
LO5	To understand the state reduction methods for Sequential circuits.						
LO6	To understand the basics of various types of memories						

Course Outcomes (CO):

Students successfully completing this module will be able to:

CO1	Explain number systems and codes.
CO2	Illustrate Boolean expressions using Minimization methods.
CO3	Demonstrate the sequential and combinational circuits.
CO4	Apply state reduction methods to solve sequential circuits.

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

CO		РО									PSO				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2												2		1
CO2	2														2
CO3	3												3		3
CO4	3	3											3		3

MCA 105.2: DIGITAL LOGIC DESIGN

UNIT – I

Binary Systems: Digital Systems, Binary Numbers, Number base conversions, Octal, Hexadecimal and other base numbers, complements, signed binary numbers, Floating point number representation, binary codes, Error detection and correction, binary storage and registers, binary logic.

Boolean algebra and logic gates: Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, Digital Logic Gates.

UNIT – II

Gate–Level Minimization: The K-Map Method, Three-Variable Map, Four-Variable Map, Five-Variable Map , sum of products , product of sums simplification, Don't care conditions, NAND and NOR implementation and other two level implementations, Exclusive-OR function.

UNIT – III

Combinational Logic: Combinational Circuits (CC), Analysis procedure, Design Procedure, Combinational circuitfor different code converters and other problems, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, Demultiplexers.

UNIT - IV

Synchronous Sequential Logic: Synchronous Sequential Circuits, Latches, Flip-flops, analysis of clocked sequential circuits, Registers, Shift registers, Ripple counters, Synchronous counters, other counters.

Asynchronous Sequential Circuits -Introduction, Analysis procedure, Circuits with latches, Design procedure, Reduction of state and follow tables, Race- free state assignment, Hazards.

UNIT – V

Memory: Introduction, Random-Access memory, Memory decoding, ROM, Programmable Logic Array, Programmable Array Logic, Sequential programmable devices.

Register Transfer and Micro operations - Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Microoperations, Logic Microoperations, Shift Microoperations, Arithmetic Logic Shift Unit.

TEXT BOOKS:

Digital Design, M. Morris Mano, M.D.Ciletti, 5th edition, Pearson.(Units I, II, III, IV, Part of Unit V)

Computer System Architecture, M.Morris Mano, 3rd edition, Pearson.(Part of Unit V)

REFERENCE BOOKS:

Switching and Finite Automata Theory, Z. Kohavi, Tata McGraw Hill.

Fundamentals of Logic Design, C. H. Roth, L. L. Kinney, 7th edition, Cengage Learning.

Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M. Rafiquzzaman, John Wiley.

SEMESTER	MCA 105.3 DISCRETE MATHEMATICAL	L	Т	Р	С
Ι	STRUCTURES	3	1	0	4

Learning Objectives (LO):

The course is designed to meet the objectives of:

CO1	To extend student 's Logical and Mathematical maturity and ability to deal with
	abstraction
CO2	To introduce most of the basic terminologies used in computer science courses and
	application
	of ideas to solve practical problems.
CO3	Apply logical reasoning to solve a variety of problems.

Course Outcomes (CO):

Students successfully completing this module will be able to:

LO1	Show greater precision in logical argument and have gained core mathematical				
	understanding				
	of discrete mathematics.				
LO2	Construct basic concepts of mathematical proof (direct proof, proof by contradiction,				
	mathematical induction).				
LO3	Solve standard logics with confidence				
LO4	Apply complex mathematical expressions and general formulae to specific contexts				
L05	Utilise Boolean Algebra and solve problems.				

CO		РО									PSO				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2	2	1												
CO2	2	2	1												
CO3	3	2	2												
CO4	3	3	2												

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

MCA 105.3: DISCRETE MATHEMATICAL STRUCTURES

UNIT-I:

The Foundations: Logic and Proofs: Propositional Logic – Propositional Equivalences – Predicates and Quantifiers – Nested Quantifiers – Rules of Inference – Introduction to Proofs – Proof Methods and Strategy

Basic Structures:Sets, Functions, Sequences and Sums: Sets – Set Operations – Functions – Sequences and Summations

The Fundamentals : Algorithms, The Integers and Matrices: Algorithms – The Growth of Functions – Complexity of Algorithms – The Integers And Divisions – Primes and Greatest Common Divisors – Integers and Algorithms – Applications of Number Theory – Matrices

Introduction and Recursion : Mathematical Induction – Strong Induction and Well-Ordering – Recursive Definitions and Structural Induction – Recursive Algorithms – Program Correctness

UNIT-II:

Counting: The Basics of Counting – The Pigeon Hole Principle – Permutations and Combinations – Binomial Coefficients – Generalized Permutations and Combinations – Generating Permutations and Combinations

Advanced Counting Techniques: Recurrence Relations – Solving Linear Recurrence Relations – Divide and Conquer Algorithms and Recurrence Relations – Generating Functions – Inclusion – Exclusion – Applications of Inclusion & Exclusion

<u>UNIT-III:</u>

Relations : Relations and Their Properties – n-ary Relations and Their Applications – Representing Relations – Closures of Relations – Equivalence Relations – Partial Orderings

Graphs: Graphs and Graph Models – Graph Terminology and Special Types of Graphs – Representing Graphs and Graph Isomorphism's – Connectivity – Euler and Hamilton Paths – Shortest Path Problems – Planar Graphs - Graph Coloring

UNIT-IV:

Trees: Introduction to Trees – Applications of Trees – Tree Traversal – Spanning Trees – Minimum Spanning Trees

Boolean Algebra: Boolean Functions – Representing Boolean Functions – Logic Gates – Minimization of Circuits

Prescribed Book:

Kenneth H Rosen, "Discrete Mathematics & its Applications", 6th Edition, McGraw-Hill (2007) **Chapters :** 1 to 10

Reference Books:

- 1. Ralph P. Grimaldi, B.V. Ramana, "Discrete and Combinational Mathematics", 5th Edition, Pearson Education (2008).
- 2. Swapan Kumar Sarkar, "A Text Book of Discrete Mathematics", S.Chand (2008).
- 3. D.S.Malik and M.K.Sen, "Discrete Mathematical Structures", Thomson (2006).

SEMESTER	MCA 106 DATA STRUCTURES LAB	L	T	P	C
Ι	MCA 100 DATA STRUCTURES LAB	-	-	6	3

MCA 106: DATA STRUCTURES USING LAB

- 1. Write a program for implementing the operations on complex numbers using classes.
- 2. Program for finding the area of circle, rectangle and room using function overloading.
- 3. Program for finding the volume of box using constructor overloading.
- 4. Program for Sorting 'n' elements Using bubble sort technique.
- 5. Sort given elements using Selection Sort.
- 6. Sort given elements using Insertion Sort.
- 7. Sort given elements using Merge Sort.
- 8. Sort given elements using Quick Sort.
- 9. Implement the following operations on single linked list.
 (i) Creation (ii) Insertion (iii) Deletion (iv) Display
- 10. Implement the following operations on double linked list.(i) Creation (ii) Insertion (iii) Deletion (iv) Display
- 11. Implement the following operations on circular linked list.(i) Creation (ii) Insertion (iii) Deletion (iv) Display
- 12. Program for splitting given linked list.
- 13. Program for traversing the given linked list in reverse order.
- 14. Merge two given linked lists.
- 15. Implement Stack Operations Using Arrays.
- 16. Implement Stack Operations Using Linked List.
- 17. Implement Queue Operations Using Arrays.
- 18. Implement Queue Operations Using Linked List.
- 19. Implement Operations on Circular Queue.

- 20. Construct and implement operations on Priority Queue.
- 21. Implement Operations on double ended Queue.
- 22. Converting infix expression to postfix expression by using stack.
- 23. Write program to evaluate post fix expression.
- 24. Add two polynomials using Linked List.
- 25. Multiply Two polynomials using Linked List.
- 26. Construct BST and implement traversing techniques recursively.
- 27. Implement preorder traversal on BST non recursively.
- 28. Implement inorder traversal on BST non recursively.
- 29. Implement postorder traversal on BST non recursively.
- 30. Implement binary search techniques recursively.



SEMESTER	MCA 107 DBMS LAB	L	Т	Р	С
I	MCA 107 DDWIS LAD	-	-	6	3

Aim: Marketing Company wishes to computerize their operations by using following tables.

Table Name: Client_Master

Description: This table stores the information about the clients.

Column Name	Data Type	Size	Attribute
Client_no	Varchar2	6	Primary Key and first letter should starts with 'C'
Name	Varchar2	10	Not null
Address1	Varchar2	10	
Address2	Varchar2	10	
City	Varchar2	10	
State	Varchar2	10	
Pincode	Number	6	Not null
Bal_due	Number	10,2	

Table Name:Product_master

Description: This table stores the information about products.

Column Name	Data Type	Size	Attribute
Product_no	Varchar2	6	Primary Key and first letter should starts with 'P'
Description	Varchar2	10	Not null
Profit_percent	Number	2,2	Not null
Unit_measure	Varchar2	10	
Qty_on_hand	Number	8	

Record_lv1	Number	8	
Sell_price	Number	8,2	Not null, can't be 0
Cost_price	Number	8,2	Not null, can't be 0

Table Name: salesman_master

Description: This table stores the salesmen working in the company

Column Name	Data Type	Size	Attribute	
Salesman_id	Varchar2	6	Primary Key and first letter should starts with 'S'	
Name	Varchar2	10	Not null	
Address1	Varchar2	10	10	
Address2	Varchar2	10	13	
City	Varchar2	10		
State	Varchar2	10		
Pincode	Number	6	Not null	
Sal_amt	Number	8,2	Should not null and zero	
Target_amt	Number	6,2	Should not null and zero	
Remarks	Varchar2	10		

Table Name: sales_order

Description: This table stores the information about orders

Column Name	Data Type	Size	Attribute
S_order_no	Varchar2	6	Primary Key and fisrt char is 'O'
S_order_date	Date		
Client_no	Varchar2	6	Foreign key
Delve_address	Varchar2	20	

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Salesman_no	Varchar2	6	Foreign key
Delve_type	Varchar2	1	Delivery: part(P)/Full(F) and default 'F'
Billed_yn	Char	1	
Delve_date	Date		Can't be less than the s_order_date
Order_status	Varchar2	10	Values in 'IN PROCESS', FULFILLED', 'BACK ORDER, 'CANCELLED'

Table Name: sales_order_details

Description: This table stores the information about products ordered

Column Name	Data Type	Size	Attribute
S_order_no	Varchar2	6	Primary key, foreign key references sales_order table
Product_no	Varchar2	6	Primary key, foreign key references product_master table
Qty_ordered	Number	8	2/5/
Qty_disp	Number	8	
Product_rate	Number	10,2	550

Table Name: challan_master

Description: This table stores the information about challans made

for orders.

Column Name	Data Type	Size	Attribute
Challan_no	Varchar2	6	Primary key, first two letters must start with 'CH'

S_order_no	Varchar2	6	Foreign key references sales_order
Challan_date	Date		
Billed_yn	Char	1	Values in 'Y', 'N' default 'N'

Table Name: Challan_Details

Description: This table stores the information about challan detail.

Column Name	Data Type	Size	Attribute
Challan_no	Varchar2	6	Primary key, foreign key references challan_master table
Product_no	Varchar2	6	Primary key, foreign key references product_master table
Qty_disp	Number	4,2	Not null

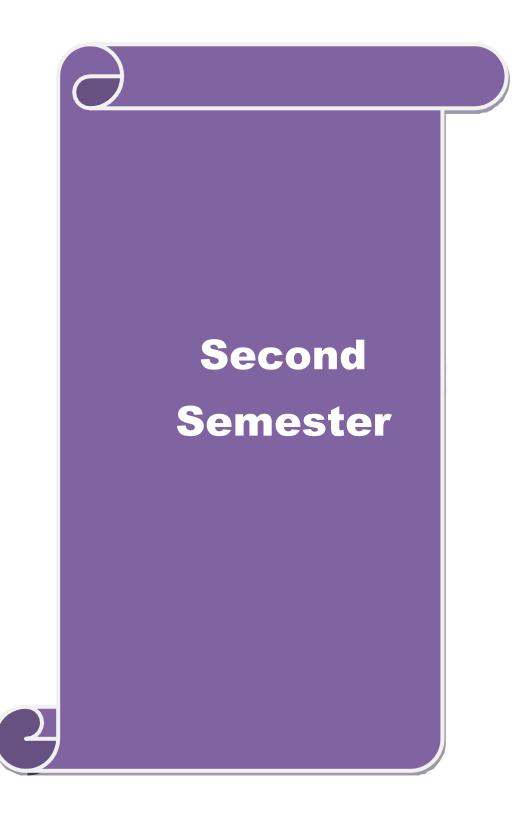
Solve the following queries by using above tables.

