ACHARYA NAGARJUNA UNIVERSITY
MCA COURSE STRUCTURE

For the batch of students admitted during 2020-2021

Master of Computer Applications (MCA)										
SEMESTER I										
S.No	Course Code	Title of the Course	Instructions Hours per Week			Credits	Evaluation			Total Marks
							CIA Marks	SEE		
			L	T	P			Marks	Duration	
1	101	Data Structures with C++	2	1	1	5	30	70	3 Hours	100
2	102	Database Management Systems	2	1	1	5	30	70	3 Hours	100
3	103	Probability and Statistics	3	1	0	4	30	70	3 Hours	100
4	104	Operating Systems	3	1	0	4	30	70	3 Hours	100
5	105	Computer Organization	3	1	0	4	30	70	3 Hours	100
6	106	Data Structures LAB			6	3	30	70	3 Hours	100
7	107	Database Management Systems LAB			6	3	30	70	3 Hours	100
8	108	Communication Skills		3		2	50	-		50
		Total	35			**30**	260	490		750
CIA – Continuous Internal Assessment						SEE – Semester End Examinations				

Master of Computer Applications (MCA)										
SEMESTER II										
S.No	Course Code	Title of the Course	Instructions Hours per Week			Credits	Evaluation			Total Marks
							CIA Marks	SEE		
			L	T	P			Marks	Duration	
1	201	Software Engineering	3	1	0	4	30	70	3 Hours	100
2	202	Programming and Problem Solving using Python	2	1	1	5	30	70	3 Hours	100
3	203	Computer Networks	3	1	0	4	30	70	3 Hours	100
4	204	Web Technologies	2	1	1	5	30	70	3 Hours	100
5	205	Artificial Intelligence	3	1	0	4	30	70	3 Hours	100
6	206	Python Programming LAB			6	3	30	70	3 Hours	100
7	207	Web Technologies LAB			6	3	30	70	3 Hours	100
8	208	Seminar		3		2	50	-		50
9		MOOCS	-			2	-	-	-	-
		Total	35			**32**	260	490		750
CIA – Continuous Internal Assessment						SEE – Semester End Examinations				

Master of Computer Applications (MCA)										
SEMESTER III										
S.No	Course Code	Title of the Course	Instructions Hours per Week			Credits	Evaluation			Total Marks
			L	T	P		CIA Marks	SEE		
								Marks	Duration	
1	301	Data Mining and Big Data	3	1	0	5	30	70	3 Hours	100
2	302	Cryptography & Network Security	2	1	1	5	30	70	3 Hours	100
3	303	Cloud Computing	3	1	0	4	30	70	3 Hours	100
4	304	Machine Learning	2	1	1	4	30	70	3 Hours	100
5	305.1 305.2 305.3	Mobile Computing with Android Open Source Technologies Block Chain Technology	3	1	0	4	30	70	3 Hours	100
6	306	Data Mining and Big Data LAB			6	3	30	70	3 Hours	100
7	307	Cryptography & Network Security LAB			6	3	30	70	3 Hours	100
8	308	Technical Report Writing		3		2	50	-		50
9		MOOCS	-			2	-	-	-	-
		Total	35			**32**	260	490		750
CIA – Continuous Internal Assessment						SEE – Semester End Examinations				

Master of Computer Applications (MCA)										
SEMESTER IV										
S.No	Course Code	Title of the Course	Instructions Hours per Week			Credits	Evaluation			Total Marks
			L	T	P		CIA Marks	SEE		
								Marks	Duration	
1	401	Project Work			4	16	---	150	3 Hours	150

I SEMESTER

MCA 101	DATA STRUCTURES WITH C++	
Instruction: 4 periods / week		Credits: 5
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

Objectives:
The course is designed to meet the objectives of:
1. To make the students familiar with the course and its importance.
2. Introduction to Basics of information technology.
3. Basic knowledge of Parts of Computer System.
4. Basic knowledge of Networking, Internet and Ecommerce..

