					Computer Science (CS)						

				SEMESTER I							
S. No	As per NEP	Course Code	Title of the Course	Instructions Hours per Week			Credits	Evaluation			Total Marks
				L	T	P		CIA Marks	SEE		
									Marks	Duration	
1	C	MCS 101	Data Structures in C	2	1	0	5	30	70	3 Hours	100
2	C	MCS 102	Object Oriented Programming with Java	2	1	0	5	30	70	3 Hours	100
3	C	MCS 103	Operating Systems	3	1	0	5	30	70	3 Hours	100
4	CF	MCS 104	Probability and Statistics	3	1	0	4	30	70	3 Hours	100
5	EF	MCS 105.1 MCS 105.2 MCS 105.3	Computer Organization Digital Logic Design Discrete Mathematical Structure	3	1	0	4	30	70	3 Hours	100
6	P – I	MCS 106	Data Structures using C LAB	-	-	6	3	30	70	3 Hours	100
7	P – II	MCS 107	JAVA Programming LAB	-	-	6	3	30	70	3 Hours	100
8	SEC	MCS 108	Seminar	-	3	-	1	50	-		50
			Total	35			30	260	490	-	750
			C - Mandatory Core *CF – Compulsory Foundation* *EF – Elective Foundation* *SEC – Skill Enhancement Course* *P - Practical*				*CIA – Continuous Internal Assessment* *SEE – Semester End Examinations*				

ACHARYA NAGARJUNA UNIVERSITY
MSc Computer Science COURSE STRUCTURE

For the batch of students admitted during 2022-2023

Computer Science (CS)

SEMESTER II

S. No	As per NEP	Course Code	Title of the Course	L	T	P	Credits	CIA Marks	SEE Marks	SEE Duration	Total Marks
1	C	MCS 201	Database Management Systems	2	1	1	5	30	70	3 Hours	100
2	C	MCS 202	Design & Analysis of Algorithms	3	1	0	5	30	70	3 Hours	100
3	C	MCS 203	Software Engineering	3	1	0	5	30	70	3 Hours	100
4	CF	MCS 204	Computer Networks	3	1	0	4	30	70	3 Hours	100
5	EF	MCS 205.1 / MCS 205.2	Web Technologies / Web Services	2	1	1	4	30	70	3 Hours	100
6	P – I	MCS 206	DBMS LAB	-	-	6	3	30	70	3 Hours	100
7	P – II	MCS 207	Web Technologies LAB / Web services LAB	-	-	6	3	30	70	3 Hours	100
8	SEC	MCS 208	Communication Skills	2	-	2	1	50	-		50
9			MOOCS	-	-	-	4	-	-		
			Total	**L + T + P = 36**			**34**	**260**	**490**		**750**
			C - Mandatory Core CF – Compulsory Foundation EF – Elective Foundation SEC – Skill Enhancement Course P - Practical	CIA – Continuous Internal Assessment SEE – Semester End Examinations							

Computer Science (CS)
SEMESTER III
S. N o	As per NEP	Course Code	Title of the Course	L	T	P	Credits	CIA Marks	Marks	Duration	Total Marks
colspan="4"		colspan="3"	Instructions Hours per Week		colspan="4"	Evaluation		
colspan="4"		colspan="3"				CIA Marks	colspan="2"	SEE	
1	C	MCS 301	Object Oriented Modelling and Design using UML	3	1	0	5	30	70	3 Hours	100
2	C	MCS 302	Cloud Computing	3	1	0	5	30	70	3 Hours	100
3	C	MCS 303	Artificial Intelligence	2	1	1	4	30	70	3 Hours	100
4	CF	MCS 304	Cryptography & Network Security	2	1	1	4	30	70	3 Hours	100
5	EF	MCS 305.1 MCS 305.2	Programming and Problem Solving using Python Introduction to R Programming	3	1	0	5	30	70	3 Hours	100
6	P – I	MCS 306	Cryptography & Network Security LAB			6	3	30	70	3 Hours	100
7	P – II	MCS 307	Python / R Programming LAB			6	3	50	-		50
8	SEC	MCS 308	Seminar	2	2	0	1				
9			MOOCS	-	-	-	4	-	-		
colspan="4"	**Total**	colspan="3"	36	34	260	490		750
colspan="3"		colspan="4"	C - Mandatory Core CF – Compulsory Foundation EF – Elective Foundation SEC – Skill Enhancement Course P - Practical	colspan="5"	CIA – Continuous Internal Assessment SEE – Semester End Examinations

S.No	As per NEP	Course Code	Title of the Course	L	T	P	Credits	CIA Marks	SEE Marks	SEE Duration	Total Marks
			Computer Science (CS)								
			SEMESTER IV								
1	C	MSC 401	Data Mining and Big Data	4			5	30	70	4 Hours	100
2	C	MCS 402	Machine Learning	4			5	30	70	4 Hours	100
3	EF	MCS 403.1 MCS 403.2 MCS 403.3	Mobile Computing with Android Block Chain Technology Microsoft Dynamics	4			4	30	70	4 Hours	100
4	SEC	MCS 404	Soft Skills	2			1	50	-	3 Hours	50
5	SEC	MCS 405	Project Work				10	30	70	20 Hours	100
			Total	**4**			**25**	**170**	**280**	**35**	**450**
			C - Mandatory Core EF – Elective Foundation SEC – Skill Enhancement Course				CIA – Continuous Internal Assessment SEE – Semester End Examinations				

Total Marks: **2700**
Total no. of Credits: **123**

MCS 101	DATA STRUCTURES IN C	
Instruction: 4 periods / week		**Credits: 5**
Internal: **30 marks**	**University Exam:** **70 marks**	**Total:** **100 Marks**

Objective
1. To impart programming skills using the basics of C language.
2. To make them study the need of data structures in different programming levels.
3. To impart the knowledge of dynamic memory allocation using pointers
4. Ability to work with arrays and structures.
5. To develop using the right one in different data structure available.
6. To train them using data structures such as arrays, linked lists, stacks and queues.
7. To develop the skill of applying algorithm of sorting and searching.

Outcomes
1. Write programs in c language.
2. Acquire knowledge about linear and non-linear data structures
3. Know the difference between static and dynamic memory
4. Understand and use C data structures

Syllabus

UNIT-I

Arrays and Structures - Arrays, Dynamically allocated arrays, Structures and Unions, polynomials. **Stacks and Queues** - Stacks, Stacks using Dynamic Arrays, Queues, Circular queues using dynamic arrays, Evaluation of expressions, multiple stacks and queues.

Learning Outcomes
Student acquire knowledge about
1. Principles of C programming
2. Array and structures concepts

UNIT - II

Linked List - Single Linked List and chains, Representing chains in C, Linked stacks and queues, polynomials, Polynomial representation, Adding polynomials, Additional list operations, Operations on chains, Operations for Circularly linked lists, Sparse Matrices , Sparse Matrix representation, Doubly Linked lists.

Learning Outcomes
Student acquire knowledge about
1. Polynomials concepts
2. Stacks, Queues and Linked list

<h2 style="text-align:center">UNIT – III</h2>

Introduction - Terminology, Representation of trees. **Binary Trees**- The abstract data type, Properties of binary trees, Binary tree representations. **Binary tree traversals** - Inorder traversal, Preorder traversal, Postorder traversal. **Threaded Binary trees** - Threads Inorder traversal of a threaded binary tree. **Binary Search Trees** - Definition, Searching a BST, Insertion into a BST, Deletion from a BST.

Learning Outcomes

Students upon completion of this unit will be able to

- Non-linear Data Structures
- Demonstrate different traversal methods for trees.
- Threaded binary trees

<h2 style="text-align:center">UNIT-IV</h2>

Sorting - Motivation, Insertion sort, Quick sort, Merge sort, Heap sort, External sorting. Hashing – Introduction, Static hashing,   Hash tables, hash functions, Overflow handling

Learning Outcomes

Students upon completion of this unit will be able to

- Sorting techniques

<h2 style="text-align:center">UNIT- V</h2>

Graphs - The graph abstract data type, Introduction, definitions, graph representations. Elementary graph operations -Depth First Search, Breadth First Search, Connected Components,Spanning trees, Biconnected Components.   Minimum cost Spanning trees - Kruskals Algorithm, Prims algorithm. Shortest paths - Single source problem, all pairs shortest path.