- 1. Retrieve the list of names and cities of all the clients.
- 2. List the various products available from product_master.
- 3. Find out the clients who stay in a city whose second letter is 'a'.
- 4. Find the list of all clients who stay in the city ' CHENNAI' or 'DELHI'.
- 5. List all the clients located at 'CHENNAI'.
- 6. Print the information from sales order as the order the places in the month of January.
- 7. Find the products with description as 'Floppy Drive' and 'Pen drive'.
- 8. Find the products whose selling price is grater than 2000 and less than or equal to 5000.
- 9. Find the products whose selling price is more than 1500 and also find the new selling price as original selling price *15.
- 10. Find the products in the sorted order of their description.
- 11. Divide the cost of product '540 HDD' by difference between its price and 100.
- 12. List the product number, description, sell price of products whose description begin with letter 'M'.
- 13. List all the orders that were cancelled in the month of March.
- 14. Count the total number of orders.
- 15. Calculate the average price of all the products.
- 16. Determine the maximum and minimum product prices.
- 17. Count the number of products having price grater than or equal to 1500.
- 18. Find all the products whose quantity on hand is less than reorder level.
- 19. Find out the challan details whose quantity dispatch is high.
- 20. Find out the order status of the sales order, whose order delivery is maximum

in the month of March.

- 21. Find out the total sales made by the each salesman.
- 22. Find the total revenue gained by the each product sales in the period of Q1 and Q2 of year 2006.
- 23. Print the description and total qty sold for each product.
- 24. Find the value of each product sold.
- 25. Calculate the average qty sold for each client that has a maximum order value of 1,50,000.
- 26. List the products which has highest sales.
- 27. Find out the products and their quantities that will have to deliver in the current month.
- 28. Find the product number and descriptions of moving products.
- 29. Find the names of clients who have purchased 'CD DRIVE'.
- 30. List the product numbers and sales order numbers of customers having quantity ordered less than 5 from the order details for the product '1.44 Floppies'.
- 31. Find the product numbers and descriptions of non-moving products.
- 32. Find the customer names and address for the clients, who placed the order '019001'.

SEMESTER	8	L	Т	Р	С
I	MCA 108 Communication Skills	_	3	_	2



ACHARYA NAGARJUNA UNIVERSITY

UNIVERSITY COLLEGE OF SCIENCES

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

MASTER OF COMPUTER APPLICATIONS

SEMESTER-II

Semester		L	Τ	P	C
П	MCA 201: SOFTWARE ENGINEERING	3	1	0	4

Learning Objective (LO):

LO1	The need of software engineering, its different life cycles and different
LUI	phases
LO2	To measure cost, efforts, time and team management etc,
LO3	Testing and maintenance techniques of big projects and
LO4	Different risks and its management systems
LO5	Learn about quality management.

Course Outcomes (CO):

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

CO1	Describe software engineering layered technology and process framework
CO2	Evaluate the different process models and choose the best model for their
002	project
CO3	Understand the different development practices and its advantages
CO4	Explain software testing approaches, software tactics and metrics for process
04	and project domains
CO5	Analyse estimation techniques, quality management and formal methods

CO						Р	0						PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1				2						2		2	2		2
CO2		3	2							2			2		2
CO3		3	2	3						3			2		2
CO4		3	2	3						3			2		2
C05		3	2	3						2			2		2

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

MCA 201: SOFTWARE ENGINEERING

Unit-I:

Introduction to Software Engineering: The Evolving Role of Software, Software, The Changing Nature of Software, Legacy Software: The Quality of legacy software, Software Evolution, Software Myths.

A Generic View of Process: Software Engineering-A Layered Technology, A Process Frame Work, The capability Maturity Model Integration (CMMI), Process Patterns, Process Assessment, Personal and Team Process Models: Personal Software Process (PSP), Team Software Process (TSP), Process Technology, Product and Process.

Process Models: Prescriptive Models, The Waterfall Model, Incremental Process Models: The Incremental Model, The RAD Model, Evolutionary Process Model: Prototyping, The Spiral Model, The Concurrent Development Model, Specialized Process Models: Component Based Development, The formal Methods Model, The Unified Process.

An Agile View of Process: What is Agility? What is Agile Process? Agile Process Models: Extreme Programming, Adaptive Software Development, Dynamic Systems Development Method, Scrum, Crystal, Feature Driven Development, Agile Modeling.

<u>Unit-II</u>

Software Engineering Practice: Software Engineering Practice, communication practices, Planning Practices, Modeling Practices, Construction Practices, and Deployment.

System Engineering: Computer Based Systems, the System Engineering Hierarchy, Business Process Engineering: An Overview, System Modeling.

Building the Analysis Model: Requirement Analysis, Analysis Modeling Approaches, Data Modeling Concepts, Object Oriented Analysis, Scenario Based Modeling, Flow Oriented Modeling, Class Based Modeling, Creating a Behavioral Model.

Design Engineering: Design within the contextof Software Engineering, Design Process and Design Quality, Design Concepts, The Design Model, Pattern Based Software Design.

<u>Unit-III</u>

Testing Strategies: A strategic Approach to Software Testing, Strategic Issues, and Test Strategies for conventional Software, Testing Strategies for Object Oriented Software, Validation Testing, System Testing, the Art of Debugging.

Testing Tactics: Software Testing Fundamentals, Black Box and White Box Testing, White Box Testing, Basis Path Testing, Control Structure Testing, Black Box Testing, Object Oriented Testing Methods, Testing Methods Applicable at the class level, InterClass Test Case Design, Testing for Specialized Environments, Architectures and Applications, Testing Patterns.

Project Management: The Management Spectrum, the People, The Product, The Process, The Project, The W5HH Principles.

Metrics for Process and Projects: Metrics in the Process and Project Domains, Software Measurement, Metrics for Software Quality, Integrating Metrics within Software Process, Metrics for Small Organizations, Establishing a Software Metrics Program.

<u>Unit-IV</u>

Estimation: Observations on Estimations, The project planning process, Software Scope and Feasibility, Resources, Software Project Estimation, Decomposition Techniques, Empirical Estimation Models, Estimations for Object Oriented Projects, Specialized Estimation Techniques, The Make/Buy Decision

Quality Management: Quality Concepts, Software Quality Assurance, Software Reviews, Formal Technical Reviews, Formal Approaches to SQA, Statistical Software Quality Assurance, Software Reliability, The ISO 9000 Quality Standards, the SQA Plan

Formal Methods: Basic Concepts, Object Constraint Language (OCL), The Z specification language, The Ten Commandments for Formal Methods.

Cleanroom Software Engineering: The Cleanroom Approach, Functional Specification, Cleanroom Design, Cleanroom Testing.

Prescribed Book:

Roger S Pressman, "Software Engineering–A Practitioner's Approach", Sixth Edition, TMH International.

Reference Books:

- 1. Sommerville, "Software Engineering", Seventh Edition Pearson Education (2007)
- 2. S.A.Kelkar, "Software Engineering A Concise Study", PHI.
- 3. Waman S.Jawadekar, "Software Engineering", TMH.
- 4. Ali Behforooz and Frederick J.Hudson, "Software Engineering Fundamentals", Oxford (2008).

Semester		L	Τ	Р	C
II	MCA 202: COMPUTER NETWORKS	3	1	0	4

Learning Objective (LO):

The course is designed to meet the objectives of:

LO1	Understanding the state-of-the-art in network protocols, architectures, and
	applications
LO2	Examining and studying of different protocols in OSI and TCP/IP
LO3	Understanding of network addressing, mapping etc
LO4	Understanding error control, flow control, packet recovery etc
LO5	Understanding internetworking of devices

Course Outcomes (CO):

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

CO1	Analyse basic taxonomy and terminology of the computer networking
	area.
CO2	Describe the configuration and design of a small network
CO3	Explain about research areas and future internets research fields
CO4	Learn components and rules of communications
CO5	Construct and implement layer protocols within an environment

		PO					PSO								
со	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1		2		2						2		2		3	2
CO2		2	2							2				3	2
CO3		2	2	3						3				3	2
CO4		2	2	3						3				3	2
CO5		2	2	3		1	Sea.	5		2				3	2

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

MCA 202: COMPUTER NETWORKS

<u>UNIT – I</u>

Introduction: Uses of Computer Networks: Business Application, Home Applications, Mobile Users – Social Issues. Network Hardware: Local Area Networks – Metropolitan Area Networks – Wide Area Networks – Wireless Networks – Home Networks – Internetworks. Network Software: Protocol Hierarchies – Design Issues for the Layers – Connection Oriented and Connectionless Services – Service Primitives – The relationship of Services to Protocols. Reference Models: The OSI Reference Model – The TCP/IP Reference Model – A Comparison of OSI and TCP/IP reference Model – A Critique of the OSI Model and Protocols – A Critique of the TCP/IP reference model. Example Networks: The Internet – Connection Oriented Networks: x.25, Frame Relay, and ATM – Ethernet – Wireless LANs Network Standardization: Who's who in the Telecommunication World – Who's who in the International Standards World – Who's who in the Internet Standards World?

Physical Layer: Guided Transmission Media: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics

Data Link Layer: Data Link Layer Design Issues: Services Provided to the Network Layer – Framing – Error Control – Flow Control. Error Detection and Correction: Error correcting Codes – Error Detecting Codes. Elementary Data Link Protocols: An unrestricted Simplex Protocol – A simplex Stop- and – wait Protocol – A simplex Protocol for a Noisy channel. Sliding Window Protocols: A one-bit sliding Window Protocol – A Protocol using Go Back N – A Protocol using selective Repeat. Example Data Link Protocols: HDLC – The Data Link Layer in the Internet.

<u>UNIT – II</u>

The Medium Access Control Sublayer : Ethernet : Ethernet Cabling – Manchester Encoding – The Ethernet MAC sublayer Protocol – The Binary Exponential Backoff Algorithm – Ethernet Performance – Switched Ethernet – Fast Ethernet – Gigabit Ethernet – IEEE 802.2: Logical Link Control – Retrospective on Ethernet. Wireless Lans: The 802.11 Protocol Stack - The 802.11 Physical Layer - The 802.11 MAC sublayer Protocol - The 802.11 Frame Structure. Bluetooth: Bluetooth Architecture – Bluetooth Applications – The Bluetooth Protocol Stack – The Bluetooth Radio Layer – The Bluetooth Baseband Layer – The Bluetooth L2CAP layer – The Bluetooth Frame Structure. Data Link Layer Switching: Bridges from 802.x to 802.y – Local Internetworking – Spanning Tree Bridges – Remote Bridges – Repeaters, Hubs, Bridges, Switches, Routers and Gateways – Virtual LANs.

<u>UNIT – III</u>

The Network Layer: Network Layer Design Issues: Store – and Forward Packet Switching – Services provided to the Transport Layer – Implementation of Connectionless Services – Implementation of Connection Oriented Services – Comparison Of Virtual Circuit and Datagram subnets. Routing Algorithms: The Optimality Principle – Shortest Path Routing – Flooding – Distance Vector Routing – LinkState Routing – Hierarchical Routing – Broadcast Routing – Multicast Routing – Routing for Mobile Hosts. Internet Working: How Networks Differ – How Networks can be connected – Concatenated Virtual Circuits – Connectionless Internetworking – Tunneling – Internet work Routing – Fragmentation. The Network Layer in the Internet: The IP Protocol – IP address – Internet Control Protocols – OSPF – The Internet Gateway Routing Protocol – BGP – The Exterior Gateway Routing Protocol.

The Transport Layer: The Transport Service: Services provided to the Upper Layers – Transport Services Primitives – Berkeley Sockets. Elements of Transport Protocols: Addressing – Connection Establishment – Connection Release – Flow Control and Buffering – Multiplexing – Crash Recovery. The Internet Transport Protocols: UDP

Introduction to UDP – Remote Procedure Call – The Real Time Transport Protocol. The Internet Transport Protocols: TCP Introduction to TCP – The TCP Service Model – the TCP Protocol – The TCP segment header – TCP connection establishment – TCP connection release – Modeling TCP connection management- TCP Transmission Policy – TCP congestion Control – TCP Timer Management – Wireless TCP and UDP – Transactional TCP.

<u>UNIT – IV:</u>

The Application Layer: DNS: The Domain Name System: The DNS Name Space – Resource Records – Name Servers. Electronic Mail: Architecture and Services – The User Agent – Message Formats – Message Transfer – Final Delivery. The World Wide Web: Architecture Overview – Static Web Documents – Dynamic Web Documents – HTTP – The Hyper Text Transfer Protocol – Performance Enhancements – The Wireless Web. Multimedia: Introduction to Digital Audio – Audio Compression – Streaming Audio –

Internet Radio – Voice Over IP – Introduction to Video – Video Compression – Video on Demand.

Prescribed Book:

Andrew S. Tanenbaum, "Computer Networks", Fourth Edition, PHI.