Outcomes:
Students successfully completing this module will be able to:

1. Students will develop interest in learning the subject
2. Students will be skilled theoretically to utilize the concepts in real time.

MCA 101: DATA STRUCTURES WITH C++

Unit – I

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.

Unit – II

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.

Unit – III

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.

Unit – IV

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). (Chapters 1, 3, 5, 6, 7, 8, 9, 10, 11 and 12.)

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 .

Model Paper

MCA 101: DATA STRUCTURES WITH C++

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**

Answer the following questions. Each question carries 14 Marks.

1. a) Define Data Abstraction.
   b) Define Pointer.
   c) What are the differences between Single and Double Linked List?
   d) Write the complexity of binary search algorithm.
   e) What are the applications of Stack?
   f) Application of AVL Tree.
   g) Define Multigraph.
   h) What is the purpose of Garbage Collection?

UNIT - I

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++.

UNIT – II

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

MCA 102	DATABASE MANAGEMENT SYSTEMS	
Instruction: 4 periods / week		Credits: 5
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

Objectives:

The course is designed to meet the objectives of:

1. The purpose of a database management system (DBMS)
2. The role of the database administrator
3. Data consistency, data integrity, data redundancy and data independence
4. The concept of entity relationships and data normalization
5. The concept of a client/server database, and
6. The relevant advantages of a client/server database over a non-client/server database

Outcomes:

Students successfully completing this module will be able to:

1. Design database, different operations, queries performed for a management system problems,
2. Understand and design of ER-diagram in DBMS,
3. Implementation of different normalizations for database size reduction and removal of redundancy, and able to implement PL/SQL, SQL injection, procedures etc.

MCA 102: DATABASE MANAGEMENT SYSTEMS

Unit–I

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.

Unit-II

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.

Unit-III

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.

Unit-IV

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 :

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

Chapters: 1.1 to 1.6, 2, 13.1 to 13.10, 14, 3.1 to 3.6,
3.9, 4.1 to 4.5, 5, 6, 8, 10, 11, 17, 18.1 to 18.5,
25.1 to 25.3, 25.6

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).

Model Paper

MCA 102: Database Management Systems

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) Discuss about Security Management in DBMS.
b) What is failure? Mention different causes for failure of a 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?

Unit-I

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.

Unit-II

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

Unit-III

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?

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MCA 103	PROBABILITY AND STATISTICS	
Instruction: 4 periods / week		Credits: 4
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

Objectives:

The course is designed to meet the objectives of:

1. introducing the basic notions of probability theory and develops them to the stage where one can begin to use probabilistic ideas in statistical inference and modelling, and the study of stochastic processes,
2. providing confidence to students in manipulating and drawing conclusions from data and provide them with a critical framework for evaluating study designs and results,

Outcomes:

Students successfully completing this module will be able to:

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

MCA 103: PROBABILITY AND STATISTICS

Unit I:

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).

Chapters: 2, 3.1 to 3.3, 3.5,3.8,3.9,4.1,4.2,4.4,4.7.1,7.4,
8.3 to 8.6,9,10.1 to 10.3, 11.1, 11.3, 11.6, 12.1, 12.2,
12.4, 13.1 to 13.3,13.5.

Reference book:

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

Model paper

MCA 103: Probability and Statistics

Time: 3hours **Maximum: 70 M.**

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) □ 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.

$$f(x) = \begin{cases} 0 & ; \text{if } x < -2 \\ 1/2 & ; \text{if } -2 \square x < 0 \\ 3/4 & ; \text{if } 0 \square x < 2 \\ 1 & ; x \square 2 \end{cases}$$

i. Sketch the group h of F(x)
ii. Obtain P.D.F of f(x)
iii. Compute the probabilities P(X □ 1); P(X □ 2); P(1 □ X □ 2)

UNIT-II

4. (a) Derive the 100 (1-□)% 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 24 25 19

Sample II : 27 33 42 35 32 34 38 28 41 43

30 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	*B*	*C*	*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

$\square_{y/x} = \square 0 + \square_1 X$

(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 $\square_{y/x} = \square 0 + \square_1 X + \square_2 X^2$

Number of Units (X)	Cost in hundreds of dollars (Y)
5	14.0
5	12.5
10	7.0
10	5.0
11	2.1
12	1.8
13	6.2
14	4.9
15	13.2
16	14.6

(a) Draw the Scatter diagram.