Learning Outcomes

Students upon completion of this unit will be able to

- Spanning trees
- Graph operations

Prescribed Book

Horowitz, Sahani, Anderson - Freed,"Fundamentals of Data Structures in C"

Chapters 2-8

Reference Book

1. D SAMANTA, "Classic Data Structures", –PHI
2. Balagurusamy, "C Programming and Data Structures", Third Edition, TMH (2008)

<h3 style="text-align:center">Model Question Paper</h3>

MCS-101 : DATA STRUCTURES IN C

Time: 3Hrs   **Max.Marks: 70**

Answer ONE Question from each unit   **5 x 14 = 70 M**

Unit -I

1. a) Write short notes on structures and Unions.

    b) Write a program to push and pop elements into and from the stack

    (OR)
2. a) Explain queue with deletion and insertions algorithms
    b) Develop an algorithm to delete an element from a circular Queue.

Unit-II

3. a) Write short notes on representation on chains

    b) Write a program to add two polynomials

    (OR)
4. a) Explain single linked list with code and example
    b) Develop an algorithm to insert an element from double linked list.

Unit-III

5. a) Explain the various representations of trees.
    b) Explain binary search trees

    (OR)
6. a) Explain Threaded binary trees.
    b) Explain the tree traversals.

Unit-IV

7. a) Illustrate Heap sort through an example.

    b) Write short notes on Insertion sort.

    (OR)
8. a) What is Merge sort ?
    b) Explain static hashing.

Unit-V

9. a) Write short notes on Representation of Graphs.
    b) Explain Kruskals Algorithm.

    (OR)
10. a) Explain Breadth first search and Depth first search.
     b) Explain all pairs shortest path.

MCS 102	OBJECT ORIENTED PROGRAMMING WITH JAVA	
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. Learning to program in an object-oriented programming language
2. Focusing those who already have some experience with another programming language, and who now wish to move on to an object-oriented one
3. Learning object-oriented programming language by using java.

Outcomes

Students successfully completing this module will be able to

1. Explain the principles of the object oriented programming paradigm specifically including abstraction, encapsulation, inheritance and polymorphism using Java
2. Use an object oriented programming language, and associated class libraries, to develop object oriented programs using Java
3. Design, develop, test, and debug programs using object oriented principles in conjuncture with an integrated development environment using Java.

Syllabus

<u>UNIT I</u>

Java Basics - History of Java, Java buzzwords, comments, data types, variables, constants, scope and life time of variables, operators, operator hierarchy, expressions, type conversion and casting, enumerated types, control flow-block scope, conditional statements, loops, break and continue statements, simple java program, arrays, input and output, formatting output, Review of OOP concepts, encapsulation, inheritance, polymorphism, classes, objects, constructors, methods, parameter passing, static fields and methods, access control, this reference, overloading methods and constructors, recursion, garbage collection, building strings, exploring string class, Enumerations, autoboxing and unboxing, Generics.

Inheritance –Inheritance concept, benefits of inheritance, Super classes and Sub classes, Member access rules, Inheritance hierarchies, super uses, preventing inheritance final classes and methods, casting, polymorphism- dynamic binding, method overriding, abstract classes and methods, the Object class and its methods.

Learning Outcomes

Students upon completion of this unit will be able to

- understand the principles of the object oriented programming paradigm specifically including abstraction, encapsulation, inheritance and polymorphism using Java

- learn how to use an object oriented programming language, and associated class libraries, to develop object oriented programs using Java

UNIT II

Interfaces – Interfaces vs. Abstract classes, defining an interface, implementing interfaces, accessing implementations through interface references, extending interface
Packages-Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages.

Learning Outcomes
Students upon completion of this unit will be able to
- Read and understand Java-based software code of medium-to-high complexity.
- Use standard and third party Java's API's when writing applications

UNIT III

Files – streams- byte streams, character streams, text Input/output, binary input/output, random access file operations, File management using File class, Using java.io.

Exception handling – Dealing with errors, benefits of exception handling, the classification of exceptions- exception hierarchy, checked exceptions and unchecked exceptions, usage of try, catch, throw, throws and finally, rethrowing exceptions, exception specification, built in exceptions, creating own exception sub classes, Guide lines for proper use of exceptions.

Learning Outcomes
Students upon completion of this unit will be able to
- To learn how to handling the files and its operations
- To learn how to produce robust programs in Java using exception handling and extensive program testing.

UNIT IV

Multithreading - Differences between multiple processes and multiple threads, thread states, creating threads, interrupting threads, thread priorities, synchronizing threads, interthread communication, thread groups, daemon threads.

Event Handling - Events, Event sources, Event classes, Event Listeners, Relationship between Event sources and Listeners, Delegation event model, Semantic and Low-level events, Examples handling a button click, handling mouse and keyboard events, Adapter classes.
Learning Outcomes
- Learn how to implement real time applications using multithreading concept.
- How to implement different events for handling in the applications.

UNIT V

Applets – Inheritance hierarchy for applets, differences between applets and applications, life cycle of an applet - Four methods of an applet, Developing applets and testing, passing parameters to applets, applet security issues.

GUI Programming with Java - The AWT class hierarchy, Introduction to Swing, Swing vs. AWT,MVC architecture, Hierarchy for Swing components, Containers – Top-level containers – JFrame, JApplet, JWindow, JDialog, Light weight containers – JPanel, A simple swing application, Overview of several swing components- Jbutton, JToggleButton, JCheckBox, JRadioButton, JLabel, JTextField, JTextArea, JList, JComboBox, JMenu, Java's Graphics capabilities – Introduction, Graphics contexts and Graphics objects, color control, Font control, Drawing lines, rectangles and ovals, Drawing arcs, Layout management - Layout manager types – border, grid, flow, box.

Learning Outcomes
Students upon completion of this unit will be able to
- Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem.
- Developing GUI applications using with AWT and Swing Components.

Prescribed Text Books
1. Java the complete reference, 7th editon, Herbert Schildt, TMH.
2. Java for Programmers, P.J.Deitel and H.M.Deitel, Pearson education / Java How to Program P.J.Deitel and H.M.Deitel ,8th edition, PHI.

Reference Text Books
Core Java, Volume 1-Fundamentals, eighth edition, Cay S.Horstmann and Gary Cornell, Pearson education.
Thinking in Java, Bruce Eckel, PHP
Object Oriented Programming through Java, P.Radha Krishna, Universities Press.

MODEL PAPER

MCS 102   Object oriented programming with JAVA

Time: 3 hrs   Max Marks: 70

Answer ONE Question from each unit   5 x 14 = 70 M

UNIT – I

1. a) Explain about final classes, final methods and final variables?
    b) Explain about the abstract class with example program
                                            (OR)
2. What are the basic principles of Object Oriented Programming? Explain with examples,
    how they are implemented in C++

UNIT – II

3. Is there any alternative solution for Inheritance. If so explain the advantages and
    disadvantages of it.
                                            (OR)
4. a)What is a package? How do we design a package?
    b) How do we add a class or interface to a package?

UNIT – III

5. In JAVA, is exception handling implicit or explicit or both. Explain with   the help of
example java programs.
                                            (OR)
6. a. Explain in detail about random access file operations.
    b. Write about Stream Classes.

UNIT-IV

7. a) With the help of an example, explain multithreading by extending thread class.
    b) Implementing Runnable interface and extending thread, which method you   refer for
       multithreading and why?
                                            (OR)
8. Explain Mouse and KeyBoard Events
UNIT – V

9. Differentiate following with suitable examples
    a) Frame, JFrame   b) Applet, JApplet   c) Menu, JMenu
                                            (OR)
10. Explain the following
    a) Creating an applet b) Passing parameters to applets c) Adding graphics

MCS 103	OPERATING 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 appreciate

1. Understanding the role of an operating system
2. making aware of the issues in management of resources like processor, memory and input-output
3. Understanding file management techniques.

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.

SYLLABUS

UNIT–I

Introduction : What Operating Systems Do – Computer System Organization – 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 – Inter process Communication – Examples of IPC Systems – Communication in Client Server Systems.

Learning Outcomes

Students upon completion of this unit will be able to

- Analyze the structure of OS and basic architectural components involved in OS design
- Appreciate the role of operating system as System software.
- Demonstrate understanding of the Process.

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.

Learning Outcomes
Students upon completion of this unit will be able to
- Understand the uses of Thread and the process of Multi Threading.
- Understand the process management policies and scheduling of processes by CPU

UNIT–III

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

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

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

- Evaluate the requirement for process Synchronization and coordination handled by operating system
- Apply various concept related with Deadlock to solve problems related with Resources allocation, after checking system in Safe state or not.

UNIT–IV

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.

Learning Outcomes
- Identify use and evaluate the Memory Management policies with respect to different Memory Management technologies.
- Identify use and evaluate the Virtual Memory Management policies with respect to different Virtual Memory Management techniques.