Reference Books:

1.James F.Kurose, Keith W.Ross, "Computer Networking", Third Edition, Pearson Education

2.Behrouz A Forouzan, "Data Communications and Networking", Fourth Edition, TMH (2007)

3. Michael A. Gallo, William M. Hancock, "Computer Communications and NetworkingTechnologies", Cengage Learning (2008)



Paper-IV:

Semester	MCA 203: WEB TECHNOLOGIES	L	Т	Р	С
II	MCA 203: WEB TECHNOLOGIES	2	1	1	5

Learning Objective (LO):

LO1	Design and develop Web applications
	and all and the the
LO2	Create web pages using HTML, DHTML and Cascading Styles sheets.
LO3	Analyze and build interactive web applications using JSP and Servlets.
LO4	Design and develop Web applications
1.05	Designing Enterprise based applications by encapsulating an application's
LO5	business logic

Course Outcomes (CO):

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

CO1	Explain the technologies used in web applications.
CO2	Demonstrate HTML5, CSS, JavaScript coding for web applications
CO3	Design creative websites using object based scripting concepts
CO4	Learn to access database through Java programs, using Java Data Base Connectivity (JDBC)
CO5	Create dynamic web pages, using Servlets and JSP

Correlation between Outcomes (COs) and Program Outcomes (POs):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		2	2						2			2		2
CO2	2		2	2						2			2		2
CO3	2		2	3						3			3		3
CO4	2		2	3						3			3		3
CO5	2		2	3			A		1	3			3		3

MCA 203: WEB TECHNOLOGIES

<u>UNIT I</u>

Java Basics: Java buzzwords, Review of OOP concepts, dynamic binding, abstract classes and methods, interfaces, Packages.

GUI Programming with JAVA: Event Handling, Applets, Swing - Introduction to Swing, Swing vs. AWT,MVC architecture, Hierarchy for Swing components, Containers, JFrame, JApplet, JWindow, JDialog, JPanel, A simple swing application, Overview of several swing components, Layout management - Layout manager types – border, grid, flow, box.

<u>UNIT II</u>

HTML: Common Tags: List, Tables, images, forms, Frames, Cascading Style Sheets;

Java Script: Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script.

XML:Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML Processors: DOM and SAX

<u>UNIT III</u>

JDBC: Introduction to JDBC – Connections – Internal Database Connections – Statements – Results Sets - Prepared Statements - Callable Statements.

Network Programming and RMI: why networked Java – Basic Network Concepts – looking up Internet Addresses – URLs and URIs – UDP Datagrams and Sockets – Remote Method Invocation.

<u>Unit –IV</u>

Web Servers and Servlets: Tomcat web server, Introduction to Servlets: Lifecycle of a Servlet, JSDK, The Servlet API, The javax.servlet Package, Reading Servlet parameters, Reading Initialization parameters. The javax.servlet HTTP package, Handling Http Request & Responses, Using Cookies-Session Tracking, Security Issues.

Introduction to JSP: The Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat

Prescribed Textbooks

- 1. The Complete reference Java, Herbet Schildt, 7th Edition, McGraw Hill.
- 2. Java Programming with JDBC ;Donald Bales, O'Reilly
- 3. Web Technologies a computer science perspective, Jeffrey C. Jackson, Pearson, 2007.

Reference Textbooks

- 1. Java Network Programming, elliotte Rusty Harold, 3rd Edition
- 2. Java Server Pages Hans Bergsten, SPD O'Reilly
- 3. Robert W. Sebesta, "Programming the World Wide Web", Third Edition, Pearson Education (2007).
- 4. Anders Moller and Michael schwartzbach, "An Introduction to XML and Web Technologies", Addison Wesley (2006)
- 5. Chris Bates, "Web Programming-Building Internet Applications", Second Edition, Wiley (2007).

Semester		L	Т	Р	C
П	MCA 204: ARTIFICIAL INTELLIGENCE	3	1	0	4

Learning Objective (LO):

LO1	To introduce the basic principles, techniques, and applications of Artificial
	Intelligence
LO2	To Formulate a given problem in the language/framework of different AI
LOZ	methods
LO3	Explore weal slots, structures and game planning in AI.
LO4	To equip students with the knowledge and skills in logic programming using
LU4	Prolog
LO5	To explore the different paradigms in knowledge representation and reasoning

Course Outcomes (CO):

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

CO1	Understand the history, development and various applications of artificial intelligence
CO2	Illustrate knowledge base system
CO3	Solve different problems using AI algorithm
CO4	Analyze how uncertainty is being tackled in the knowledge representation and reasoning process
CO5	Classify the expert systems

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

CO	РО										PSO				
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2									2			2		
CO2	2									2			2		
CO3	2								2		2	2	3		
CO4	2								2		2	3	3		
CO5	2									2			3		3

MCA 204: ARTIFICIAL INTELLIGENCE

<u>Unit-I :</u>

What is AI? : The AI Problems, The Underlying Assumption, What is AI Technique?, The level of the Model, Criteria for Success.

Problems, Problem spaces & Search: Defining the Problem as a State Space Search, Production Systems, Problem Characteristics, Production System Characteristics, Issues in the design of Search Programs, Additional Problems.

Heuristic search techniques: Generate and Test, Hill Climbing, Best First Search, Problem Reduction, Constraint Satisfaction, Means Ends Analysis.

Unit-II:

Knowledge Representation Issues: Representations and Mappings, Approaches to Knowledge Representation, Issues in Knowledge Representation, the Frame Problem

Using Predicate Logic: Representing Simple Facts in Logic, Representing Instance and Isa Relationships, Computable Functions and Predicates, Resolution, Natural Deduction

Representing knowledge using Rules: Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning, Matching, Control Knowledge

<u>Unit-III :</u>

Symbolic Reasoning under Uncertainty: Introduction to Nonmonotonic Reasoning, Logics for Nonmonotonic Reasoning, Implementation Issues, Augmenting a Problem Solver, Implementation: Depth-First Search, Implementation: Breadth-First Search

Weak slot & filler Structures: Semantic Nets, Frames

Planning : Overview, An Example Domain : The Blocks World, Components of a Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques

<u>Unit-IV :</u>

Natural Language Processing: Introduction, Syntactic Processing, Semantic Analysis, Discourse and Pragmatic Processing

Commonsense: Qualitative Physics, Commonsense Ontologies, Memory Organisation, Case-Based Reasoning

Expert Systems: Representing and Using Domain Knowledge, Expert System Shells, Explanation, Knowledge Acquisition

Prescribed Book:

Knight K, "Artificial Intelligence", TMH (1991)

Reference Book:

- 1. Michael Negnevitsky, "Artificial Intelligence A Guide to Intelligent Systems", Second Edition, Pearson Education (2008)
 - 2. Winston P.H, "Artificial Intelligence", Addision Wesley (1993)



Semester		L	Τ	Р	С
II	MCA 205.1 : PROGRAMMING AND PROBLEM SOLVING USING PYTHON	3	1	1	5

Learning Objective (LO):

LO1	Install and run the Python interpreter
LO2	Create and execute Python programs
LO3	Understand the concepts of file I/O
LO4	Be able to read data from a text file using Python
LO5	Plot data using appropriate Python visualization libraries

Course Outcomes (CO):

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

CO1	Demonstrate understanding of modern version control tools.
CO2	Exhibit facility with a Linux command line environment.
CO3	Demonstrate understanding of the role of testing in scientific computing, and write unit tests in Python.
CO4	Use command line tools to write and edit code.
CO5	Develop publication-ready graphics from a dataset.

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

CO						Р	0						PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2			2									2		
CO2	2			2									2		
CO3	3			3					2			2	3		
CO4	3			3					2			3	3		3
CO5	3			3									3		3

MCA 205.1 : Programming and Problem Solving using Python

UNIT I

Introduction: The Process of Computational Problem Solving, Python Programming Language. **Python Data Types**: Expressions, Variables and Assignments, Strings, List, Objects and Classes, Python Standard Library

Imperative Programming: Python programs, Execution Control Structures, User-Defined Functions, Python Variables and Assignments, Parameter Passing.

UNIT II

Text Files: Strings, Formatted Output, Files, Errors and Exception Handling

Execution and Control Structures: if Statement, for Loop, Two Dimensional Lists, while Loop, More Loop Patterns, Additional Iteration Control Statements

Containers and Randomness: Dictionaries, Other Built-in Container Types, Character Encoding and Strings, Module random, Set Data Type.

UNIT III

Object Oriented Programming: Fundamental Concepts, Defining a New Python Class, User-Defined Classes, Designing New Container Classes, Overloaded Operators, Inheritance, User-Defined Exceptions

Namespaces: Encapsulation in Functions, Global versus Local Namespaces, Exception Control Flow, Modules and Namespaces.

Objects and Their Use: Software Objects, Turtle Graphics, Modular Design: Modules, Top-Down Design, Python Modules

Recursion: Introduction to Recursion, Examples of Recursion, Run Time Analysis, Searching, Iteration Vs Recursion, Recursive Problem Solving, Functional Language Approach.

UNIT IV

Graphical User Interfaces: Basics of tkinter GUI Development, Event-Based tkinter Widgets, Designing GUIs, OOP for GUI,

The Web and Search: The World Wide Web, Python WWW API, String Pattern Matching, Database Programming in Python

Prescribed Book:

Ljubomir Perkovic, "Introduction to Computing Using Python: An Application Development Focus", Wiley, 2012.

Reference Book:

Charles Dierbach, "Introduction to Computer Science Using Python: A Computational Problem-Solving Focus", Wiley, 2013.

Semester		L	Т	Р	C
Π	MCA 205.2: INTRODUCTION TO R PROGRAMMING	3	1	1	5

Learning Objective (LO):

LO1	The basics of statistical computing and data analysis
LO2	How to implement data structure in R
LO3	R loop functions and debugging tools
LO4	Lists and Vectors concepts in R
LO5	Factors and levels in R

Course Outcomes (CO):

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

CO1	Explain critical R programming concepts
CO2	Demonstrate how to install and configure RStudio
CO3	Apply OOP concepts in R programming
CO4	Explain the use of data structure and loop functions
CO5	Apply various concepts to write programs in R

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

CO						Р	0						PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2		2							1			2		1
CO2	2		3							2					2
CO3	2		2							2			2		2
CO4	2		3							3			2		3
CO5	2		3							3			2		3

MCA 205.2 Introduction to R Programming

UNIT I

Introduction : Overview of R, R data types and objects, reading and writing data, sub setting R Objects, Essentials of the R Language, Installing R, Running R, Packages in R, Calculations, Complex numbers in R, Rounding, Arithmetic, Modulo and integer quotients, Variable names and assignment, Operators, Integers, Factors, Logical operations

UNIT II

Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes.

Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations

UNIT III

Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, Data Frames, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations

UNIT IV

Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables, Extracting a Sub table, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions

Prescribed Text Books:

1. Roger D. Peng, "R Programming for Data Science", 2012

2. Norman Matloff, "The Art of R Programming- A Tour of Statistical Software Design", 2011

Reference TextBooks:

1. Jared P. Lander, "R for Everyone - advanced analytics and Graphics", 2nd Edition, Addison-Wesley.

2. Paul Teetor, "R Cookbook", 2nd Edition, O'Reilly publications.

3. Garrett Grolemund, Hadley Wickham, "Hands-On Programming with R: Write Your Own Functions and Simulations", 1st Edition, 2014

Semester			L	Т	Р	С
II	MCA 206:	PYTHON PROGRAMMING LAB	0	0	6	3

Lab Cycle

Simple Programs

- 1. Write a program using print Pascal triangle.
- 2. Write a program to find out the roots of the quadratic equations.
- 3. Write a program to display the Fibonacci series using generators.
- 4. Write a program to check the given number is palindrome or not.
- 5. Write a program to find the sum of digits of a given number
- 6. Write a Python program to calculate $X = \frac{1}{2!} + \frac{2}{4!} + \frac{4}{8!} + \frac{8}{16!}$
- 7. Write a Python program to remove the punctuations from a string.
- 8. Write a Python program to implement the simple calculator.
- 9. Write a Python program to print the lower and upper triangles of a matrix.
- 10.Write a Python program to merge two mails.

Functions

- 1. Write a recursive Python function that has a parameter representing a list of integers and returns the maximum stored in the list.
- 2. Write a recursive Python function to that generates the top n prime numbers in the range 1 to 1000.
- 3. Write a python function to calculate the multiplication of two matrices.
- 4. Write a Python function to reverse the given string.
- 5. Write a Python function that takes an integer n and a character c, returns a string and displays as "xxxxx" (Ex: the length of the retuned string is 5, then the output as XXXXX)
- 6. Write Python function that the search the given number in the list of numbers by using binary search.
- 7. Write a Python function to convert the given decimal number into binary number by using recursion.
- 8. Write a Python function to sort the list of records in a file.

GUI Programs

- 1. Construct a GUI application to generate the employee pay slip
- 2. Construct a GUI application to generate a Bar Graph for a excel data
- 3. Construct a GUI application to perform the Arithmetic operations
- 4.Read Input Values through input window
- 5. Choose choice and Operation through following windows
- 6.Display the result in Message Box.