(b) Estimate the constants of given model.

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MCA 104	OPERATING SYSTEMS	
Instruction: 4 periods / week		Credits: 4
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

Objectives:

The course is designed to meet the objectives of:

1. appreciating the role of an operating system
2. making aware of the issues in management of resources like processor, memory and input-output,
3. selecting appropriate productivity enhancing tools or utilities for specific needs like filters or version control
4. obtaining some insight into the design of an operating system.

Outcomes:

Students successfully completing this module will be able to:

1. understands what is an operating system and the role it plays
2. get high level understanding of the structure of operating systems, applications, and the relationship between them
3. gather knowledge of the services provided by operating systems
4. get exposure to some details of major OS concepts.

MCA 104: OPERATING SYSTEM PRINCIPLES

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.

UNIT–II:

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.

UNIT–IV:

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.

Chapters: 1.1 – 1.12, 2.1 – 2.10, 3.1 – 3.6, 4.1 – 4.5,
5.1 – 5.5, 6.1 – 6.9 , 7.1 – 7.7 , 8.1 – 8.7,
9.1 – 9.6, 10.1 – 10.6, 11.1 – 11.8, 12.1 – 12.7,
13.1 – 13.7

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).

Model Paper

MCA 104: Operating System Principles

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) 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 computing and peer- to-peer computing
b) Describe Storage device Hierarchy

(or)

3.a) Discuss different types of Operating System Structures
b) Explain Process Scheduling

UNIT – II

4.a) Discuss different threading issues.

b) Explain semaphores with suitable examples.

(or)

5. Compare different types of Process Scheduling Algorithms.

UNIT – III

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.

UNIT - IV

8.a) Explain different file access metods.
b) Described linked file allocation methods.

(or)

9.a) Explain different RAID levels.
b)Discuss about interrupt driven I/O cycle.

MCA 105	COMPUTER ORGANIZATION	
Instruction: 4 periods / week		Credits: 4
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

Objectives:

The course is designed to meet the objectives of:

1. helping the students to develop an understand the nature and characteristics of the organisation and design of the modern computer systems,
2. focusing on the organisation &operation of the CPU.

Outcomes:

Students successfully completing this module will be able to:

1. understand the key concepts that are likely to be included in the design of any modern computer system
2. understand and to apply the basic metrics by which new and existing computer systems may be evaluated
3. understand and to evaluate the impact that languages, their compilers and underlying operating systems have on the design of computer systems
4. understand and to evaluate the impact that peripherals, their interconnection and underlying data operations have on the design of computer systems
5. demonstrate the techniques needed to conduct the design of a computer
6. examine different computer implementations and assess their strengths and weaknesses.

MCA 105: COMPUTER ORGANIZATION

Unit-I

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.

Unit-II

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.

Unit-III

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. Behrooz Parhami, "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)

Model Paper

MCA 105: Computer Organization

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) 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)= Σm (0,3,7,8,9,11,12,13) + Σd (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.

UNIT-II

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?

UNIT-III

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.

$$X = \frac{(A+B)(C+D)}{(A+C)}$$

UNIT-IV

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.

MCA 106	DATA STRUCTURES USING C++ LAB	
Instruction: 6 periods / week		**Credits: 3**
Internal : 30 marks	**University Exam: 70 marks**	**Total : 100 Marks**

MCA 106: DATA STRUCTURES USING C++ 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.