UNIT–V

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.

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

- Compare the various algorithms and comment about performance of various algorithms used for   File handling and I/O operations.
- Master issues related to file system interface and implementation, disk management.

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, 2.Pearson Education (2007)
3.Achyut S Godbole, "Operating Systems", Second Edition, TMH (2007).
4.Flynn/McHoes, "Operating Systems", Cengage Learning (2008).
5.Deitel & Deitel, "Operating Systems",Third Edition, Pearson Education (2008).

Model Paper

MCS 103 <u>OPERATING SYSTEMS</u>

Time : 3 Hrs   Max. Marks: 70

Answer ONE Question from each unit   **5 x 14 = 70 M**

<u>UNIT – I</u>

1. a) Explain Traditional computing, Client-Server computing and peer- to-peer computing
   b) Describe Storage device Hierarchy

(OR)

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

<u>UNIT – II</u>

3. Discuss different threading issues.

(OR)

4. Compare different types of Process Scheduling Algorithms.

<u>UNIT – III</u>

5. Explain Deadlock avoidance mechanisms.

(OR)

6. Explain Semaphores and Monitors

<u>UNIT-IV</u>

7. Explain Continuous Memory Allocation and Paging.

(OR)

8 Give a Brief note on Virtual Memory Management.

<u>UNIT – V</u>

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

(OR)

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

MCS 104	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 analyzing 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

MCS 104: PROBABILITY AND STATISTICS

<u>Unit I:</u>

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

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

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

- To apply the basic probability rules, including additive and multiplicative laws, independent and mutually exclusive events in probability models.
- To identify the type of statistical situation to which different distributions can be applied.

Unit II:

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

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

Learning Outcomes
Students upon completion of this unit will be able to
- To examine exponential, normal and Conditional Distributions.
- Describe and identify normal and other distributions.
- Get basic knowledge about different estimation and central limit theorem.

UNIT III:

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.

Learning Outcomes
Students upon completion of this unit will be able to
- To apply statistical tools for drawing meaningful inferences
- To understand the problem of statistical inference with specific reference to point estimation

UNIT IV:

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

Learning Outcomes
Students upon completion of this unit will be able to
Apply sampling distributions of means and variances and the t- and F-distributions
Apply one-way classification , comparing variances.

UNIT V:

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.

Learning Outcomes
Students upon completion of this unit will be able to
- Understand the fundamental theory behind linear regression and, through data examples, learn to fit, examine, and utilize regression models to examine relationships between multiple variables.
- Develop a deeper understanding of multiple linear regression models and its limitations

Prescribed book:

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

Reference book:

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

Model paper

MCS 104: **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

UNIT-I

1. (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

2.(a) Out of 800 families with 5 children each how many would you expect you have
      (i) 3 boys (ii) 5 girls
      (iii) Either 2 or 3 girls Assume equal probabilities for boys and girls.

  (b) The distribution function of a random variate X is given by the following function.
        $f(x) = 0$; if x < -2
            1/2   ; if $-2 \leq x < 0$
            3/4   ; if $0 \leq x < 2$
             1   ; $x \geq 2$
   i.   Sketch the group h of F(x)
   ii.   Obtain P.D.F of f(x)
   iii.   Compute the probabilities $P(X \leq 1)$; $P(X \geq 2)$; $P(1 \leq X \leq 2)$

UNIT-II

3. (a) Derive the 100 (1-α)% 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
4. (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

5. (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

6.(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

7. Derive the Normal equations of curve of Regression Y on X.

                       (OR)

8. 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
      $\mu_{y/x} = \beta_0 + \beta_1 X$
        (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.

UNIT - V

9.   Derive the Normal equations for Multiple linear regression model.

(OR)

10.   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 $\mu_{y/x} = \beta_0 + \beta_1 X + \beta_2 X^2$

Number of Units (X)	Cost in hundreds of dollars (Y)
5	14.0
5	12.5
10	7.0
10	5.0
15	2.1
16	1.8
17	6.2
18	4.9
19	13.2
20	14.6

            (a) Draw the Scatter diagram.
            (b) Estimate the constants of given model.

MCS 105.1	COMPUTER ORGANIZATION	
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. helping the students to develop understand the nature and characteristics of the organisation and design of the digital computer systems.

2. Focusing on the organisation and instruction set architecture of the CPU.

Outcomes

Students successfully completing this module will be able to

1. Understand the concepts that are included in the design of digital computer system

2. Understand and to evaluate the impact that languages, their compilers and underlying operating systems have on the design of computer systems

3. Understand and to evaluate the impact that peripherals, their interconnection and underlying data operations have on the design of computer systems

4. Understand the memory organization of the computer system

SYLLABUS

UNIT I

Digital logic circuits-Logic gates, Boolean algebra, Map simplification, Combinational logic, circuits, Flip flops, Sequential logic circuits.

Digital Components - Integrated circuits, Decoders, Multiplexers, Registers, Shift registers, Binary Counters, Memory unit.

Data Representation - Data types, Complements, Fixed & Floating point representation, Other binary codes, Error Detection codes

Learning Outcomes

Students upon completion of this unit will be able to

● To acquire the basic knowledge of digital logic levels and application of knowledge to understand digital electronics circuits.

● Employ the codes and number systems converting circuits and Compare different types of logic families which are the basic unit of different types of logic gates in the domain of economy, performance and efficiency

UNIT II

Register Transfer and micro operations
Register transfer language, Register transfer, Bus and Memory transfers, Arithmetic micro operations, Logical 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

Learning Outcomes
Students upon completion of this unit will be able to
- To understand the structure, function and characteristics of computer systems.
- To understand the design of the various functional units and components of computers.

UNIT III

Micro programmed Control - control Memory, Address Sequencing, Micro program example, Design of control unit.
Central Processing Unit - General Register Organization, Stack Organization, Instruction format, Addressing modes, Data Transfer and Manipulation, Program Control.

Learning Outcomes
Students upon completion of this unit will be able to
- Understand the basics of hardwired and micro-programmed control of the CPU.
- To identify the elements of modern instructions sets and their impact on processor design.
- Compare CPU implementations etc.

UNIT IV

Computer Arithmetic - Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-Point Arithmetic Operations, Decimal Arithmetic Unit, Decimal Arithmetic Operations.

Learning Outcomes
Students upon completion of this unit will be able to
- Learn about algorithms of arithmetic operations

UNIT V

Input-Output Organization - Peripheral Devices, Input Output Interface, asynchronous Data Transfer, Modes of Transfers, Priority Interrupt.

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

Learning Outcomes

Students upon completion of this unit will be able to

- Learn about various I/O devices and the I/O interface
- Learn the function of each element of a memory hierarchy

Prescribed Book

Morris Mano, "Computer System Architecture", 3rd Edition, PHI.

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)

Model Question Paper

MCS 105.1   COMPUTER ORGANIZATION

Time: 3Hrs   **Max.Marks: 70M**

Answer ONE Question from each unit   **5 x 14 = 70 M**

UNIT-I

1.   a)Simplify the following Boolean function in sum of products form by means of a four variable map. Draw the logic diagram with a)AND–OR gates b)NAND gates F(A,B,C,D)=$\sum$(0,2,5,8,9,10,11,14,15)

b) i) Show the circuit of a 5 by 32 decoder constructed with four 3 by 8 decoders one 2x4 decoder.
 ii) What are Error Detection Codes?
(OR)
2.   a) Explain the Working of JK Flip-flop with necessary circuit diagram.
b) i) Write short notes on fixed point Integer representation.
ii) Draw the logic diagram of 4-bit synchronous binary counter.

UNIT-II

3.   a) Design a combination circuit for 4 bit Adder subtractor.
b) Give the block diagram of control unit of a basic computer.
(OR)
4.   a) Explain the steps performed in the 1st pass of a two pass Assembler.
b) i) Write about subroutines.
ii) Write Register Transfer Language program for following
Instructions of a Basic computer i) LDA ii)STA

UNIT-III

5.   a) Draw and Explain the block diagram of a typical Micro program sequences for a control memory.
b) Give the difference between Hardwire control and microgram control.
(OR)
6.   a) Explain any four Addressing modes.
b) Explain about Memory Stack.

UNIT – IV

7.   a) Explain Booth Multiplication Algorithm?
b) Explain Hardware implementation for Signed-Magnitude Data?

(OR)

8. Explain briefly about Decimal Arithmetic Operations of Multiplication?

UNIT-V

9. a) Explain DMA Data transfer.
   b) Write about Virtual Memory.