Semester		L	T	P	С
П	MCA 206: R PROGRAMMING	LAB 0	0	6	3

1. Download and install R-Programming environment and install basic packages using install.packages() command in R.

2. Learn all the basics of R-Programming (Data types, Variables, Operators etc.)

3. Implement R-Loops with different examples.

4. Learn the basics of functions in R and implement with examples.

5. Implement data frames in R. Write a program to join columns and rows in a data frame using cbind() and rbind() in R.

6. Implement different String Manipulation functions in R.

7. Implement different data structures in R (Vectors, Lists, Data Frames)

8. Write a program to read a csv file and analyze the data in the file in R

9. Create pie charts and bar charts using R.

10. Create a data set and do statistical analysis on the data using R.

Semester	I MCA 207: WEB TECHNOLOGIES LAB	L	Τ	Р	C
II	MCA 207: WEB TECHNOLOGIES LAB	0	0	6	3

- 1. Write a Java Program to define a class, describe its constructor, overload the constructors and instantiate its object
- 2. Build and run "Celsius Converter" sample application using swings
- 3. Develop an applet that receives an integer in one text field, and computes its factorial Value and returns it in another text field, when the button named "Compute" is clicked
- 4. Develop and demonstrate a HTML document that illustrates the use of external style sheet, ordered list, table, borders, padding, color, and the tag.
- 5. Create a form with the following specifications:
 - a) Our form uses frames, one to hold the links bar at the top of the browser window.
 - b) Other is a larger frame that provides the main view.

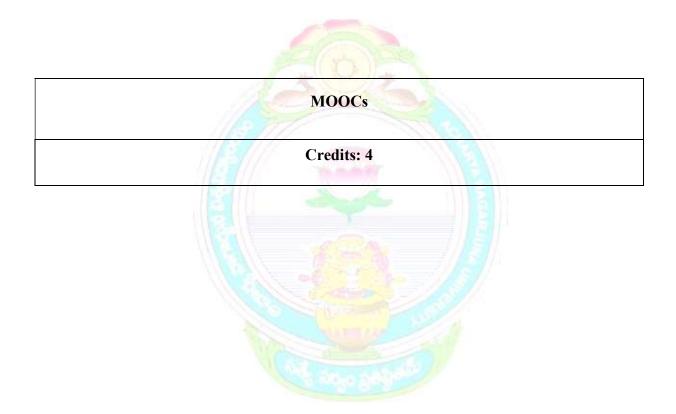
c) The links bar should contain 5 links, which when clicked, should display the appropriate HTML file in the larger frame.

- 6. Create a webpage with the following using html
 - a. Embed an image in web page
 - b. Fix the hot spots
 - c. Show all the related information when a hot spot is clicked in the map
- 7. Write a JavaScript code to find factorial of N. (Use recursive function)
- 8. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.
- 9. Create a web page using two image files, which switch between one another as the mouse pointer moves over the images. Use the onMouseOver and onMouseOut event handlers.
- 10. Design an XML document to store information about a student in an engineering college affiliated to ANU. The information must include college id, Name of the College, Brach, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.
- 11. Create an XML document, which contains 10 users information. Implement a program, which takes User Id as an input and returns the user details by taking the user information from the XML document

- 12. write a java program to illustrate java to database connectivity using JDBC
- 13. Write a program to print the Fibonacci numbers using RMI.
- 14. write a java servlet program to conduct online examination and to display student mark list available in a database
- 15. Create a java program to create an airline reservation service and a travel agent and the travel agent is searching for an airline using web services and database.



Semester	MCA 200 CEMINA D	L	Τ	Р	С
II	MCA 208: SEMINAR	4	0	0	2



ACHARYA NAGARJUNA UNIVERSITY

UNIVERSITY COLLEGE OF SCIENCES

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

MASTER OF COMPUTER APPLICATIONS

SEMESTER-III

SEMESTER	MCA 301 Data Mining and Big Data	L	Т	Р	С
III		3	1	0	5

Learning Objectives (LO):

The course is designed to meet the objectives of:

L01	To identify the scope and essentiality of Data Warehousing and Mining.
LO2	To analyze data, choose relevant models and algorithms for respective applications
LO3	To develop research interest towards advances in data mining
LO4	To provide an overview of an exciting growing field of big data analytics

Course Outcomes (CO):

Students upon completion of this course will be able to:

CO1	Explain Data Warehouse fundamentals, Data Mining Principles
CO2	Demonstrate appropriate data mining algorithms to solve real world problems
CO3	Compare different data mining techniques like classification, prediction, clustering
	and association rule mining.
CO4	Construct big data associated applications in intelligent business and scientific
	computing
CO5	Infer fundamental enabling techniques and scalable algorithms like Hadoop, Map
	Reduce in big data analytics

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

CO		PO							PSO						
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	3	2											2		
CO2	3	2							3		3	3	2		
CO3	3	3							3		3	3	3		
CO4	3	3							3		3	3	3		3
CO5	3	3							3		3	3	3		3

MCA 301 Data Mining and Big Data

<u>Unit – I</u>

Data Warehouse and OLAP Technology: An Overview: What is Data Warehouse? - A Multidimensional Data Model - Data warehouse Architecture - From Data Warehousing to Data Mining

Data mining – Introduction, Data mining on what kind of data, Data mining functionalities, classification of Data mining systems, Major issues in Data mining

<u>Unit – II</u>

Mining Association rules in large databases - Association rule mining, Mining Single-Dimensional Boolean association rules from Transactional databases, Mining multi-Dimensional Association rules from relational Databases and Data Warehouses

Classification and Prediction - Introduction classification by decision tree induction, Bayesian Classification. Other classification methods, classification by back propagation, Prediction, classifier accuracy

<u>Unit – III</u>

Cluster analysis – Introduction, Types of data in cluster analysis, a categorization of major clustering methods, portioning methods, hierarchical methods, Density based methods: DBSCAN, Grid-based method : STING , Model based clustering method: Statistical Approach, outlier analysis.

<u>Unit – IV</u>

Big Data: Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications.

Hadoop: Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands, Anatomy of File Write and Read., Hadoop MapReduce paradigm. Writing Hadoop MapReduce Programs

Prescribed Books :

1. Jiawei Han Micheline Kamber, "Data mining & Techniques", Morgan Kaufmann publishers

2. Boris lublinsky, Kevin t. Smith, Alexey Yakubovich, "Professional Hadoop Solutions", Wiley, ISBN: 9788126551071, 2015.

3. Chris Eaton, Dirk deroos et al., "Understanding Big data", McGraw Hill, 2012.

4. Tom White, "HADOOP: The definitive Guide", O Reilly 2012.

SEMESTER	MCA 302 CLOUD COMPUTING	L	Т	Р	С
III		3	1	0	4

earning Objectives (LO):

The course is designed to meet the objectives of:

L01	Introduce various types of virtualizations and hypervisors
LO2	Use and adopt Cloud Computing services and tools in their real life scenarios.
LO3	Explore some important cloud computing driven commercial systems such as Amazon WebServices, Google cloud services, Microsoft Azure etc.
LO4	Describe the security aspects in cloud

Course Outcomes (CO):

Students successfully completing this module will be able to:

CO1	Distinguish different types of Distributed Computing models and Identify different
	cloud computing models and services provided by cloud providers
CO2	Demonstrate virtualization of clusters and data centers
CO3	Apply and design Cloud Resource Management and scheduling algorithms
CO4	Explain Storage models and security aspects of Cloud
CO5	Illustrate Cloud Applications and Paradigms

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

CO		PO							PSO						
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2							2			2		2	2	
CO2	2							2			2		2	2	
CO3	3							3			3		3	3	2
CO4	3							3			3		3	3	3
CO5	3							3			3		3	3	3

MCA 302: CLOUD COMPUTING

Unit-I

Introduction: Network-Centric Computing and Network-Centric Content, Peer-to-Peer Systems, Cloud Computing: An Old Idea Whose Time has Come, Cloud Computing Delivery Models and Services, Ethical Issues in Cloud Computing, Cloud Vulnerabilities, Major Challenges Faced by Cloud Computing

Parallel and Distributed Systems: Parallel Computing, Parallel Computer Architecture, Distributed Systems, Global State of a Process Group, Communication Protocols and Process Coordination, Logical Clocks, Message Delivery Rules; Causal Delivery, Runs and Cuts; Causal History ,Concurrency, Atomic Actions, Consensus Protocols, Modeling Concurrency with Petri Nets, Enforced Modularity: The Client-Server Paradigm.

Cloud Infrastructure: Cloud Computing at Amazon, Cloud Computing: The Google Perspective, Microsoft Windows Azure and Online Services, Open-Source Software Platforms for Private Clouds, Cloud Storage Diversity and Vendor Lock-in, Cloud Computing Interoperability: The Intercloud, Energy Use and Ecological Impact of Large-Scale Data Centers, Service- and Compliance-Level Agreements.Responsibility Sharing Between User and Cloud Service Provider

Unit-II

Cloud Computing: Applications and Paradigms: Challenges for Cloud Computing, Existing Cloud Applications and New Application Opportunities, Architectural Styles for Cloud Applications, Workflows: Coordination of Multiple Activities, Coordination Based on a State Machine Model: The ZooKeeper, The MapReduce Programming Model. A Case Study: The GrepTheWeb Application, Clouds for Science and Engineering, High-Performance Computing on a Cloud, Cloud Computing for Biology Research, Social Computing, Digital Content, and Cloud Computing.

Cloud Resource Virtualization: Virtualization, Layering and Virtualization, Virtual Machine Monitors, Virtual Machines, Performance and Security Isolation, Full Virtualization and Para virtualization, Hardware Support for Virtualization, Case Study: Xen, a VMM Based on Para virtualization, Optimization of Network Virtualization in Xen, vBlades: Para virtualization Targeting an Itanium Processor, A Performance Comparison of Virtual Machines, The Darker Side of Virtualization, Software Fault Isolation

Cloud Resource Management and Scheduling: Policies and Mechanisms for Resource Management, Applications of Control Theory to Task Scheduling on a Cloud, Stability of a Two-Level Resource Allocation Architecture, Feedback Control Based on Dynamic Thresholds, Coordination of Specialized Autonomic Performance Managers, A Utility-Based Model for Cloud-Based Web Services, Resource Bundling: Combinatorial Auctions for Cloud Resources, Scheduling Algorithms for Computing Clouds, Fair Queuing, Start-Time Fair Queuing, Borrowed Virtual Time, Cloud Scheduling Subject to Deadlines,

Scheduling MapReduce Applications Subject to Deadlines, Resource Management and Dynamic Application Scaling

Unit-III

Networking Support: Packet-Switched Networks, The Internet, Internet Migration to IPv6, The Transformation of the Internet. Web Access and the TCP Congestion Control Window, Network Resource Management, Interconnection Networks for Computer Clouds, Storage Area Networks, Content-Delivery Networks, Overlay Networks and Small-World Networks. Scale-Free Networks, Epidemic Algorithms

Storage Systems: The Evolution of Storage Technology, Storage Models, File Systems, and Databases, Distributed File Systems: General Parallel File System, Google File System, Apache Hadoop, Locks and Chubby: A Locking Service, Transaction Processing and NoSQL Databases, BigTable, Megastore Cloud

Cloud Security: Cloud Security Risks, Security: The Top Concern for Cloud Users, Privacy and Privacy Impact Assessment, Trust, Operating System Security, Virtual Machine Security, Security of Virtualization, Security Risks Posed by Shared Images, Security Risks Posed by a Management OS, Xoar: Breaking the Monolithic Design of the TCB, A Trusted Virtual Machine Monitor.

Unit-IV

Complex Systems and Self-Organization: Complex Systems , Abstraction and Physical Reality, Quantifying Complexity ,Emergence and Self-Organization , Composability Bounds and Scalability , Modularity, Layering, and Hierarchy, More on the Complexity of Computing and Communication Systems , Systems of Systems: Challenges and Solutions

Application Development: Amazon Web Services: EC2 Instances, Connecting Clients to Cloud Instances Through Firewalls, Security Rules for Application and Transport Layer Protocols in EC2, How to Launch an EC2 Linux Instance and Connect to it, How to Use S3 in Java, How to Manage SQS Services in C#, How to Create an EC2 Placement Group and Use MPI, How to Install the Simple Notification Service on Ubuntu, How to Install Hadoop on Eclipse on a Windows System, Cloud-Based Simulation of a Distributed Trust Algorithm, Trust Management Service , A Cloud Service for Adaptive Data Streaming , Cloud-Based Optimal FPGA Synthesis

TEXT BOOK

1. Cloud Computing Theory and Practice, Dan C. Marinescu, Elsevier, 3rd edition, 2018

REFERENCE BOOKS

1. Cloud Computing ,A practical approach, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, Indian Edition

2. Cloud Computing: Principles and Paradigms by Rajkumar Buyya, James Broberg and Andrzej M. Goscinski, Wiley, 2011.

2. Distributed and Cloud Computing: From parallel processing to the Internet of Things, Kai Hwang, Geoffrey C. Fox, Jack J.Dongarra

3. Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, Tim Mather, Subra Kumaraswamy, Shahed Latif, O'Reilly, SPD, rp2011



SEMESTER	MCA 303 MACHINE LEARNING	L	Т	Р	С
III		2	1	1	4

Learning Objectives (LO):

The course is designed to meet the objectives of:

L01	To introduce to the students the basic concepts and fundamentals of machine
	learning
LO2	To develop skills of implementing machine learning techniques
LO3	To familiarize the students with latest technologies
LO4	To implement machine learning solutions to classification, regression and clustering

Course Outcomes (CO):

Students successfully completing this module will be able to:

CO1	How to make a computer program learn from experience
CO2	Illustrate the significance of concept learning
CO3	Representation of decisions and decision making explicitly
CO4	Construct finite and infinite Hypothesis spaces for computational learning
CO5	Apply Inductive and Analytical learning in developing learning tasks

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

CO	PO											PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2		2							2	2				2
CO2	2		2							2	2				2
CO3	3		3							3	3				2
CO4	3		3							3	3				3
CO5	3		3							3	3				3

MCA 303 Machine Learning

UNIT - I

Introduction - Well-posed learning problems, designing a learning system, Perspectives and issues in machine learning

Concept learning and the General to Specific Ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the Candidate-Elimination algorithm, Remarks on version spaces and Candidate-Elimination, Inductive Bias

UNIT – II

Decision Tree learning – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning, Inductive bias in decision tree learning, Issues in decision tree learning

Evaluation Hypotheses – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms

Bayesian learning – Introduction, Bayes theorem, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibbs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm

UNIT - III

Computational learning theory – Introduction, Probability Learning an Approximately Correct Hypothesis, Sample Complexity for Finite Hypothesis Space, Sample Complexity for infinite Hypothesis Spaces, The Mistake Bound Model of Learning

Instance-Based Learning- Introduction, k -Nearest Neighbor Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning

Unit- IV

Genetic Algorithms – Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

Combining Inductive and Analytical Learning – Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators

Prescribed Textbook:

1. Machine Learning – Tom M. Mitchell, - MGH

Reference Book:

- 1. Introduction to Machine Learning,- Ethem Alpaydin, PHI
- 2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis



SEMESTER	MCA 304.1 CRYPTOGRAPHY AND	L	Т	P	С
III	NETWORK SECURITY	2	1	1	5

Learning Objectives (LO):

The course is designed to meet the objectives of:

LO1	Security breaches can be very expensive in terms of business disruption and the
	financial losses that may result,
LO2	Increasing volumes of sensitive information are transferred across the internet or
	intranets connected to it,
LO3	Networking that make use of internet links are becoming more popular because they
	are cheaper than dedicated leased lines. This, however, involves different users
	sharing internet links to transport their data,
LO4	Directors of business organizations are increasingly required to provide effective
	information security

Course Outcomes (CO):

Students successfully completing this module will be able to:

CO1	Find the factors driving the need for network security,
CO2	Identify and classify particular examples of attacks,
CO3	Compare symmetric and asymmetric encryption systems and their vulnerability to attacks
CO4	Summarize the use of hash functions and explain the characteristics of one-way and collision-free functions
CO5	Illustrate the effectiveness of passwords in access control and the influence of human behaviour,

CO		РО								PSO					
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C01	2							2		2			2	2	
CO2	2							2		2			2	2	
CO3	3							3		3			2	2	2
CO4	3							3		3			3	3	2
C05	3							3		3			3	3	2

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

MCA 304.1: CRYTOGRAPHY AND NETWORK SECURITY

Unit-I

Introduction: Security trends, the OSI security architecture, security attacks, security services, security mechanisms, a model for network security.

Classical encryption techniques:Symmetric cipher model,Substitution techniques, Transposition techniques, Rotor machines, Steganography.

Block cipher and the data encryption standard:Blockcipher principles, the strength of DES, Differential and linear cryptanalysis, Block cipher design principles.

Confidentiality using Symmetric Encryption: Placement of encryption function, Traffic confidentiality, key distribution, random number generator.

UNIT-II

Public key cryptography and RSA: Principles of public key crypto systems, The RSA algorithm

Key management:Other public-key crypto systems: Key management, Diffie-Hellman key exchange.

Message authentication and hash functions: Authentication requirements, Authentication functions, message authentication codes, Hash functions, security of hash functions and MACs.

Digital signatures and authentication protocols: Digital signatures, Authentication protocols, Digital Signature standard.

UNIT-III

Authentication Applications: Kerberos, X.509 authentication service

Email Security: Pretty good privacy, S/MIME

IP security: IP security overview, IP security architecture, Authentication header, Encapsulating security payload, combining security associations, key management.

Web security: Web security considerations, Secure Socket Layer and transport layer security, Secure electronic transaction.

UNIT-IV

Intruders: Intruders, Intrusion detection, password management

Malicious Software: Viruses and related threads, virus counter measures, distributed denial of service attacks.

Firewalls: Firewall Design principles, trusted systems, common criteria for information technology, security evaluation.

Prescribed Book:

William Stallings, "Cryptography and Network Security", Fourth edition, PHI.

Reference Books:

- 1. William Stallings, "Network Security Essentials Applications and Standards", Third Edition, Pearson Education (2007).
- 2. Chris McNab, "Network Security Assessment", 2nd Edition, OReilly (2007).
- 3. Jon Erickson, "Hacking The Art of Exploitation", SPD, NOSTARCH Press (2006).
- 4. Neal Krawety, "Introduction to Network Security", Thomson (2007).

SEMESTER	MCA 304.2 CYBER SECURITY	L	Т	Р	С
III		2	1	1	5

Course Objectives (CO):

The students will be able to:

CO1	Understand various block cipher and stream cipher models
CO2	Describe the principles of public key cryptosystems, hash functions and digital signature
CO3	To get a firm knowledge on Cyber Security Essentials

Course Outcomes(CO):

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

CO1	Explain basic security algorithms required by any computing system
CO2	Analyze the possible security attacks in complex real time systems and their effective
	countermeasures
CO3	Compare various governing bodies of cyber laws
CO4	Infer various privacy policies for an organization
	AND THE RAP OF
CO5	Solve the vulnerabilities in any computing system and hence be able to design a
	security solution

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

CO		PO							PSO						
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	2							2		2			2	2	
CO2	2							2		2			2	2	
CO3	3							3		3			3	3	2
CO4	3							3		3			3	3	2

MCA 304.2CYBER SECURITY

Unit I:

Introduction to Security: Data Encryption Standard-Block cipher principles-block cipher modes of operation-Advanced Encryption Standard (AES)-Triple DES-Blowfish-RC5 algorithm

Public Key Cryptography and Hash Algorithms: Principles of public key cryptosystems-The RSA algorithm-Key management - Diffie Hellman Key exchange- Hash functions-Hash Algorithms (MD5, Secure Hash Algorithm)

Unit II:

Fundamentals of Cyber Security: Attacker Techniques and Motivations: How Hackers Cover Their Tracks- Fraud Techniques - Threat Infrastructure.

Exploration: Techniques to Gain a Foothold (Shellcode, SQL Injection, Malicious PDF Files)- Misdirection, Reconnaissance, and Disruption Methods

Unit III:

Privacy to provide Cyber Security :Privacy Concepts -Privacy Principles and Policies -Authentication and Privacy - Data Mining -Privacy on the Web - Email Security - Privacy Impacts of Emerging Technologies

Unit IV:

Cyber Security Management and Incidents: Security Planning - Business Continuity Planning - Handling Incidents - Risk Analysis – Dealing with Disaster.

Legal Issues and Ethics: Protecting programs and Data – Information and the law – Rights of Employees and Employers

Emerging Topics: The Internet of Things - Cyber Warfare

Text book:

- 1. William Stallings, "Cryptography and Network Security", Pearson Education, 6th Edition, 2013.
- 2. Graham, J. Howard, R., Olson, R., Cyber Security Essentials, CRC Press, 2011.
- 3. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition, Pearson Education , 2015.

SEMESTER	MCA 305.1 MOBILE COMPUTING WITH	L	Т	Р	С
III	ANDROID	3	1	0	4

Learning Outcomes(LO):

The course is designed to meet the objectives of:

LO1	To introduce the concept of mobile android
LO2	To introduce the concept of different views of android
LO3	To understand the designing aspects of android mobiles
LO4	To make them familiar with SMS, email, service, binding and deploying APks

Course Objectives(CO):

Students successfully completing this module will be able to:

CO1	How to familiarize with mobile android Terminology.
CO2	Develop an understanding about how to build interfaces
CO3	Illustrate the creation of menus
CO4	Experiment with knowledge about publishing, deploying APK files and Eclipse
CO5	Develop mobile computing applications

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

CO					1	Р	0	eur ^{es}					PSO			
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	
CO1	2			2						2	2		2			
CO2	2			2						2	2		2			
CO3	3			3						3	3		3		2	
CO4	3			3						3	3		3		2	
CO5	3			3						3	3		3		2	

Unit – I

What is Android? Features of Android, Architecture of Android, Eclipse, Android SDK, ADT, Creating Android virtual devices, Creating Application and Anatomy application. Understanding Activities – Applying styles and themes to activity, hiding the activity title, displaying a dialog window, displaying a progress dialog. Linking Activities using intents. Calling built-in applications using intents.

Unit – II

Understand the components of a screen, Adapting to display orientation, managing changes to screen orientation, creating the user interface programmatically, listening for UI notifications. Basic views, pickers views, list views. Using images views to display pictures, using menus with views and some additional views.

Unit – III

User preferences, persisting data to files, creating and using databases, sharing data in android, using a content provider, creating your own content provider, SMS messaging, e-mails and networking.

Unit – IV

Creating own services, communicating between a service and an activity, binding activities to services, publishing, deploying APF files and eclipse.

Prescribe Book

Beginning Android 4 Application Development, Wei-MengLee, Wiley Reference Books

Professional Android 4 Application Development, Reto Meier, Wiley India, (Wrox).

SEMESTER	MCA 305.2 BLOCK CHAIN TECHNOLOGY	L	Т	Р	С
III		3	1	0	4

Learning Outcomes(LO):

The course is designed to meet the objectives of:

L01	Understand the significance of block chain technology
LO2	Increase security to the data models using block chain
L03	Applications in business
LO4	Traceability of data shared across a business network.

Course Objectives(CO):

The course is designed to meet the objectives of:

CO1	Relate the concept of Blockchain
CO2	Demonstrate the problems of centralization
CO3	Infer the concepts of Bitcoin
CO4	Make use of Bitcoin network, payments, clients and APIs
CO5	Outline the Bitcoin network

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

CO						Р	0	10 -		1			PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C01	2					1	ar á	2			2		2	2	
CO2	2							2			2		2	2	
CO3	3							3			3		3	3	2
CO4	3							3			3		3	3	3
CO5	3							3			3		3	3	3

MCA 305.2 Block Chain Technology

Unit – I

Blockchain , the growth of blockchain technology, distributed systems, the history of blockchain and Bitcoin, types of blockchain. Decentralization , methods of decentralization , routes of decentralization, blockchain and full ecosystem decentralization, smart contracts, Decentralized organizations and platforms for decentralization.

Unit – II

Symmetric Cryptography, working with the OpenSSL command line, cryptographic primitives. Public Key Cryptography, asymmetric cryptography, public and private keys and financial markets and trading.

Unit – III

Introducing Bitcoin, Bitcoin, digital keys and addresses, transactions, blockchain, mining. Alternative Coins. Limitations of Bitcoin

Unit – IV

Bitcoin Network and payments, The Bitcoin network, wallets, Bitcoin payments, innovation in Bitcoin, Bitcoin Clients and APIs.

Prescribe Book

1. Mastering Blockchain 2nd Edition, Imran Bashir, PACKT Publication

Reference Books

1. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Goldfeder. Bitcoin and cryptocurrency technologies: a comprehensive introduction. Princeton University Press, 2016.

Semester		L	Τ	Р	C
IV	MCA 305.3 : Microsoft Dynamics	4	0	0	4

Learning Objective (LO):

LO1	Explore Dynamics 365 applications.
LO2	Discover business value in Dynamics 365 applications and how they support digital transformation.
LO3	Gain in-depth knowledge of CRM application modules.
LO4	Understand Dynamics 365 customization, configuration, integration, deployment types
LO5	Design and configure business units

Course Outcomes (CO):

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

CO1	Understand Dynamics 365 framework
CO2	Examine the Design and configuration of Business Units, Configure
02	Security Roles
CO3	Experiment with Creating and managing entities
CO4	Illustrate the Customization of forms, views and visualizations
CO5	Develop various process flows and solution management.