MCA 107	DBMS LAB	
Instruction: 6 periods / week		Credits: 3
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

MCA 107: DBMS LAB

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_lvl	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	
Address2	Varchar2	10	
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	
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	
Qty_disp	Number	8	
Product_rate	Number	10,2	

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 details.

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’.

MCA 108	Communication Skills	
Instruction: 3 periods / week		Credits: 2
Internal : 50 marks	University Exam: ---	Total : 50 Marks

SEMESTER II

MCA 201	SOFTWARE ENGINEERING	
Instruction: 4 periods / week		Credits: 4
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

Objectives:

The course is designed to meet the objectives of:

1. the need of software engineering, its different life cycles and different phases,
2. to measure cost, efforts, time and team management etc,
3. testing and maintenance techniques of big projects and
4. different risks and its management systems

Outcomes:

Students successfully completing this module will be able to:

1. the scope and necessity of software engineering
2. the causes solutions for software crisis
3. fragment problems into small units, code reusability, efficient coding and software development management
4. different ways of software life cycles and their phases.

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.

Unit-II

Software Engineering Practice: Software Engineering Practice, communication practices, Planning Practices, Modeling Practices, Construction Practices, 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 context of Software Engineering, Design Process and Design Quality, Design Concepts, The Design Model, Pattern Based Software Design.

Unit-III

Testing Strategies: A strategic Approach to Software Testing, Strategic Issues, 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.

Unit-IV

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.

Chapters : 1,2,3,4,5,6,8,9,13,14,21,22,23,26,28,29

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).

Model Paper

MCA 201: Software Engineering

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) 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	Python Programming	
Instruction: 4 periods / week		Credits: 5
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

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.

Model Paper

MCA 202: PYTHON PROGRAMMING

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 List
c. 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 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.
(iv) Assign to list poisonous the sublist of list flowers consisting of just the last object of list flowers.
(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 instance variables.

UNIT IV

8. Explain the concept designing GUIs

OR

9. Explain Python WWW API

MCA 203	COMPUTER NETWORKS	
Instruction: 4 periods / week		Credits: 4
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

Objectives:

The course is designed to meet the objectives of:

1. understanding the state-of-the-art in network protocols, architectures, and applications
2. examining and studying of different protocols in OSI and TCP/IP.
3. understanding of network addressing, mapping etc
4. understanding error control, flow control, packet recovery etc.
5. understanding the structure of LAN, WAN and MAN, and
6. understanding internetworking of devices

Outcomes:

Students successfully completing this module will be able to:

1. learn components and rules of communications
2. configuration and design of a small network.
3. learn about research areas and future internets research fields

MCA 203: COMPUTER NETWORKS

UNIT – I

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.

UNIT – II

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.

UNIT – III

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 – Link State 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.

UNIT – IV:

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.

Chapters: 1.1 to 1.6, 2.2, 3.1 to 3.4, 3.6, 4.3, 4.4, 4.6, 4.7,
5.1, 5.2.1 to 5.2.9, 5.5, 5.6.1 to 5.6.5, 6.1.1 to 6.1.3,
6.2, 6.4, 6.5, 7.1 to 7.4

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)

MODEL PAPER

MCA 203 : Computer Networks

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) Difference between Protocol and Service.
   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

2. a) Compare OSI and TCP/IP reference models.
   b) Describe Go Back N protocol.

OR

3. 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

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MCA 204	WEB TECHNOLOGIES	
Instruction: 4 periods / week		Credits: 5
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

Objectives:
The course is designed to meet the objectives of:

- Using Graphics, Animations and Multithreading for designing Simulation and Game based applications.
- Design and develop GUI applications using AWT, Swing and Event Handling.
- Design and develop Web applications
- Designing Enterprise based applications by encapsulating an application's business logic.