(OR)

10. a) Discuss about various types of cache memory mapping procedures.
    b) Explain Daisy chain priority Interrupt.

MCS 105.2	DIGITAL LOGIC DESIGN	
Instruction: 4 periods / week		**Credits: 5**
Internal: **30 marks**	**University Exam:** **70 marks**	**Total:** **100 Marks**

Objectives:

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

Outcomes:

- Able to understand number systems and codes.
- Able to solve Boolean expressions using Minimization methods.
- Able to design the sequential and combinational circuits.
- Able to apply state reduction methods to solve sequential circuits.

SYLLABUS

UNIT – I

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

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

Learning Outcomes
Students upon completion of this unit will be able to
- Identify and explain, number systems, binary coded systems
- Understand fundamental concepts of digital logic design including basic and universal gates

UNIT – II

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

Learning Outcomes
Students upon completion of this unit will be able to
- Introduce the basics of Minimizing Booleans functions by using various techniques like K-Map
- Demonstrate the acquired knowledge to apply techniques related to the multi-variable Karnaugh map

UNIT – III

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

Learning Outcomes
Students upon completion of this unit will be able to
- Realize the combinational and sequential logic circuits by using various logical blocks.
- Able to design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.

UNIT – IV

Synchronous Sequential Logic: Synchronous Sequential Circuits, Latches, Flip-flops, analysis of clocked sequential circuits, Registers, Shift registers, Ripple counters, Synchronous counters, other counters. Asynchronous Sequential Circuits -Introduction, Analysis procedure, Circuits with latches, Design procedure, Reduction of state and follow tables, Race- free state assignment, Hazards.

Learning Outcomes
Students upon completion of this unit will be able to
- Design synchronous counters and develop sequential circuit applications using flip flop and registers.
- Able to analyze synchronous sequential circuits

UNIT – V

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

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

Learning Outcomes

Students upon completion of this unit will be able to
- Understand various types of computer memory and how to build it.
- Understands register transfer language and perform various operations using RTL.

TEXT BOOKS:
1. Digital Design, M. Morris Mano, M.D.Ciletti, 5th edition, Pearson.(Units I, II, III, IV, Part of Unit V)
2. Computer System Architecture, M.Morris Mano, 3rd edition, Pearson.(Part of Unit V)

REFERENCE BOOKS:
1. Switching and Finite Automata Theory, Z. Kohavi, Tata McGraw Hill.
2. Fundamentals of Logic Design, C. H. Roth, L. L. Kinney, 7th edition, Cengage Learning.
3. Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M. Rafiquzzaman, John Wiley.

MCS 105.2: Digital Logic Design

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

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

UNIT-I

1. a) How are negative numbers represented? Represent signed numbers from +7 to -8 using different ways of representation.
   b) Perform the subtraction using 2's complement method.
        (i)11010 – 10100 (ii)11010 – 1101.10 (iii)110 - 110000

   (OR)

2. a) Explain various number systems and codes and their conversion with examples for each.
   b) Simplify the following Boolean expressions to a minimum number of literals
        (i) ABC+A'B+ABC' (ii) xy + x(wz+wz')

UNIT-II

3. a) Simplify the following Boolean functions, using a four variable Karnaugh map method and implement the simplified function using NAND gates
        $F(A,B,C,D) = \sum 0,2,4,5,6,7,8,10,13,15)$
   b) Show that the dual of the exclusive OR is also its compliment

   (OR)

4. a) Obtain the minimal sum of products expression for the following function and implement the same using only NAND gates
        $f\ A, B, C, D = 1,4,7,8,9,11 + (0,3,5)$
   b) Realize the following function with i) Multilevel NAND-NAND network and ii) Multilevel NOR-NOR network. $Y = A'B + B\ C + D + EF'\ (B' + D')$

UNIT-III

5. a) What is a combinational logic circuit? Implement a Full adder using two half adders and one OR gate.
   b) With a neat diagram explain in detail about Decimal Adder.

   (OR)

6. Construct a 4 bit 2's complement adder using full adders and perform addition and subtraction by taking 4-bit numbers with examples.
   .

UNIT-IV

7. a) Convert an SR Flip-Flop into JK Flip-Flop.
   b) Explain the design procedure for multiplexers and de-multiplexers and draw the logic diagram of a 4-to-1 line multiplexer with logic gates.

<div align="center">(OR)</div>

8. With a neat diagram explain about 4-bit bidirectional shift register

<div align="center">

UNIT-V

</div>

9. Design 4-bit shift register using D flip-flops and explain its working with the help of timing diagrams.

10. Design a counter with the following repeated binary sequence: 0,1,2,3,4,5,6, use JK flip-flops.

MCS 105.3	DISCRETE MATHEMATICAL STRUCTURES
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 extend student's Logical and Mathematical maturity and ability to deal with abstraction and to introduce most of the basic terminologies used in computer science courses and application of ideas to solve practical problems.

2. Apply logical reasoning to solve a variety of problems.

Outcomes

Students successfully completing this module will be able to

1. Have acquired greater precision in logical argument and have gained a core mathematical understanding of discrete mathematics.

2. Learned and practised basic concepts of mathematical proof (direct proof, proof by contradiction, mathematical induction).

3. Handle the standard logical symbols with some confidence.

4. Learned elementary combinatorial and counting techniques and how to apply them to simple problems.

5. Simplify complex mathematical expressions and apply general formulae to specific contexts.

6. Learned how to state precisely and prove elementary mathematical statements and solve problems.

SYLLABUS

UNIT – I

Mathematical Logic: Connectives, Well formed Formulas, Truth Tables, Tautology, Equivalence, Implication, Normal Forms, Predicates, Free & bound variables, Rules of inference, Consistency, Proof by contradiction, Automatic theorem proving.

Learning Outcomes

Students upon completion of this unit will be able to
- Write an argument using logical notation and determine if the argument is valid or not.
- Demonstrate the ability to write and evaluate a proof and give examples of each proof technique described.

UNIT – II

Set Theory: Properties of Binary Relations, Equivalence, Compatibility & Partial ordering relations, Hasse diagrams, Functions, Inverse function, Composition of functions, Recursive functions

Learning Outcomes

Students upon completion of this unit will be able to
- Understand the basic principles of sets and operations in sets.
- Prove basic set equalities
- Demonstrate an understanding of relations and functions

UNIT – III

Algebraic Structures: Semi groups and Monoids, Groups, Homomorphism, group codes.

Learning Outcomes
Students upon completion of this unit will be able to
- Details of group theory

UNIT – IV

Lattices and Boolean Algebra Introduction: Lattices as partially ordered set, Boolean Algebra and Boolean Functions

Learning Outcomes
Students upon completion of this unit will be able to
- Details of Boolean algebra

UNIT – V

Graph Theory: Introduction - Basic concepts of graph theory, Isomorphism's and sub graphs, connected components, cyclic graph, Bipartite graph, planar graphs, Euler's formula, Euler's circuits, de bruijin sequence, Hamiltonian graphs, chromatic numbers, cut set, tie set, The four-color problem

Learning Outcomes
Students upon completion of this unit will be able to
- Demonstrate an understanding of relations and functions
- Demonstrate different traversal methods for graphs.
- Model problems in Computer Science using graphs.

Prescribed Books

1. J.P.Tremblay & R.Manohar, "Discrete Mathematical Structures with
   Applications to Computer Science", - TMH

2. Joe L.Mott, Abraham Kande, Theodore P. Baker," Discrete Mathematics for
   Computer scientists and Mathematicians – PHI

Reference Books

Ralph P. Grimaldi, B.V. Ramana, "Discrete and Combinational Mathematics", 5th Edition, Pearson Education (2008).

Swapan Kumar Sarkar, "A Text Book of Discrete Mathematics", S.Chand (2008).

D.S.Malik and M.K.Sen, "Discrete Mathematical Structures", Thomson (2006).

MODEL PAPER

MCS-105.3 : DISCRETE MATHEMATICAL STRUCTURES

Time 3Hrs   **Max. Marks: 70**

Answer ONE Question from each unit   **5 x 14 = 70 M**

UNIT - I
1. (a). Verify whether the following statement is a tautology or not.
   $(P{\rightarrow}Q) \rightarrow ((\neg R{\rightarrow}\neg Q) \rightarrow (P{\rightarrow}R))$
   (b). Show that $\sim (P\mathbf{V}(\sim P\wedge Q)$ and $(\sim p\wedge\sim Q)$ are logically equivalent.
(OR)
2. (a). Obtain the principal disjunctive normal form of $P \rightarrow ((P{\rightarrow}Q) \wedge \neg(\neg Q\mathbf{V}\neg P))$
   (b). Show that RVS fallows logically from the premises
   CVD, (CVD)$\rightarrow \neg$ H, $\neg$ H$\rightarrow$(A$\wedge\neg$ B) and (A$\wedge\neg$ B)$\rightarrow$(RVS)

UNIT-II
3. (a). Write about the properties of binary relations in a set.
   (b). Let R be the relation on the set of real numbers such that aRb if and
        only if a-b is an integer. Is R an equivalence relation?