Correlation between Outcomes (COs) and Program Outcomes (POs) and Program Specific Outcomes (PSOs):

CO						Р	0						PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
C01	2							2			2		2	2	
CO2	2							2			2		2	2	
CO3	3							3			3		3	3	2
CO4	3							3			3		3	3	3
CO5	3							3			3		3	3	3

SYLLABUS

UNIT 1

Prerequisites

- a) Install VS Code https://code.visualstudio.com/download
- b) Install Docker Engine https://docs.docker.com/engine/install/
- c) Install Al Visx file
- I. Go to visual Studio code and then market place
- II. Search AL and install the AL Language vsix file
- d) Install BcContianerHelper -

https://github.com/microsoft/navcontainerhelper/blob/master/NavContainerHelper.md

#GetStartedHelper

e) Install Bc Container using BCContianerhelper -

https://github.com/microsoft/navcontainerhelper/blob/master/NavContainerHelper.md

#GetStartedRun

UNIT II

Business Central – Basic Functional Knowledge

a) Getting Started - https://learn.microsoft.com/en-us/training/paths/get-started-

dynamics-365-business-central/

b) Sales - https://learn.microsoft.com/en-us/dynamics365/business-central/sales-

manage-sales

c) Purchase - https://learn.microsoft.com/en-us/dynamics365/business-

central/purchasing-manage-purchasing

d) Inventory - https://learn.microsoft.com/en-us/dynamics365/business-

central/inventory-manage-inventory

UNIT III

Business Central – AL Development

a) Getting Started - https://learn.microsoft.com/en-us/dynamics365/business-

central/dev-itpro/developer/devenv-get-started

b) Creating a Sample Project - https://learn.microsoft.com/en-

us/dynamics365/business-central/dev-itpro/developer/devenv-extension-example

c) Keyboard Shortcuts - https://learn.microsoft.com/en-us/dynamics365/business-

central/dev-itpro/developer/devenv-keyboard-shortcuts

d) Business Objects

I. Tables - https://learn.microsoft.com/en-us/dynamics365/business-

central/dev-itpro/developer/devenv-tables-overview

II. Pages - https://learn.microsoft.com/en-us/dynamics365/business-

central/dev-itpro/developer/devenv-pages-overview

III. Events - https://learn.microsoft.com/en-us/dynamics365/business-

central/dev-itpro/developer/devenv-events-in-al

IV. Reports - https://learn.microsoft.com/en-us/dynamics365/business-

central/dev-itpro/developer/devenv-reports

UNIT IV

Business Central – AL Programming

a) Overview - https://learn.microsoft.com/en-us/dynamics365/business-central/dev-

itpro/developer/devenv-reference-overview

b) DataTypes &Methods - https://learn.microsoft.com/en-us/dynamics365/business-

central/dev-itpro/developer/methods-auto/library

c) Properties - https://learn.microsoft.com/en-us/dynamics365/business-central/dev-

itpro/developer/properties/devenv-properties

d) Triggers - https://learn.microsoft.com/en-us/dynamics365/business-central/dev-

itpro/developer/triggers-auto/devenv-triggers

e) AL Methods - https://learn.microsoft.com/en-us/dynamics365/business-

central/dev-itpro/developer/devenv-al-methods

f) AL Simple Statements - https://learn.microsoft.com/en-us/dynamics365/business-

central/dev-itpro/developer/devenv-al-simple-statements

g) AL Control Statements - https://learn.microsoft.com/en-us/dynamics365/business-

central/dev-it pro/developer/devenv-al-control-statements



SEMESTER	MCA 306 Data Mining and Big Data LAB	L	Т	Р	С
III		-	-	6	3

CYCLE – 1 Data Mining

(Using Python, Java, WEKA or any open source data mining tool)

- 1. Write a program to Generate Association rules by using Apriori algorithm
- 2. Write a program to implement naïve Bayesian classification
- 3. Write a program to implement k-means clustering algorithm
- 4. Write a program to implement k-mediods clustering algorithm
- 5. Write a program to implement dbscan algorithm

CYCLE – 2 Hadoop

- Implement the following Data structures in Java a)Linked Lists b) Stacks c) Queues
 d) Set e) Map
- 2. Study and configure hadoop for big data
- 3. Hadoop commands
- 4. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.
- 5. Implement Matrix Multiplication with Hadoop Map Reduce

SEMESTER	MCA 307 Cryptography and Network Security LAB	L	Т	Р	С
III		-	-	6	3

1. Write a Java program to perform encryption and decryption using the following algorithms:

a) Ceaser Cipher

b) Substitution Cipher

c) Hill Cipher

2. Write a Java program to implement the DES algorithm logic.

3. Write a Java program to implement RSA Algorithm.

4. Write a C/JAVA program to implement the Blowfish algorithm logic.

5. Write a C/JAVA program to implement the Rijndael algorithm logic.

6. Using Java Cryptography, encrypt the text "Hello world" using Blowfish. Create your own key using Java key tool.

7. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.

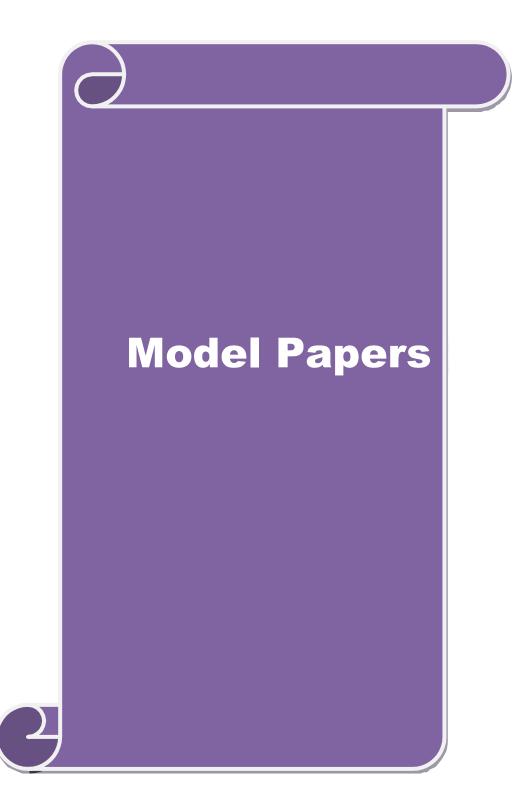
8. Write a program to implement digital signature.

9. Compute common secret key between client and server using Diffie-Hellman key exchange technique. Perform encryption and decryption of message using the shared secret key (Use simple XOR operation to encrypt and decrypt the message).

10. Implement DSS algorithm for signing and verification of messages between two parties (obtain H (M) using simple XOR method of hash computation on M).

SEMESTER	MCA 308 Technical Report Writing	L	T	Р	С
III		-	3	-	2





DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING MASTER OF COMPUTER APPLICATIONS

SEMESTER-I

MODEL PAPER

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

MASTER OF COMPUTER APPLICATIONS

SEMESTER-II

MODEL PAPER

MCA 101: DATA STRUCTURES with C++

Time: 3 Hrs 70		Max. Marks:
Answer Question No.1 Compulsory:	7 x 2 = 14 M	
Answer ONE Question from each unit:	4 x 14 = 56 M	
Answer the following questions. Each questio	on carries 14 Marks.	
1. a) Define Data Abstraction.		
b) Define Pointer.		
c) What are the differences between Single and	l Double Linked List?	
d) Write the complexity of binary search algorithms	ithm.	
e) What are the applications of Stack?		
f) Application of AVL Tree.		
g) Define Multigraph.		
h) What is the purpose of Garbage Collection?		

<u>UNIT - I</u>

2.a) What is Class ? How can you define classes in C++.

b) Explain how we can access class members by using Pointer Variable.

OR

- c) Write a C++ Program to implement the operations on Complex numbers using classes.
- d) Explain about constructors and destructors in C++.

<u>UNIT – II</u>

- 3. a) Write procedure to insert an element in an ordered list.
 - b) Explain Backtracking with an example.

OR

- c) Write procedures to delete an element & count number of nodes in Double Linked List.
- d) Explain different collision resolution techniques.

UNIT - III

- 4. a) Define Stack. Implement operations on Stack using arrays.
 - b) Write the procedure for selection sort.

OR

- c) What is Priority Queue? Write the procedure for implementing the operations on Priority Queue.
- d) Write a C++ program for sorting 'n' elements using Merge Sort technique.

UNIT - IV

- 5.a) Write a procedure to find minimum & maximum element in a binary search tree.
 - b) Write the non-recursive algorithm for post order.

OR

- c) Explain Different Graph traversal techniques.
- d) With an example graph. Explain how to generate minimum cost spanning tree

MODEL PAPER

MCA 102: Database Management Systems

Time:	3	Hrs
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Max. Marks: 70

Answer Question No.1 Compulsory:	7 x 2 = 14 M		
Answer ONE Question from each unit:	4 x 14 = 56 M		
1.a) Discuss about Security Management in DBMS.			
b) What is failure? Mention different causes for failure of	fa		
transaction?			
c) What is Entity? Give Examples for Entity types.			
d) What is closure set of functional dependencies?			
e) What is the use for Trigger? Give any two advantages of Triggers.			
f) What are the pros and cons of distributed database over			
centralized databases?			
g) What is Data Fragmentation?			
h) What is partitioned Hashing?			
<u>Unit-I</u>			
2.a) Discuss about three level architecture with representation of			
data in each level.			
b) Discuss about levels of RAID.			
OR			

- 3.a) Compare and Construct the indexing of data by using B and B^+ Trees.
- b) Discuss about Data Independency with an example.

<u>Unit-II</u>

4.a) Discuss about Arithmetic functions in SQL with example?

Master of Computer Applications, 2022-23 onwards - College of Sciences, ANU

b) Express the following statements in terms of Relational Algebra

- i. Fetch the Department Numbers consisting of more than three employees.
- ii. Fetch the Employee aggregated salary for a department.

OR

5.a) Discuss about Views and its Limitations?

b) What is Index? Create an index for the employees belongs to the

Accounts and Sales departments.

<u>Unit-III</u>

- 6.a) What is Functional Dependency? Explain the role of FD's in construction of Relational Schema.
- b) Can I say that BCNF is equivalent Normal Form for III NF, Justify?

OR

7.a) What is Non-Loss Dependency? Explain with an example.

- b) Discuss the following
 - i. II NF
 - ii. Multi-valued Dependency.

Unit-IV

8.a) What is Lock? Discuss about Shared and Exclusive Locking Process

b) Discuss about

i. Two-Phase Locking

ii. Time-Stamping Algorithm

OR

9.a) What is Dirty-Read Problem? Explain with an Example.

b) What is serializability? Discuss with aid of an example to test the conflicts in serializability?

MODEL PAPER

MCA 103: Operating Systems

Time:	3	Hrs

Answer Question No.1 Compulsory:	$7 \ge 2 = 14 M$			
Answer ONE Question from each unit: 4 x 14 = 5				
1.a) Advantages of Multiprocessor Systems.				
b) What is s System Call ?				
c) Importance of PCB				
d) Difference between Thread and Process.				
e) Advantages of Segmentation.				
f) Virtual Memory is Logical or Physical, Why?				
g) Why Operating System requires Second Storage Support for its Operation?				
UNIT – I				
2.a) Explain Traditional computing, Client-Server comp	puting and			
peer- to-peer computing				
b) Describe Storage device Hierarchy				
(or)				
3.a) Discuss different types of Operating System Struct	ures			
b) Explain Process Scheduling				

<u>UNIT – II</u>

4.a) Discuss different threading issues.

b) Explain semaphores with suitable examples.

(or)

5. Compare different types of Process Scheduling Algorithms.

<u>UNIT – III</u>

6.a) Explain Deadlock avoidance mechanisms.

b) Describe swapping with diagram.

(or)

7.a) Explain segmentation.

b)Write about LRU page replacement and Optimal page replacement.

<u>UNIT - IV</u>

(or)

8.a) Explain different file access metods.

b) Described linked file allocation methods.

9.a) Explain different RAID levels.

b)Discuss about interrupt driven I/O cycle.

MODEL PAPER

MCA 104: Probability and Statistics

Time: 3hours Maximum: 70 Marks

Answer Question No.1 Compulsory:	7 x 2 = 14 M
Answer ONE Question from each unit :	4 x 14 = 56 M

- 1. (a) If BCA then Prove that $P(B) \square P(A)$.
 - (b) If two unbiased die are thrown then find the expected values of the sum of numbers of points on them.
 - (c) Conditional Expectations.
 - (d) Estimator and Estimation.
 - (e) Mathematical model of the Randomized complete block design.
 - (f) Properties of F-distribution.
 - (g) Covariance.
 - (h) Type I error and Type II error.

UNIT-I

2. (a) State and Prove the addition theorem for n events.

(b) In a certain town, Males and Females form 50 percent of the population. It is known that 20 percent of the males and 5 percent of the females are unemployed. A research student studying the employment situation selects unemployed persons at random. What is the probability that the person selected is (a) Male (b) Female.

OR

3.(a) Out of 800 families with 5 children each how many would you expect you have

- (i) 3 boys (ii) 5 girls
- (iii) Either 2 or 3 girls Assume equal probabilities for boys and girls.
- (b) The distribution function of a random variate X is given by the following function.

f(x) = 0; if x < -2

	$1/2$; if $-2 \Box x < 0$
	$3/4$; if $0 \Box x < 2$
	1 ; x \Box 2
i.	Sketch the group h of $F(x)$
ii.	Obtain P.D.F of $f(x)$
iii.	Compute the probabilities $P(X \Box 1)$; $P(X \Box 2)$; $P(1 \Box X \Box 2)$

UNIT-II

4. (a) Derive the 100 $(1-\Box)$ % confidence interval limits of the mean in Normal distribution.

- (b) Define the following terms :
- i. Critical region; Composite hypothesis; level of Significance; Power of the test;
- ii. How can you derive the test statistic on significance test on the Mean

OR

5. (a) How can you derive the test statistic on significance of Difference of Proportions.

(b) Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men 325 women were in favour of the proposal. Test the hypothesis, that proportions of men and women in favour of the proposal are same against that they are not, at 5% level.

UNIT-III

6. (a) Derive the test statistic on F test.