Outcomes:
Students upon completion of this course will be able to:

- learn the Internet Programming, using Java Applets
- create a full set of UI widgets and other components, including windows, menus, buttons, checkboxes, text fields, scrollbars and scrolling lists, using Abstract Windowing Toolkit (AWT) & Swings
- apply event handling on AWT and Swing components.
- learn to access database through Java programs, using Java Data Base Connectivity (JDBC)
- create dynamic web pages, using Servlets and JSP.

MCA 204: WEB TECHNOLOGIES

UNIT I

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.

UNIT II

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

UNIT III

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.

Unit –IV

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).

Model Paper

MCA 204: Web Technologies

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) 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

6. Explain JDBC architecture and different types of devices available

OR

7. Explain about RMI architecture

UNIT – IV

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

OR

9. Explain the life cycle of Servlet.

MCA 205	ARTIFICIAL INTELLIGENCE	
Instruction: 4 periods / week		Credits: 4
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

Objectives:

The course is designed to meet the objectives of:

1. To introduce the fundamental concepts of artificial intelligence;
2. To equip students with the knowledge and skills in logic programming using Prolog;
3. To explore the different paradigms in knowledge representation and reasoning

Outcomes:

Students successfully completing this module will be able to:

1. understand the history, development and various applications of artificial intelligence
2. familiarize with propositional and predicate logic and their roles in logic programming;
3. understand the programming language Prolog and write programs in declarative programming style;
4. learn the knowledge representation and reasoning techniques in rule-based systems, case-based systems, and model-based systems;
5. appreciate how uncertainty is being tackled in the knowledge representation and reasoning process.

MCA 205: ARTIFICIAL INTELLIGENCE

Unit-I :

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

Unit-III :

Symbolic Reasoning under Uncertainity: 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

Unit-IV :

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)

Chapters : 1 through 7, 9, 13, 15, 10 and 20

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)

Model Paper

MCA 205: 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 Acquisional 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 Non linear 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
   Syntactic Analysis
   Semantic Analysis
   Discourse Analysis
   Pragmatic Analysis
   ii) Explain Goal Stack planning.

(or)

9. Explain about Expert systems in detailed.

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MCA 206	PYTHON PROGRAMMING LAB	
Instruction: 6 periods / week		Credits: 3
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

Lab Cycle

Simple Programs

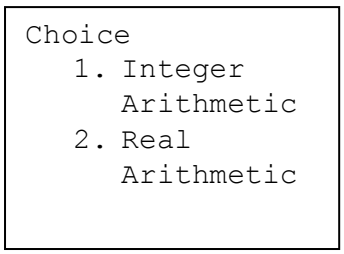
1. Write a program using print Pascal triangle.
2. Write a program to find out the roots of the quadratic equations.
3. Write a program to display the Fibonacci series using generators.
4. Write a program to check the given number is palindrome or not.
5. Write a program to find the sum of digits of 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.

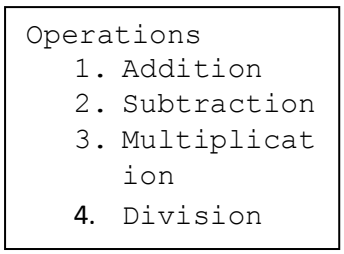
Functions

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 20 even 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
   - Read Input Values through input window
   - Choose choice and Operation through following windows





   - Display the result in Message Box.

MCA 207	WEB TECHNOLOGIES LAB	
Instruction: 6 periods / week		**Credits: 3**
Internal : 30 marks	**University Exam: 70 marks**	**Total : 100 Marks**

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.

MCA 208	SEMINAR	
Instruction: 3 periods / week		Credits: 2
Internal : 50 marks	University Exam: ---	Total : 50 Marks

MOOCS
Credits: 2
Note: Students should mandatorily complete one MOOCS Course in this semester.