(OR)

4. (a). Draw the Hasse diagram for the partial ordering $\{(A,B) / A \subseteq B\}$
        on the power set P(S) Where S={a,b,c}.
   (b). Let f(x) = x+2, g(x) = x-2, and h(x) = 3x for xϵR, Where R is the
        set of real numbers. Find gof; fog; fof; gog; hog; hof; and fohog.

UNIT -III
5.(a). Let G be a group and let Z = {a : ax = xa for all x$\in$G} is a center of the group G.
       Then prove that 'Z' is a normal subgroup of G.
  (b). The minimum weight of the non-zero code words in a group code is equal to
       its minimum distance.
(OR)
6. (a). Show that in a group <G, $\star$>, if for any a,b$\in$G, $(a \star b)^2 = a^2 \star b^2$ then
        <G,*> must be an abelian group.
   (b). Show that the set of all the invertible elements of a monoid from a
        group under the same operation as that of the monoid.

UNIT-IV
7. (a). Prove $(a{\oplus}b)' = a'{*}b'$
   (b). Every chain is a distributive lattice.
(OR)
8. Write the following Boolean expressions in an equivalent sum-of-products canonical

form in three variables x_1, x_2, and x_3:

(a) $x_1 * x_2$;   (b) $x_1 \oplus x_2$;   and   (c) $(x_1 \oplus x_2)' * x_3$

UNIT-V

9.(a). Theorem: An undirected graph has an even number of vertices of odd degree.

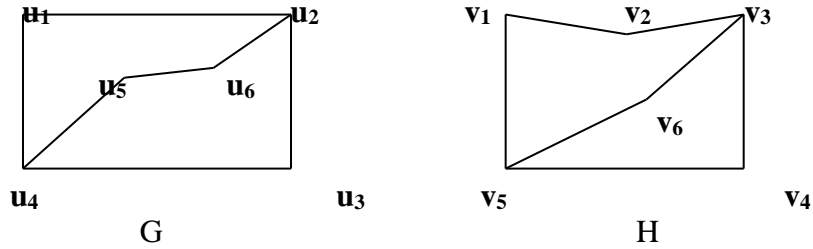(b). Determine whether the Graphs G and H shown in below figure are Isomorphic or not.

Figure: Graphs G and H.

(OR)

10.(a). State and prove Euler's formula for planar graphs.

(b). Write a brief note about the basic rules for constructing Hamiltonian Paths and Hamiltonian Cycles.

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

Lab cycle

1. Program for Sorting 'n' elements Using bubble sort technique.

2. Sort given elements using Selection Sort.

3. Sort given elements using Insertion Sort.

4. Sort given elements using Merge Sort.

5. Sort given elements using Quick Sort.

6. Implement the following operations on single linked list.
   (i) Creation (ii) Insertion (iii) Deletion (iv) Display

7. Implement the following operations on double linked list.
   (i) Creation (ii) Insertion (iii) Deletion (iv) Display

8. Implement the following operations on circular linked list.
   (i) Creation (ii) Insertion (iii) Deletion (iv) Display

9. Program for splitting given linked list.

10. Program for traversing the given linked list in reverse order.

11. Merge two given linked lists.

12. Create a linked list to store the names of colors.

13. Implement Stack Operations Using Arrays.

14. Implement Stack Operations Using Linked List.

15. Implement Queue Operations Using Arrays.

16. Implement Queue Operations Using Linked List.

17. Implement Operations on Circular Queue.

18. Construct and implement operations on Priority Queue.

19. Implement Operations on double ended Queue.

20. Converting infix expression to postfix expression by using stack.

21. Write program to evaluate post fix expression.

22. Implement Operations on two-way stack.

23. Add two polynomials using Linked List.

24. Multiply Two polynomials using Linked List.

25. Construct BST and implement traversing techniques recursively.

26. Implement preorder traversal on BST non recursively.

27. Implement in order traversal on BST non recursively.

28. Implement post order traversal on BST non recursively.

29. To Convert matrix into sparse matrix.

30. Implement binary search techniques recursively.

31. Program to implement graph traversing techniques DFS AND DFS.

32. Program to estimate shortest path for a graph.

MCS 107	JAVA PROGRAMMING LAB	
Instruction: 6 periods / week		**Credits: 3**
Internal: **30 marks**	**University Exam:** **70 marks**	**Total:** **100 Marks**

Lab Cycle

1. Write a Java Program to define a class, describe its constructor, overload the constructors and instantiate its object.

2. Write a Java Program to define a class, define instance methods for setting and retrieving values of instance variables and instantiate its object

3. Write a java program to practice using String class and its methods

4. Write a java program to implement inheritance and demonstrate use of method overriding

5. Write a java program to implement multilevel inheritance by applying various access controls to its data members and methods.

6. Write a program to demonstrate use of implementing interfaces

7. Design a Java interface for ADT Stack. Develop two different
classes that implement this interface, one using array and the other using linked-list. Provide necessary exception handling in both the implementations.

8. Write a Java program to implement the concept of importing classes from user defined package and creating packages

9. Write a program to implement the concept of threading by implementing Runnable Interface

10. write a java program to store and read objects from a file

11. Write a Java program that displays the number of characters, lines and words in a text file.

12. write a java program to illustrate object serialization

13. Create a java program to illustrate user defined exception

14. Write a java program to create a thread using runnable interface

15. Write a Java program that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds

16. Write an applet To create multiple threads that correctly implements producer consumer problem using the concept of Inter thread communication

17. Write an applet To handling the mouse events

18. Write a Program That works as a simple calculator using Grid layout to arrange buttons for the digits and +,-,* % operations. Add a text field to print the result.

19. Build and run "CelsiusConverter" sample application using swings

20. 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

MCA 108	Seminar	
Instruction: 3 periods / week		Credits: 1
Internal : 50 marks	University Exam: ---	Total : 50 Marks

Semester	MCS 201: DATABASE MANAGEMENT SYSTEMS	L	T	P	C
II		2	1	1	5

Learning Objective (LO):

LO1	The need of a database management system (DBMS)
LO2	The concept of data normalization
LO3	The concept of entity relationships
LO4	The concept of a client/server database, and
LO5	The concepts of MongoDB

Course Outcomes (CO):

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

CO1	Design database, different operations, queries performed for a management system problems,	K5
CO2	Understand and design of ER-diagram in DBMS	K2
CO3	Understand the concept of Relational algebra and Relational Calculus.	K2
CO4	Applying different normalizations for database size reduction and removal of redundancy	K3
CO5	Understand and design application development in MongoDB	K2

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SYLLABUS

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.

Learning Outcomes
Students upon completion of this unit will be able to
- have a broad understanding of database concepts and database management system software

UNIT-II

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.

Learning Outcomes
Students upon completion of this unit will be able to
- Compare the basic database storage structures and access techniquesfile and page organizations, indexing methods including B-tree, and hashing.
- Explain and use design principles for logical design of databases, including the E-R method and normalization approach

UNIT-III

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.

Learning Outcomes
Students upon completion of this unit will be able to
- Apply relational database theory and be able to describe relational algebra expression, tuple and domain relation expression from queries.
- write SQL commands to create tables and indexes, insert/update/delete data, and query data in a relational DBMS
- Formulate the queries required to solve the issues in database

UNIT-IV

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 from Relational Database Schema Design, Multivalued Dependencies and Fourth Normal Form, Join Dependencies and Fifth Normal Form, Inclusion Dependencies, Other Dependencies and Normal Forms.

Learning Outcomes
Students upon completion of this unit will be able to
- Recognize and identify the use of normalization and functional dependency, indexing and hashing technique used in database design.
- Understand how to normalize the tables.

UNIT-V

Document oriented data principles of schema design, designing an e-commerce data model, Nuts and bolts on databases collections and documents.

Queries and Aggregatione-commerce's queries, MongoDB's query language, aggregating orders, aggregating in detail.

Updates atomic operations and deletes Document updates, e-commerce updates, atomic document processing, nuts and bolts Mongo DB updates and deletes.