(b) Two random samples drawn from two normal populations

are

Sample I : 20	16 26 27	23	22	18	<mark>2</mark> 4	25	19
Sample II : 27 3	33 42 35	32	34	38	28	41	43 37

Obtain estimates of the variances of the populations and test whether the populations have same variances.

OR

7.(a) Explain the statistical analysis of one way classification.

(b) The following data represent the number of units of production per day turned out by 5 different workmen using different types of machines.

Work Men Machine Types

	A	В	С	D
1	46	40	49	38
2	48	42	54	45
3	36	38	46	34
4	35	40	48	35
5	40	44	51	41

(i) Test whether the mean productivity is the same for the four brands of machine type.

(ii)Test whether 5 different workmen differ with respect to productivity.

UNIT-IV

8. (a) Derive the Normal equations of curve of Regression Y on X.

(b) The relationship between energy consumption and household income was studied, yielding the following data on household income X (in units of \$ 1000/Year) and energy consumption Y (in Units of 108 Btu/Year).

Energy Consumption (Y)	Household income (X)
1.8	20.0
3.0	30.5
4.8	40.0
5.0	55.1
6.5	60.3
7.0	74.9
9.0	88.4
9.1	95.2

- (a) Plot a scatter diagram of these data.
- (b) Estimate the linear regression equation

$$\Box_{y/x} = \Box 0 + \Box_1 X$$

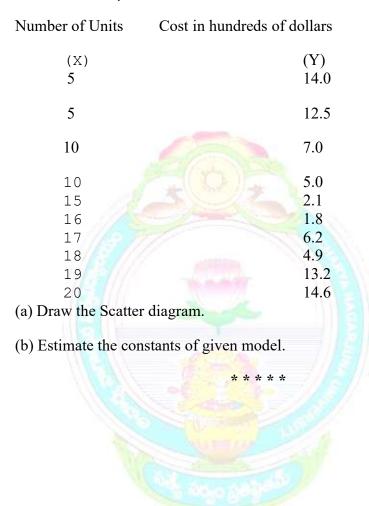
(c) If x=50 (household income of \$ 50,000), estimate the average energy consumed households of this income. What would your estimate be for a single house hold.

(or)

9. (a) Derive the Normal equations for Multiple linear regression model.

(b) A Study is conducted to develop an equation by which the unit cost of producing a new drug (y) can be predicted based on the number of units produced (X).

The proposed model is $\Box_{y/x} = \Box 0 + \Box_1 X + \Box_2 X^2$



MODEL PAPER

MCA 105.1: Computer Organization

Time: 3hours
Maximum: 70 Marks.Answer Question No.1 Compulsory:7 x 2 = 14 MAnswer ONE Question from each unit:4 x 14 = 56 M

- 1. a) Universal Logic gate.
 - b) Tristate Buffer.
 - c) Interrupt Cycle.
 - d) RISC Characteristics.
 - b) Associative Memory.
 - c) Perform (67) (42) in binary using 2's complement method.
 - d) Instruction Format.
 - e) Floating point representation.

UNIT-I

2. a) Simplify the following Boolean functions using K-maps and draw

the relevant logic diagram.

 $f (abcd) = \Sigma m (0,3,7,8,9,11,12,13) + \Sigma d (1,4,14,15)$

b) Explain the operation of Full- Adder circuit.

(or)

- 3. a) Design a 4-bit Synchronous counter using T-Flip Flops.
 - b) Explain the Operation of Bidirectional Shift Register.

<u>UNIT-II</u>

- 4. a) Explain about Instruction cycle in detail.
 - b) Explain various Memory reference instructions.

(or)

- 5. a) Explain any one stage of arithmetic logic shift unit.
 - b) What are various logic micro operations and their implementation?

<u>UNIT-III</u>

6.a) Explain different addressing modes with an example.

b) What is an interrupt ? Explain various types of interrupts.

(or)

7.a) What is Control memory ? Explain address sequencing with suitable diagram.

b) Prepare 3-address, 2-address, 1-address, 0-address instructions to

solve the following statement. $x = \frac{(A+B)(C+D)}{(A+C)}$

<u>UNIT-IV</u>

8.a) Explain Booth multiplication Algorithm with an example.

b) Explain memory mapped I/O and Isolated I/O.

(or)

9.a) What is Locality of reference? Explain various organizations of

Cache memory.

b) What is an I/O Interface? Explain DMA data transfer in detail.

MODEL PAPER

MCA 105.3: Discrete Mathematical Structures

Time: 3hours M.	Maximum: 70
Answer Question No.1 Compulsory:	$7 \ge 2 = 14 M$
Answer ONE Question from each unit:	4 x 14 = 56 M
1. (a) Find the truth table of the proposition (point p and r are true and q is false. (b) Find the inverse of $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 3 & 0 \\ 0 & 1 & 2 \end{bmatrix}$ (c) Express the integer 325 as a product of	
(d) How many ways are there to seat 8 boys	and 8 girls
around a circular table.	
(e) Define equivalence relation with example	e.

(f) Define an Euler circuit in a graph.

(g) Write Warshalls Algorithm.

<u>UNIT-I</u>

2. (a) Verify whether the following is a tautology by using truth

table. ${(P \lor Q) \land (P \rightarrow R) \land (Q \rightarrow R)} \rightarrow R.$

(b) Let $f:A \rightarrow B$ be a function then f^1 is a function from B to A iff f is 1-1.

(or)

3. (a) Find LCM and GCD of 540 and 504.

(b) Show that if we select 151 distinct computer science courses

numbered between 1 and 300 inclusive at least two are

consecutively numbered.

<u>UNIT-II</u>

4. (a) Show that if any five numbers from 1 to 8 are choosen then two

of them will add to 9.

(b) If n is a +ve integer Prove that

 $C(n,0)+C(n,2)+\ldots=C(n,1)+C(n,3)\ldots=2^{n-1}$

5. (a) Solve the following recurrence relation $a_n = 4a_{n-1} + 5a_{n-2}$

 $a_1=2, a_2=6.$

(b) Find a generating function for a_r=the no.of ways of distributing r similar balls in to n numbered

(or)

boxes where each box is non empty.

UNIT-III

6. (a) i) Define irreflexive relation give an example.

ii) Determine whether the following relation R on a set A is reflexive, irreflexive, symmetric asymmetric, Antisymmetric or transitive $A=Z^+aRb \Leftrightarrow a=b^k$ for some $K\in Z^+$.

(b)Let A = $\{1,2,3,4\}$ R= $\{(1,2) (2,3) (3,4) (2,1)\}$ Find the transitive closure of K.

(or)

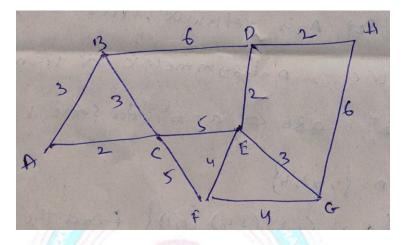
7. (a) Check whether the following graphs are Isomorphic or not.

21	nz	VI	42
ns no	7	05	v 6
		Val	
28 2	200 1000		CV N
24	73	Vy	20

(b) Show that the sum of all vertex degree is equal to twice the number of edges.

UNIT-IV

- 8. (a) Show a tree with n vertices has exactly n-1 edges.
 - (b) Use primes algorithm to find minimal spanning tree for a connected graph.



- 9.(a) Use K-map for the expression to find a minimal sum of products $f(a,b,c) = \Sigma (0,1,4,6)$.
 - (b) Use Quine mcclusky to find minimal expression for $f(a,b,c) = \Sigma(0,2,3,7)$



SEMESTER-II

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING MASTER OF COMPUTER APPLICATIONS

SEMESTER-II

MODEL PAPER

MCA 201: Software Engineering

Time: 3 Hr Max. Marks: 70 **Answer Question No.1 Compulsory:** $7 \ge 2 = 14 M$ Answer ONE Question from each unit: $4 \times 14 = 56 M$ 1.a) Define is Software Crisis? b) List the advantages of Formal Methods? c) What is meant by "Product is Right"? d) Give the characteristics of a good design? e) Explain top-down integration? f) Goals of Software Engineering? g Difference between Error and Bug? h) What is the importance of Certification? Unit-I 2.a) Describe Software Characteristics. b) Explain agile software process.

(or)

3.a) Explain Spiral Model and its suitability

b) Why Software Myths becomes constraints to software process.

Unit-II

- 4.a) What is Use Case? Discuss about the importance of Use Cases in Software Engineering.
- b) What is Class? Explain Class Responsibility Collaborator Modeling.

(or)

5. Discuss different Levels of Data Flow Diagrams with the help of an example.

Unit-III

6.a) What is the role of Basis Path Testing in software testing?

b) What is Test Case? Prepare a Test Case for Factorial of a number.

(or)

7.a) Discuss about Function Oriented Metrics.

b) What is Debugging? Explain about Debugging Strategies.

Unit-IV

8.a) What are the attributes of the Quality?

b) Explain Clean room software engineering approach.

(or)

9.a) Describe the COCOMO Model?

b) Why software Quality Assurance is important?

MCA 202 : <u>Computer Networks</u>

Time : 3 hrs	Max Marks : 70
Answer Question No.1 Compulsory	: 7 x 2 = 14 M
Answer ONE Question from each u	nit: $4 \times 14 = 56 \text{ M}$
a) Difference between Protocol and Servic	e.
b) Describe Ethernet.	
c) Why Repeaters are required.	
d) Give any two applications of Bluetooth.	
e) What are the problems with Flooding.	
f) Where UDP protocol is used.	
g) Define HTTP.	
h) Define User Agent.	
	UNIT – I
a) Compare OSI and TCP/IP reference mo	dels.
b) Describe Go Back N protocol.	
	OR
a) Explain the architecture of the Internet	
b) Write about design issues of a Data Link	layer.

UNIT – II

4. a) Explain Spanning tree Bridges.

b) Give and explain 802.11 frame structure, services

OR

- 5. a) Describe architecture ,applications, protocol stack of Bluetooth
 - b) Explain Switched Ethernet

UNIT - III

- 6. a) Explain IP Header Format and IP addresses
 - b) Discuss about Tunneling and Fragmentation

OR

- 7. a) Explain Distance Vector Routing Algorithm
 - b) write about TCP Congestion Control

UNIT – IV

- 8. a) Explain about DNS
 - b) Write about URL's

OR

* * *

9. a) Explain Electronic Mail concept

b)Discuss JPEG Compression mechanism

MCA 203: Web Technologies

Time: 3 Hrs	Max. Marks: 70
Answer Question No.1 Compulsory:	$7 \ge 2 = 14 M$
Answer ONE Question from each unit:	4 x 14 = 56 M
1 a) Define Interface	
b) Differentiate Swing and AWT	
c) List out Table Tags	
d) Explain DTD	
e) Explain Result Sets	
f) Explain Servlet API	
g) Write steps for installing JDK	
UNIT – I	
2. a) Differentiate abstract class and interface	
b) Write short notes on dynamic binding	
OR	
3. What are events handler? Explain five event handlers	

UNIT – II

4. How to place hyperlink on web page? Explain <A> tag in detail

OR

- 5. (a) What are style sheets? Explain various types.
 - (b) Write a java script program to find factorial of a given numbers.

UNIT – III

Page 111 of 134

6. Explain JDBC architecture and different types of devices available

OR

7. Explain about RMI architecture

- 8. a) What is JSP? What are the advantages and Disadvantages of JSP?
 - b) Explain the anatomy of JSP



MCA 204: Artificial Intelligence

Time: 3 Hrs	Max. Marks: 70
Answer Question No.1 Compulsory:	7 x 2 = 14 M
Answer ONE Question from each unit:	4 x 14 = 56 M

1. a. What is Abduction in Reasoning?

b. What is meant by Turing Test?

- c. Advantages of Depth-First Search.
- d. Write about production system types and explain.
- e. Define and explain Inheritable knowledge.

f. Define inferential Adequacy and Acquisitioned efficiency.

g. What is meant by pragmatic Analysis?

h. Discuss the importance of knowledge representation in A.I. system development.

Unit-I

2. a. When you call a technique is a A.I technique? What is meant by A.I problem explain in detail.

b. Discuss about problem Reduction Algorithm.

(or)

3. a. Explain Depth-First search and Breadth – First search in Reasoning.

b. Explain Nonlinear planning using constraint posting.

Unit-II

4. a. Advantages and disadvantages of forward chaining. When compared to backward chaining.

b. Explain Issues in knowledge Representation.

(or)

5. Write principles of resolution with example.

Unit-III

6. Explain conversion of Clause from with the help of Example.

(Or)

7. Write Unification algorithm with the help of example.

Unit-IV

8. a. i) Define and explain below terms

Morphological Analysis

Semantic Analysis

(or)

Syntactic Analysis

9. Explain about Expert systems in detailed.



Time: 3 Hr	Max. Marks: 70
Model Paper	
Answer Question No.1 Compulsory:	7 x 2 = 14 M
Answer ONE Question from each unit:	4 x 14 = 56 M
1 a. How to declare and assign variables in python	
b. What is Listc. Define container	
d. explain top-down design	
e. define recursion	
f. what is NameSpace	
g. what is GUI	
UNIT I	
2 (a) Write Python statements corresponding to the foll	owing:

2 (a) Write Python statements corresponding to the following:

(i) Assign to variable flowers a list containing strings 'rose', 'bougainvillea', 'yucca', 'marigold', 'daylilly', and 'lilly of the valley'.