SEMESTER III

MCA 301	Data Mining and Big Data	
Instruction: 4 periods / week		Credits: 5
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

Objectives:
The course is designed to meet the objectives of:

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

Outcomes:
Students upon completion of this course will be able to:

- Understand Data Warehouse fundamentals, Data Mining Principles
- Identify appropriate data mining algorithms to solve real world problems
- Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining.
- Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.
- Acquire fundamental enabling techniques and scalable algorithms like Hadoop, Map Reduce in big data analytics

MCA 301 Data Mining and Big Data

Unit – I

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

Unit – II

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

Unit – III

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.

Unit – IV

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.

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	CRYPTOGRAPHY AND NETWORK SECURITY	
Instruction: 4 periods / week		Credits: 5
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

Objectives:

The course is designed to meet the objectives of:

1. Security breaches can be very expensive in terms of business disruption and the financial losses that may result,
2. Increasing volumes of sensitive information are transferred across the internet or intranets connected to it,
3. 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,
4. Directors of business organizations are increasingly required to provide effective information security.

Outcomes:

Students successfully completing this module will be able to:

1. Identify some of the factors driving the need for network security,
2. Identify and classify particular examples of attacks,
3. Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack, and explain the characteristics of hybrid systems,
4. Describe the use of hash functions and explain the characteristics of one-way and collision-free functions,
5. Describe and distinguish between different mechanisms to assure the freshness of a message,
6. Explain the role of third-party agents in the provision of authentication services,
7. Discuss the effectiveness of passwords in access control and the influence of human behaviour,
8. Identify types of firewall implementation suitable for differing security requirements,
9. Distinguish between firewalls based on packet-filtering routers, application level gateways and circuit level gateways.

MCA 302: 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).

Model Paper

MCA 302: Cryptography and Network 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 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.
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 hash value 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 303	CLOUD COMPUTING	
Instruction: 4 periods / week		Credits: 4
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

Objectives:
The course is designed to meet the objectives of:

1. The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet
2. cloud concepts capabilities across the various cloud service models including Iaas,Paas,Saas,
3. developing cloud based software applications on top of cloud platforms.

Outcomes:
Students successfully completing this module will be able to:
1. Understanding the key dimensions of the challenge of Cloud Computing
2. Assessment of the economics , financial, and technological implications for selecting cloud computing for own organization

MCA 303: CLOUD COMPUTING

Unit – I

Cloud Computing Basics: Cloud Computing Overview, applications, Intranets and the Cloud, FirstMovers in the Cloud.
Your Organiztion and Cloud Computing : When you can use Cloud Computing ,Benefits Limitations.
Cloud Computing with Titans : Google, EMC, NetApp, Microsoft, Amazon, Salesforce.com, IBM and partnerships.

Unit –II
The Business Case for Going to the Cloud - Cloud Computing Services, How those Applications Help your Business,Deleting your Datacenter, Thomson Reuters.

Hardware and Infrastructure: Clients, Security- Data Leakage, Offloading work, Logging, Forensics, Compliance VPNs, Key management; Network; Services - identify, integration, mapping, payment, search.
Accessing the Cloud: Platforms web applications, Web APIs, Web Browsers.

Unit- III

Cloud Storage: Overview, Cloud storage providers.

Software as a Service : Overview, Driving Forces, Company Offerings and Industries.

Software plus Services: Overview, Mobile Device Integration,Providers, Microsoft online.

Unit-IV

Local Clouds,ThinClients,Thick clients: Types of Virtualizations,Virtualization in Your Organization, Server Solutions, Thin Clients.
Migrating to the Cloud: Cloud Services for Individuals, Cloud Services Aimed at the Mid-Market, Enterprise-Class Cloud Offerings, Migration
Best Practices and the Future of Cloud Computing - Analyze Your Service, Best Practices, How Cloud Computing Might Evolve.

Prescribed Book:

Anthony T. Velte, Toby J.Velte , Robert Elsenpeter, "*Cloud Computing A Practical Approach"*, Mc Graw-Hill.