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

- Apply and relate the concept of transaction, concurrency control and recovery in database.
- Explain basic issues of transaction processing and concurrency control
- Understand Distributed database and client server architectures.

Prescribed Books

Ramez Elmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education (2007)
Chapters1.1 to 1.6, 2, 3.1 to 3.6, 4.1 to 4.5, 5, 6, 8, 10, 11

MongoDB in Action, Kyle Banker, Manning Publication and Co.**Chapters**4,5 and 6

Reference Books

1 C.J. Date, A.Kannan, S. Swamynathan, "An Introduction to Database Systems", VII Edition Pearson Education (2006).
2. Database system concepts, Silberschatz, Korth, Sudarshan, Mc-graw-hill,5th edition.
3. MongoDBLearn MongoDB in a simple Way, Dan Warnock

Model Paper
MCS 202 Database Management Systems

Time: 3 HOURS   **Max. Marks: 70M**

Answer ONE Question from each unit   **5 x 14 = 70 M**

UNIT-I

1.   a) Discuss about three level architecture with representation of data in each level.
                 b) Classification of Database Management Systems
                                              (OR)
2.   a) Explain Data Models
          b) Characteristics of the Database Approach

UNIT-II

3.   a) Entity types and Entity sets.
          b)ER Design for the COMPANY Database.

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

UNIT-III

5.   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)
6.   a) Discuss about Views and its Limitations?
          b) What is Index? Create an index for the employee belongs to the Accounts and Sales
          departments.

UNIT-IV

7.   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)
8.   a) What is Non-Loss Dependency? Explain with an example.
          b) Discuss the following   I) II NF II) Multi-valued Dependency.

UNIT-V

9.   Explain MongoDB query selectors.
                                              (OR)
10.   Explain how documents are processed in MongoDB.

Semester	MCS 202: DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
II		2	1	1	4

Learning Objective (LO):

LO1	Learning specification of the concept of algorithm and analysis of its computational complexity
LO2	Learning design principles of algorithms and their application to computing problems
LO3	Introduction to the various algorithms of greedy method
LO4	Introduction to the various algorithms of dynamic programming
LO5	Making analysis on basic traversal and searching techniques.

Course Outcomes (CO):
At the end of the course, the student will be able to

CO1	Identify user defined data types, linear data structures for solving real world problems.	4
CO2	Illustrate some of the Divide and conquer algorithms.	2
CO3	Illustrate various algorithms in dynamic programming.	2
CO4	Define what are the various greedy methods	1
CO5	Demonstrate knowledge of back tracking algorithms and their run-time complexity.	2

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SYLLABUS

UNIT I

Introduction to Computer Algorithms- Algorithm Specification, Performance Analysis, Randomized algorithms

Elementary Data Structures- Stacks and Queues, Tree, Dictionaries, Priority Queues, Sets and Disjoint Set Union, graphs
Learning Outcomes

Students will get an understanding about

1. Time and Space Complexities
2. Solving certain problems using divide and conquer strategy

UNIT - II

Divide - And – Conquer   - General Method, Binary Search, Maximum and Minimum, Merge Sort, Quick Sort, Selection, Strassen's Matrix Multiplication, Convex Hull.

Learning Outcomes

Students will acquire knowledge about

1 Effective use of Divide and Conquer Technique

2 Sortings using Divide & Conquer

UNIT-III

The Greedy Method   - Knapsack Problem, Tree vertex splitting, Job sequencing, with deadlines, Minimum-cost spanning trees, Optimal storage on tapes, Optimal merge pattern, Single source shortest paths.

Learning Outcomes

Students will acquire knowledge about

1. Generation of minimum cost trees
2. Solving knapsack problem using greedy method and also dynamic programming

UNIT-IV

Dynamic Programming - General method, Multistage graph, All pairs shortest path, Single-source shortest path, Optimal Binary search trees, String Editing, 0/1 Knapsack, Reliability design, The traveling salesman problem, Flow shop scheduling.

Basic Traversal and Search Techniques - Basic traversal & search techniques - Techniques for binary trees, techniques for graphs, connected components & spanning trees, Bi-connected components & DFS.

Learning Outcomes

Students will acquire knowledge about

1. Difference between two traversals
2. How to solve complex problems using backtracking method

UNIT-V

Backtracking - Back tracking - The General Method, The 8-Queens Problem, Sum of subsets, Graph coloring, Hamiltonian cycle, Knapsack problem.

Branch and Bound   - The method, 0/1 Knapsack problem, Traveling salesperson, Efficiency considerations.

Learning Outcomes

Students develop understanding on

1. Domains where branch and bound technique has to be used
2. How to solve combinatorial problems
3. Designing backtracking methods

Prescribed Book

L Ellis Horwitz, Sartaj Sahani , 'Fundamentals of Computer Algorithms', Universities Press, The following topics in the prescribed book   Topics 1,2,3,4,5,6,7,8

Reference Books
1. Bases S. & Gelder A.V - computer Algorithms,Addision Wesley(200)
2. Cormen TH et al - Introduction to Algorithms, PHI(2001)
3. Brassard & Bralley - Fundamentals of Algorithms, PHI(2001)

MCS202Designand Analysis Of Algorithms

Time 3 HOURS   **Max Marks: 70**

Answer ONE Question from each unit   **5 x 14 = 70 M**

UNIT – I

1. a) Explain control abstraction for divide – and – conquer strategy.
    b) Explain the process of constructing convex hull. Also write its algorithm and complexity

(**OR**)

2. a) Explain Stack Operations and Queue Operations
    b)   Briefly Explain Sets and Disjoint sets

UNIT-II

3. a) Derive the average time complexity for quick sort.
   b) Write a randomized algorithm to perform primality testing.

(OR)

4. a) Explain Partition algorithm with an example problem
    b)   Do the Matrix multiplication using Strassen's formulas

UNIT – III

5. a) State the problem of "optimal storage on tapes". If three programs of length $(l1, l2, l3) = (5, 10, 3)$.Find
The optimal way to store those programs on tapes using greedy method.

b) Find optimal binary search tree for the identifiers (do, if, while).
   Let $p(13) = (3,3,1)$ and $q(03)=(2,3,1,1)$.   Solve it using dynamic programming

(OR)

6. a) Write the problem of tree vertex splitting. Find the places where boosters are needed for the
Following tree, for $\delta=5$
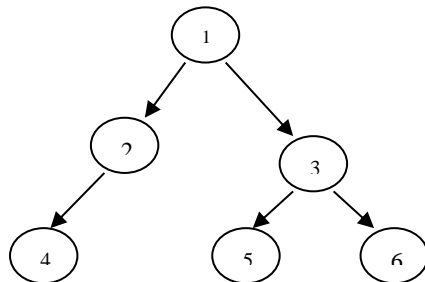
b) Solve O/I Knapsack, If the Knapsack instance n=3
(w1, w2, w3)=(2,3,4) & (p1,p2,p3)=(1,2,5) and m=6.

UNIT – IV

7. a) Solve sum of subsets problem for n=6,m=30,
w[16]={5,10,12,13,15,18}.
   b) Find connected components & spanning tree for

(OR)
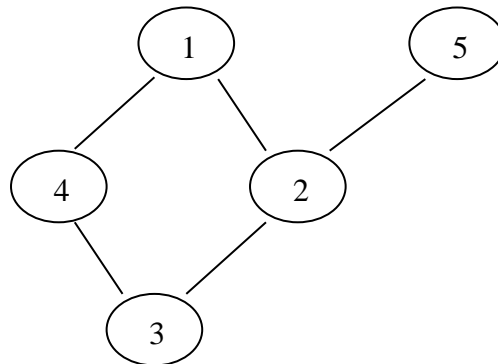
8.   a) Solve 8-queues problem
        b) Write different traversal techniques for graphs.

UNIT – V

9. a) Write a complete LC branch and bound algorithm for Knapsack problem
b) Write an non-deterministic algorithm to sort array elements.
(OR)
10.a) Explain the principles of
        i) control abstraction for LC search   ii) Bounding
        iii) FIFO branch & bound   iv) LC branch and bound

b) Write the relationship between P,NP and NP-complete,NP-hard problems

Semester	MCS 203: SOFTWARE ENGINEERING	L	T	P	C
II		3	1	0	5

Learning Objective (LO):

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

Course Outcomes (CO):
At the end of the course, the student will be able to

CO1	Describe software engineering layered technology and process framework	K1
CO2	Evaluate the different process models and choose the best model for their project	K2
CO3	Understand the different development practices and its advantages	K4
CO4	Explain software testing approaches, software tactics and metrics for process and project domains	K1
CO5	Analyse estimation techniques, quality management and formal methods	K4

.