(ii) Write a Boolean expression that evaluates to True if string 'potato' is in list flowers, and evaluate the expression.

(iii) Assign to list thorny the sublist of list flowers consisting of the first three objects in the list.

(b) Write a python program to implement string reverse function

OR

- 3 (a) Explain execution control structures
 - (b) How to achieve parameter passing in Python.

UNIT II

- 4. (a) Explain built in Exception in python with examples
 - (b) Write short notes on Dictionaries

OR

5. Explain String functions

UNIT III

- 6. (a) Differentiate Global and local namespaces
 - (b) Explain Multiple exception handlers

	OR
7. Explain class, object and instand	ce variables.
	UNIT IV
8. Explain the concept designing C	JUIs
	OR
10. Explain WWW?	

MCA 205.2: Introduction to R Programming

Time: 3 Hr	Max. Marks: 70
Answer Question No.1 Compulsory:	7 x 2 = 14 M
Answer ONE Question from each unit:	4 x 14 = 56 M
1 a)What are the essential of the R language?	
b)Write short note son modulo and integer quotients.	
c)Write syntax of if else in R.	
d) List the data structures in R.	
e) Write the syntax for creating a list.	
f) How to accessing data frames.	
g) Define Factor.	
UNIT I	
2. Explain different types of operators in R	
OR	
3. Explain various packages in R and how to install them.	
UNIT II	
4. Explain in detail about vectors in R	
OR	
5. Write about control statements in R	
UNIT III	
6. Explain in detail List indexing and how to add and delete ele	ements from a list.
OR	

7. Discuss about Data Frames in R

UNIT IV

8. Explain in detail about extracting a Sub table and Finding the Largest Cells in a Table

OR

9. What is cumulative sum,product,min,max? Explain with example? Write R functions used for this purpose?



SEMESTER-III

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

MASTER OF COMPUTER APPLICATIONS

SEMESTER-III

MODEL PAPER

MCA 301: Data Mining and Big Data

Time: 3 Hrs	Max. Marks: 70
Answer Question No.1 Compulsory:	7 x 2 = 14 M
Answer ONE Question from each unit:	4 x 14 = 56 M
1. a) Mention different OLAP operations	
b) Define Data Mining	
c) Explain in brief "Association Rule Mining"	
d) What is Prediction?	
e) Name the two data structures used in cluster analysis	
f) define primary and secondary name nodes.	
g) explain file read and write commands in hadoop	
UNIT – I	

2. a) What are the different data partitioning techniques and explain the importance of data partitioning?

b) What is ETL Process and explain the ETL Architecture

OR

3. a) Explain the major issues in data mining

b) Explain data mining as a step in the process of knowledge discovery

UNIT – II

4. a) How can we mine multilevel Association rules efficiently using concept hierarchies? Explain.

b) Explain Apriori algorithm with example and how the efficiency of Apriori algorithm can be improved.

OR

5. a) Write a brief on classification of data mining systems

b) Can we design a method that mines the complete set of frequent item sets without candidate generation? If yes, explain with example.

UNIT – III

6. a) Explain different grid-based clustering methods

b) What are the typical requirements of clustering in data mining? Explain

OR

7. Write algorithms for k-Means and k-Medoids and explain how they work with example.

UNIT – IV

8. a) What is Bigdata? and discuss in detail why big data is more important with real time examples

b) Discuss Bigdata in terms of three dimensions, volume, variety and velocity

OR

9. a) Discuss the design of Hadoop distributed file system and concept in detail

b) Explain in detail about map-reduce in detail and discuss partitioning and combining

MCA 302: Cloud Computing

Time: 3 Hrs

Max. Marks: 70

Answer Question No.1 Compulsory: $7 \ge 2 = 14 \ M$ Answer ONE Question from each unit: $4 \ge 14 = 56 \ M$

- 1. a) Define High-Throughput Computing.
 - b) Explain Hardware Abstraction Level Virtualization.
 - c) Explain about Centralized versus Distributed Computing.
 - d) Explain about Gang scheduling.
 - e) Explain about Admission control wrt Cloud resource management.
 - f) Explain about Amazon simple storage service.
 - g) Write Security Rules for Application and Transport Layer Protocols in EC2

UNIT – I

2. Explain about Degrees of Parallelism

OR

3. Explain the Layered architecture for web services and the grids.

UNIT – II

4. Explain the differences between hypervisor and para-virtualization and give one example VMM (virtual machine monitor), that was built in each of the two categories.rios

OR

5. Explain Layered architectural development of the cloud platform for IaaS, PaaS, and SaaS applications over the Internet

UNIT - III

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6.Describe Important Cloud Platform Capabilities

OR

7. What is Google App Engine? Which type of cloud service the Google App Engine provides? Explain.

UNIT - IV

8 a)Analyze the advantages of memory-based check pointing

b) DGive a comparison of several network file systems

OR

9. Explain the basic mechanisms for the implementation of resource management policies



MCA 303: MACHINE LEARNING

Time: 3 Hrs	Max. Marks: 70M

Answer Question No.1 Compulsory:	7 x 2 = 14 M
Answer ONE Question from each unit:	4 x 14 = 56 M

1. a) Write the issues of machine learning.

b) What is an unbiased learner?

c) Define Hypothesis space search

d) What is sampling theory?

e) Write about Bayes optimal classifier

f) What is regression?

g) What is the use of genetic algorithm?

Unit-I

2 a. What is Machine Learning? Explain different perspective and issues in machine learning.

b. Describe the Find-s algorithm. Explain how to find a maximally specific hypothesis.

OR

3 a. List and explain the steps to design a learning systems in detail.

b. Illustrate the candidate elimination algorithm with suitable example.

UNIT-II

4 a. Describe the Inductive Bias in decision tree learning.

b. Write about handling training examples with missing attribute values.

OR

5 a. Explain about estimating hypothesis accuracy.

b. Write a note on practical considerations in comparing learning algorithms

UNIT - III

6 a. Write Bayes theorem. What is the relationship between Bayes theorem and the problem

of concept learning?

b. Explain Maximum Likelihood Hypothesis for predicting probabilities.

OR

7 a. Explain Naïve Bayes Classifier with an Example.

b. Explain the EM Algorithm in detail.

UNIT-IV

8 a. Define the following terms

i) Error of a Hypothesis. ii) Optimal Mistake Bounds iii) Weighted-Majority Algorithm

b. Explain about sample complexity for finite hypothesis spaces

OR

9.a. Explain the K – nearest neighbour algorithm for approximating a discrete – valued function with pseudo code

b. Write about locally weighted regression.

Max. Marks: 70

MODEL PAPER

MCA 304.1: Cryptography and Network Security

Answer Question No.1 Compulsory: $7 \ge 2 = 14 M$ Answer ONE Question from each unit: $4 \times 14 = 56 M$ Section-A 1.a) Abbreviate VIRUS. b) What is meant by interception? c) What are the various places where the data can get hacked? d) What is the difference between authentication and authorization? e) Explain the role played by the certificate management authority in providing security for the data. f) SEPP architecture. g) What are the different elements involved in cryptography? h) Digital signatures. Section-B Unit-I 2.a) Discuss various ways of hacking the data. b) Discuss the way to encrypt data using substitution techniques. Explain it with suitable example. (or)

3.a) Write the structure of stream cipher.

Time: 3 Hrs

b) Discuss the process of encryption using triple DES method.

Unit- II

4.a) Explain Diffie-Hellman key exchange algorithm.

b) What is hashing? Write the procedure to calculate the hashvalue in brief.

(or)

5. Discuss different authentication protocols.

Unit-III

6.a)Discuss S-MIME functionality. Explain how it differs from MIME?

b) What is dual signature? Explain the process of calculating it.

(or)

7. Discuss in detail about the IP security.

Unit-IV

- 8. a) Write the rules for selecting passwords. Also explain how a password can be managed?
- b) Discuss various virus prevention measures.

(or)

9. Describe firewall design principles.

MCA 304.2: Cyber Security

Time: 3 Hrs

Max. Marks: 70

Answer Question No.1 Compulsory:	7 x 2 = 14 M
Answer ONE Question from each unit:	4 x 14 = 56 M
Section-A	
1.a) Abbreviate VIRUS.	
b) What is meant by interception?	
c) What are the various places where the data can get hacked?	
d) What is the difference between authentication and authorizatio	n?
e) Explain the role played by Hash algorithms in providing secur	ity for the data.
f) What are the fundamentals of cyber security. Explain.	
g) What is security planning?	
h) Explain cyber warfare.	
Section-B	
Unit- I	
2 (a) Write about Data Encryption Standard?	
(b) Write a Triple DES ?	
(OR)	
3(a) Explain about Blowfish?	
(b) Describe the RC5 algorithm?	
<u>UNIT- II</u>	
4. (a) Explain the Public Key Cryptography?	
(b) Write short notes on RSA algorithm?	

(OR)

5.Explain - Hash functions-Hash Algorithms?

<u>UNIT-III</u>

6. (a) Differentiate the How Hackers Cover Their Tracks?

(b) Explain the Fraud Techniques & Threat Infrastructure?

(OR)

7.Explain the Techniques to Gain a Foothold?

<u>UNIT-IV</u>

8. Explain Privacy Concepts, Privacy Principles and Policies?

(OR)

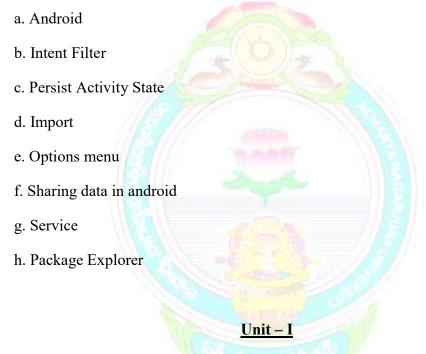
9. Discuss the Privacy Impacts of Emerging Technologies?



MCS 305.1 Mobile Computing with Android

Time : 3 Hrs	Max. Marks: 70
Answer Question No.1 Compulsory:	$7 \ge 2 = 14 M$

- Answer ONE Question from each unit: 4 x 14 = 56 M
- 1. Define the terms



- 2. a. Explain features of android?
 - b. What are the tools for android application development? Explain them.

(OR)

- 3. a. What are the languages used to develop android applications?
 - b. Discuss about passing data to an activity.

<u>Unit –II</u>

- 4. a. Describe linear, table and frame layouts.
 - b. Explain different orientations?

(OR)

5. Explain the working of radio button and checkbox?

<u>Unit – III</u>

6. Create a DBA helper class. Explain it with an example.

(OR)

7. a. Discuss about projections, filtering and sorting in content provider?

b. Explain how to insert and delete records into and from a content provider.

Unit –IV

8. Explain how to create a service in the background?

(OR)

- 9. a. Write about the feature of eclipse.
 - b. How to publish an android application.

MCA 305.2: Block Chain Technology

Time: 3 Hrs	Max. Marks: 70
Answer Question No.1 Compulsory:	7 x 2 = 14 M
Answer ONE Question from each un	iit: $4 \times 14 = 56 \text{ M}$
1. Explain the following terms.	
a. Blockchain	
b. Electronic Cash	
c. Centralization	
d. Digital Key	
e. API	
f. Double spending	
g. Bitcoin address	
UN	ат-і
2. a. Explain the types of Blockchain?	
b. Describe smart contracts?	
	DR
1. Explain methods of decentralization.	

UNIT-II

- 4. a. Explain working with the OpenSSL command line.
 - b. Explain digital Signatures.

OR

- 5. a. How asymmetric cryptography is used in Blockchain?
 - b. Explain the terms: public key and private key.

UNIT-III

6. a. Explain various interactive picture construction techniques.

b. Describe Bitcoin. Explain how Bitcoin works?

OR

7. Explain the limitation of Blockchain?

UNIT-IV

8. How to pay with Bitcoin and Bitcoin cash?

OR

9. a. Describe wallets.

b. Describe Bitcoin mining.

mining.

MCA 305.3 Microsoft Dynamics

Time 3Hrs	Max.Marks: 70

Answer ONE Question from each unit 5 x 14 = 70M 1. a. What is docket engine b. Write any 4 keyboard shortcuts in dynamics 365. c. Explain Table business obejet d. Explain Report object e. AL Properites f. Define Trigger g. List data types in AL UNIT-1 2. Explain dynamics 365 framework

Answer Question No.1 Compulsory

(OR)

3. Write steps to i nstall Bc Container using BCContianer helper

<u>UNIT-II</u>

4. Write about Dynamics 365 online setup, Dynamics 365 on premise setup

(OR)

5. Explain manage Users and Teams and how to implement Access Teams

UNIT-III

6. Explain how to manage Entity Ownership and manage Entity Properties

(OR)

7. Write in detail about various business objects.

UNIT-IV

8. Explain various types of AL Methods

(OR)

10. Explain in detail about AL Control statements