REFERENCES:

1. Michael Miller, "Cloud Computing", Pearson Education, New
2. Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi, "Mastering Cloud Computing", Mc Graw Hill Education.
3. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.
4. Cloud Application Architectures, George Reese, ISBN: 8184047142,Shroff/O' Reilly, 2009.

Model Paper

MCA 303: Cloud Computing

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) Define cloud computing?
b) What are the major goals of OSGA
c) Write about Microsoft windows Azure
d) Explain fault tolerance
e) Explain about service design
f) What is Deming Cycle
g) Write any four technical benefits of cloud computing

UNIT – I

2. Explain about Load Balancing and QoS

OR

3. a) Discuss about Business Demand.
b) What are the essential characteristics of Cloud Computing?

UNIT – II

4. Discuss in detail about cloud Scenarios

OR

5. Explain different issues to to concern while establishing the Cloud Computing Environment

UNIT - III

6. Discuss about functionality of Google App Engine and its benefits.

OR

7. Discuss about different Cloud Computing Service Models.

UNIT – IV

8 a) Explain about Amazon E2 Services
b) Discuss about benefits of IaaS and SaaS.

OR

9. Explain about Virtualization and different kinds of Virtualization.

MCA 304	MACHINE LEARNING	
Instruction: 4 periods / week		Credits: 4
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

Objectives:

The course is designed to meet the objectives of:

1. To introduce to the students the basic concepts and fundamentals of machine learning
2. To develop skills of implementing machine learning techniques
3. To familiarize the students with latest technologies
4. To implement machine learning solutions to classification, regression and clustering

Learning Outcomes

1. How to make a computer program to learn from experience
2. Importance of concept learning
3. Representation of decisions and decision making explicitly
4. To come to a conclusion from the observations about an item
5. Prediction of probabilities

MCA 304 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

Reinforcement Learning – Introduction, the Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming

Prescribed Textbook:

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

Model Paper

MCA 304: 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.

MCA 305.1	MOBILE COMPUTING WITH ANDROID	
Instruction: 4 periods / week		Credits: 4
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

Objectives:
The course is designed to meet the objectives of:

1. To introduce the concept of mobile android
2. To introduce the concept of different views of android.
3. To understand the designing aspects of android mobiles
4. To make them familiar with SMS, email, service, binding and deploying APks.

Outcomes:
Students successfully completing this module will be able to:

1. Familiarized with mobile android Terminology.
2. Understand and building interfaces
3. Understand and creating menus
4. Gain knowledge about the publishing, deploying APK files and Eclipse.

MCA 305.1 Mobile Computing with Android

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).

Model Paper

MCS 305.1 Mobile Computing with Android

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. Define the terms
   a. Android
   b. Intent Filter
   c. Persist Activity State
   d. Import
   e. Options menu
   f. Sharing data in android
   g. Service
   h. Package Explorer

Unit – I

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.

Unit –II

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

(OR)

5. Explain the working of radio button and checkbox?

Unit – III

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	OPEN SOURCE TECHNOLOGIES	
Instruction: 4 periods / week		Credits: 4
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

Objectives:
The course is designed to meet the objectives of:

1. To create the awareness and importance of Open Source Systems.
2. Basic concepts of PHP language and developing web applications.
3. PHP Browser Handling and form data access.
4. Ajax for partial rendering.
5. The use of XML and RSS with PHP.

Outcomes:

1. Students upon completion of this unit will be able to:
2. Understand essential of PHP
3. Perform basic operations in PHP using flow controls, strings and arrays.
4. Accessing data from web page using PHP
5. Handle PHP browser.

MCA 305.2 Open Source Technologies

UNIT – I
Essential PHP
Operators and Flow Control
Strings and Arrays.

UNIT – II
Reading Data in Web Pages
PHP Browser-HANDLING Power.

UNIT – III
Object Oriented Programming
Advanced Object Oriented Programming
File Handling.