SYLLABUS

UNIT – I

Introduction to software engineering (chapter 1)
The Process (chapters 2, 3)

Learning Outcomes
Students upon completion of this unit will be able to
- Study a body of knowledge relating to Software Engineering, Software myths
- A general understanding of software process models such as the waterfall and evolutionary models.

UNIT – II

Metrics for Process and Project (chapter 22)
Project management (chapter 21)

Learning Outcomes
Students upon completion of this unit will be able to
- Metric is a measure of software characteristics which are measurable.

UNIT - III

Requirement engineering (chapter 7)
Building the Analysis Modeling (chapter 8)
Design engineering (chapter 9)

Learning Outcomes
Students upon completion of this unit will be able to
- Understanding of software engineering practices and system engineering
- Understanding analysis modeling approaches

UNIT - IV

Creating an Architectural Design (chapter 10)
Performing User Interface Design (chapter 12)

Learning Outcomes
Students upon completion of this unit will be able to
- Understanding of software design techniques

UNIT - V

Testing Strategies (chapter 13)
Testing Tactics (chapter 14)

Learning Outcomes
Students upon completion of this unit will be able to
- Describe software testing strategies and tactics
- Understand project management techniques.

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

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

Model Paper
MCS 203 - SOFTWARE ENGINEERING

Time: 3 Hours   **Max. Marks:70M**

Answer ONE Question from each unit   **5 x 14 = 70 M**

UNIT-I

1. (a) What are software measurements explain them in detail
(b) What are software myths explain

(Or)

2. (a)What is an RAD model explain
    (b)What is an SPIRAL model explain.

UNIT-II

3. a) What are different metrics for process and project.
    b) Explain design in abstraction and pattern.

(OR)

4. a) Metrics for software quality.
    b) Project management risks.

UNIT-III

5. (a) Explain the elicitation requirement
    (b) Explain the flow oriented modeling

(Or)

6. (a) Explain the creation of behavioral modeling
    (b) Explain the design concepts

UNIT-IV

7. (a) Explain the architectural styles.
    (b) Discuss the golden rules of interface design.

(OR)

8. (a) Explain the transform, transaction mappings
    (b) What are the design steps involved in user interface.

UNIT-V

9. Discuss the following
    (i)White box testing. (ii) Black box testing.

(OR)

10. Write short notes on Test strategies for conventional software.

Semester	MCS 204: COMPUTER NETWORKS	L	T	P	C
II		3	1	0	4

Learning Objective (LO)

The course is designed to meet the objectives of:

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

Course Outcomes (CO):

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

CO1	Analyse basic taxonomy and terminology of the computer networking area.	K2
CO2	Describe the configuration and design of a small network	K1
CO3	Explain about research areas and future internets research fields	K1
CO4	Learn components and rules of communications	K1
CO5	Construct and implement layer protocols within an environment	K3

UNIT – I

Introduction: Uses of Computer Networks - Business Applications, 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 Networksx.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.

Learning Outcomes

The student will have an idea about

- Acquire the computer networking knowledge as well as the existing connectivity technologies and the required infrastructure which comprises the key steps involved in the communication process.
- Identify the key issues for the realization of the LAN/WAN/MAN network architectures and the hybridized existing form in the business environment and enterprise.
- Establish a solid knowledge of the layered approach that makes design, implementation and operation of extensive networks possible. To learn the 7-layer OSI network model (each layer and its responsibilities) and understand the TCP/IP suite of protocols and the networked applications supported by it.
  Establish a solid knowledge of the layered approach that makes design, Implementation, and operation of extensive networks possible.
- Physical layer, theoretical basis for data communication, guided transmission media, wireless transmission, and communication satellites.
- Acquire the knowledge about error correction and detection methods in the data link layer.

UNIT –I I

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.

Learning Outcomes
The student will have an idea about
- Understanding the characteristics of Ethernet technologies
- Understanding the basic protocols involved in Ethernet, IEEE 802.2, Bluetooth.
- Able to learn Ethernet switching techniques

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.

Learning Outcomes
The student will have an idea about
- Network layer, switching and routing, packet vs. circuit switching, protocols and services, internetworking protocols, IP, ICMP, ARP, DHCP, and VPN. Routing principles, the network layer and its usage in the Internet.

UNIT – IV
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.

Learning Outcomes
The student will have an idea about

- Transport layer services and protocols, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), TCP congestion control.

UNIT – V
The Application Layer: 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.

Learning Outcomes

The student will have an idea about
- Understanding about Domain Name System, message delivery.
- Understanding architecture of World Wide Web and its protocols
- Acquire the knowledge about the Multimedia data compression and different types of multimedia data.

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 Networking Technologies", Cengage Learning (2008)

<center>**MODEL PAPER**</center>

<center>**MCS 204: <u>COMPUTER NETWORKS</u>**</center>

Time : 3 hrs   **Max Marks: 70**

Answer ONE Question from each unit   **5 x 14 = 70 M**

<center>**<u>UNIT – I</u>**</center>

1.a). Explain about the OSI reference model.
   b). Explain about the TCP/IP reference model.
<center>**(OR)**</center>
2. a). Write about the data link layer design issues.
   b). Explain about sliding window protocols.

<center>**<u>UNIT – II</u>**</center>

3. a). Explain Switched Ethernet.
   b). Give and explain 802.11 frame structure, services.
<center>**(OR)**</center>
4. a). Describe architecture, applications, protocol stack of Bluetooth.
   b). Explain Spanning Tree Bridges.

<center>**<u>UNIT – III</u>**</center>

5. a). Discuss about Flooding routing algorithm.
 b). Explain Distance Vector Routing Algorithm.
<center>**(OR)**</center>
6. a). Discuss about Tunneling and Fragmentation.
b). Explain about IP Header Format and IP addresses.

<center>**<u>UNIT – IV</u>**</center>

7. a).Discuss about elements of transport protocols.
  b). Discuss about remote procedure call.
<center>**(OR)**</center>
8. a).Write about the TCP Protocol.
  b). Explain TCP Congestion Control.
<center>**<u>UNIT – V</u>**</center>

9. a) Explain about DNS.
 b) Write about URL's.

<center>**(OR)**</center>

10. a) Explain about Electronic Mail.
b)Discuss JPEG Compression mechanism.

Semester	MCS 205.1: WEB TECHNOLOGIES	L	T	P	C
II		2	1	1	4

Learning Objective (LO):

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

Course Outcomes (CO):

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

CO1	Explain the technologies used in web applications.	K1
CO2	Demonstrate HTML5, CSS, JavaScript coding for web applications	K2
CO3	Design creative websites using object based scripting concepts	K6
CO4	Learn to access database through Java programs, using Java Data Base Connectivity (JDBC)	K1
CO5	Create dynamic web pages, using Servlets and JSP	K6

UNIT I

HTML common Tags List, Tables, images, forms, Frames, Cascading Style Sheets; **Java ScriptIntroduction** to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script.

Learning Outcomes
Students upon completion of this unit will be able to
- Develop a dynamic webpage by the use of java script and DHTML.
- Design a responsive web site using HTML and CSS.

UNIT II

XML-Document type definition, XML Schemas, Document Object model, Presenting XML, Using XML ProcessorsDOM and SAX
CGI Scripting- What is CGI? – Developing CGI applications – Processing CGI – Returning a Basic HTML page – Introduction to CGI.pm – CGI.pm methods – Creating HTML pages dynamically.

Learning Outcomes
Students upon completion of this unit will be able to
- Write a well formed / valid XML document
- Developing CGI applications

UNIT III

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

Network Programming and RMIwhy networked Java – Basic Network Concepts – looking up Internet Addresses – URLs and URIs – UDP Datagram's and Sockets – Remote Method Invocation.

Learning Outcomes
Students upon completion of this unit will be able to
- Design to create structure of web page, to store the data in web document, and transport information through web.
- Establish the Connection between Java Application and database to insert, retrieve and modify the data in tables.

UNIT –IV

Web Servers, Tomcat web server, Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat, Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat.

Servlets

Introduction to ServletsLifecycle 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.

Learning Outcomes

Students upon completion of this unit will be able to
- Install Tomcat Server and execution of programs on server side.
- How to work with the Servlet.

UNIT-V

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

Learning Outcomes

Students upon completion of this unit will be able to
- Identify the problems in Servlets and overcome those using Java Server Pages
- Develop JSP applications with Model View Control architecture.