UNIT – IV
Working with Databases
Sessions, Cookies, and FTP
Ajax

UNIT – V
Advanced Ajax
Drawing Images on the Server
XML and RSS.

Prescribed Book

1. Steven Holzner, “PHP: The Complete Reference”, TATA McGraw Hill, 2015.

Reference Books

1. W. Jason Gilmore,“Beginning PHP and MySQL: From Novice to Professional”, Apress.
2. Steve Suehring, Tim Converse, Joyce Park,“PHP 6 and MySQL 6 Bible”, Wiley Publishing, Inc.

Model Paper

MCA 305.2: Open Source Technologies

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. Define the terms
   a) Command line PHP
   b) PHP ternary operator
   c) Arrays
   d) Loops in PHP
   e) HTTP Headers
   f) Access modifier
   g) Session
   h) GET & POST

UNIT – I

2. a. Explain creating development environment.
   b. Write about PHP data types.

(OR)

3. Discuss String functions and formatting text strings

UNIT – II

4. a. Differentiate Text Field with Text Area. Write a program to justify them.
   b. Explain Check boxes and radio buttons handling

(OR)

5. Describe data validation and explain client side data validation.

UNIT - III

6. a. Describe classes and objects
   b. Explain constructors with an example

(OR)

7. Define Interface and explain how to create an interface.

UNIT – IV

8. How to access databases in PHP?

(OR)

9. a. Describe cookies and setting a cookies
   b. Explain the creation of XMLHttpRequest Object

MCA 305.3	BLOCK CHAIN TECHNOLOGY	
Instruction: 4 periods / week		Credits: 4
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

Objectives:
The course is designed to meet the objectives of:

1. To introduce the concept of Blockchain
2. To overcome the problems of centralization
3. To introduce the concept of Bitcoin
4. To make them familiar with Bitcoin network, payments, clients and APIs.

MCA 305.3 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.

Learning Outcomes:
Students upon completion of this unit will be able to:

- Understand the structure of a blockchain and why/when it is better than a simple distributed database
- Analyze the incentive structure in a blockchain based system and critically assess its functions, benefits and vulnerabilities;

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.

Learning Outcomes:
Students upon completion of this unit will be able to:

- Work with openSSL command line environment
- Apply cryptography systems

Unit – III

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

Learning Outcomes:
Students upon completion of this unit will be able to:

- Understand how blockchain system Bitcoin works

Unit – IV

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

Learning Outcomes:

Students upon completion of this unit will be able to:

- Perform payment operations with Bitcoin Network

Prescribe Book

Mastering Blockchain 2nd Edition, Imran Bashir, PACKT Publication

Reference Books

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

Model Paper

MCA 305.3: Block Chain Technology

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. Explain the following terms.

a. Blockchain
b. Electronic Cash
c. Centralization
d. Digital Key
e. API
f. Double spending
g. Bitcoin address

UNIT-I

2. a. Explain the types of Blockchain?
   b. Describe smart contracts?

OR

3. 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.

MCA 306	Data Mining and Big Data LAB	
Instruction: 6 periods / week		Credits: 3
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

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

1. 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

MCA 307	Cryptography and Network Security LAB	
Instruction: 6 periods / week		Credits: 3
Internal : 30 marks	University Exam: 70 marks	Total : 100 Marks

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).

MCA 308	Technical Report Writing	
Instruction: 3 periods / week		Credits: 2
Internal : 50 marks	University Exam: ----	Total : 50 Marks

MOOCS
Credits: 2
Note: Students should mandatorily complete one MOOCS Course in this semester.

SEMESTER IV

Master of Computer Applications (MCA)										
SEMESTER IV										
S.No	**Course Code**	**Title of the Course**	**Instructions Hours per Week**			**Credits**	**Evaluation**			**Total Marks**
			L	T	P		**CIA Marks**	**SEE**		
								Marks	**Duration**	
1	401	Project Work			4	16	---	150	3 Hours	150