Prescribed Textbooks

1. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech (units I, II)

2. Java Programming with JDBC ;Donald Bales, O'Reilly (Unit III)

3. Java Network Programming, elliotte Rusty Harold, 3rd Edition, O'Reilly (Unit III)

4. Java Server Pages – Hans Bergsten, SPD O'Reilly (Unit IV)

Reference Textbooks

1. Robert W. Sebesta, "Programming the World Wide Web", Third Edition, Pearson Education (2007).

2. Anders Moller and Michael schwartzbach, "An Introduction to XML and Web Technologies", Addison Wesley (2006)

3. Jeffrey C. Jackson, "Web Technologies – A Computer Science Perspective", Pearson Education (2008).

4. H.M.Deitel, P.J.Deitel, "Java How to Program", Sixth Edition,   Pearson Education (2007).

Model Paper
MCS 205.1 WEB TECHNOLOGIES

Time: 3 Hrs   **Max. Marks: 70M**

Answer ONE Question from each unit   **5 x 14 = 70 M**

UNIT – I

1. (a) Create a simple HTML page which demonstrates the use of the various types of lists. Try adding a definition list which uses an unordered list to define terms.
   (b) Develop a JavaScript to determine whether a given number is an 'ARMSTRONG NUMBER'   or not.

OR

2. (a) How group and alignment of tables rows and columns is achieved using HTML.
   (b) Describe the various Date Objects with suitable examples.

UNIT – II

3. a) Explain the five possible keywords in a DTD declaration with suitable examples.
   (b) Define an XML schema. Show how an XML schema can becreated.

OR

4. (a) explain CGI.pm module
   (b) Explain clearly the steps involved in executing a CGI program

UNIT – III

5. (a) Discuss the four types of JDBC drivers.
   (b) Give a note on javax.sql package.

OR

6. What is the RMI layer model? What are the steps involved in writing an RMI Application?

UNIT – I V

7. (a) Explain about Webserver
   (b) Discuss about Tomcat Server, intstallation ?

OR

8. Explain Servlet Life cycle and the javax.servlet.HTTP package?

UNIT-V

9. Explain the components of JSP and how application data can be shared in JSP?

OR

10. What are the limitations of Servlets? How JSP over comes these Problems

Semester	MCS 205.2: WEB SERVICES	L	T	P	C
II		**2**	**1**	**1**	**4**

Learning Objective (LO):

LO1	Understanding Web Services and the SOA implementation model
LO2	To comprehend the SOA, its principles, and its advantages
LO3	For knowledge of XML concepts
LO4	To comprehend the paradigms required for Web Service testing
LO5	To investigate various test approaches for SOA-based applications

Course Outcomes (CO):

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

CO1	Understand the SOA principles.	
CO2	Use market-leading environment tools to efficiently design and consume web services.	
CO3	Recognize and pick the relevant framework components for the development of a webservice solution.	
CO4	Understand the paradigms required for Web Service testing	
CO5	Use OOP principles to build webservice solutions.	

SYLLABUS

UNIT – I

Evolution and Emergence of Web Services – Evolution of distributed computing. Core distributed computing technologies – client/server, CORBA, JAVA RMI, Micro Soft DCOM, MOM, and Challenges in Distributed Computing.

Introduction to Web Services – The definition of web services, basic operational model of web services, tools and technologies enabling webservices, benefits and challenges of using web services.

Learning Outcomes
Students upon completion of this unit will be able to
- Explain the benefits of packaging business applications as services over the Internet
- Solve and develop program logic for Web Services systems

UNIT – II

Web Service Architecture – Web services Architecture and its characteristics, core building blocks of web services, standards and technologies available for implementing web services, web services communication, and basic steps of implementing web services.

Learning Outcomes
Students upon completion of this unit will be able to
- Understand web service architecture
- Learn various technologies used for implementing web services

UNIT – III

Brief Over View of XML – XML Document structure, XML namespaces, Defining structure in XML documents, Reuse of XML schemes, Document navigation and transformation.

Developing Web Services Using SOAP : Simple Object Access Protocol, Inter-application communication and wire protocols, SOAP as a messaging protocol, Structure of a SOAP message, SOAPenvelope, Encoding, Service Oriented Architectures, SOA revisited, Service roles in a SOA, Reliable messaging

Learning Outcomes
Students upon completion of this unit will be able to
- To Understand XML concepts
- To understand the advantages of using XML technology family
- Use handlers to control SOAP message transmission
- Utilize SOAP to transmit attachments

UNIT – IV

Describing Web Services – WSDL introduction, non-functional service description, WSDL1.1 Vs WSDL 2.0, WSDL document, WSDL elements, WSDL binding, WSDL tools, WSDL port type, limitations of WSDL.

Learning Outcomes
Students upon completion of this unit will be able to
- To understand WSDL concepts
- Learn about various tools, elements of WSDL

UNIT – V

Registering and Discovering Services : The role of service registries, Service discovery, Universal Description, Discovery, and Integration, UDDI Architecture, UDDI Data Model, Interfaces, UDDI Implementation

Learning Outcomes
Students upon completion of this unit will be able to
- Understanding of the role of service registers
- Understanding of web service technology UDDI

Prescribed Textbooks

1. Developing Java Web Services, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India.

2. Web Services & SOA Principles and Technology, Second Edition, Michael P. Papazoglou.

Reference Textbooks

1. XML, Web Services, and the Data Revolution, F.P.Coyle, Pearson Education.

2. Building web Services with Java, 2nd Edition, S. Graham and others, Pearson Education.

3. Java Web Services, D.A. Chappell & T. Jewell, O"Reilly, SPD.

4. McGovern, et al., "Java web Services Architecture", Morgan Kaufmann Publishers, 2005

5. Developing Enterprise Web Services, S. Chatterjee, J. Webber, Pearson Education.

MODEL PAPER

MCS 205.2:<u>WEB SERVICES</u>

Time: 3 Hours   **Max Marks: 70**

Answer ONE Question from each unit   **5 x 14 = 70 M**

<u>UNIT – I</u>

1 Explain the architectural model of java RMI-based application.

(OR)

2. Explain basic operational model of web services

<u>UNIT – II</u>

3. Discuss the Web Service architecture and characteristics

(OR)

4. List and explain standards and technologies available for implementing web services

<u>UNIT – III</u>

5.Explain SOAP message exchange models

(OR)

6. Give an account on XML transformation technologies

<u>UNIT – IV</u>

7. Briefly discuss the WSDL definition document.

(OR)

8. Explain WSDL elements, WSDL binding, WSDL tools.

<u>UNIT – V</u>

9. ExplainUDDI Architecture, UDDI Data Model and its Interfaces

(OR)

10. How to search and delete information in UDDI registry? Explain

Semester	MCS 206: DBMS LAB	L	T	P	C
II		0	0	6	3

LAB Cycle – I

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'.
33. Find the client names who have placed orders before the month of May, 2006.
34. Find the names of clients who have placed orders worth of 10000 or more.
35. Find out if the product is '1.44 drive' is ordered by any client and print the client number, name to whom it is sold.

Cycle-II

Aim:
A Manufacturing Company deals with various parts and various suppliers supply these parts. It consists of three tables to record its entire information. Those are as follows

S(SNO,SNAME,CITY,STATUS)
P(PNO,PNAME,COLOR,WEIGTH,CITY,COST)
SP(SNO,PNO,QTY)
J(JNO,JNAME,CITY)
SPJ(SNO,PNO,JNO,QTY)

1. Get Suppliers Names for Suppliers who supply at least one red part.
2. Get Suppliers Names for Suppliers who do not supply part 'P2'
3. Using Group by with Having Clause, Get the part numbers for all the parts supplied by more than one supplier.
4. Get supplier numbers for suppliers with status value less the current max status value.
5. Get the total quantity of the part 'P2' supplied.
6. Get the part color, supplied by the supplier 'S1'
7. Get the names of the parts supplied by the supplier 'Smith' and "Black"
8. Get the Project numbers, whose parts are not in Red Color, from London.
9. Get the suppliers located from the same city.
10. Get the suppliers, who does not supply any part.
11. Find the pnames of parts supplied by London Supplier and by
12. no one else.

13. Find the sno's of suppliers who charge more for some part than the average cost of that part.
14. Find the sid's of suppliers who supply only red parts.
15. Find the sid's of suppliers who supply a red and a green part.
16. Find the sid's of suppliers who supply a red or green part.

Cycle III

An Airline System would like to keep track their information by using the following relations.

Flights (flno integer, from string, to string, distance integer, Price integer)
Aircraft (aid integer, aname string, cruising_range integer)
Certified (eid integer, aid integer)
Employees (eid integer, ename string, salary real)

Note that the employees relation describes pilots and other kinds of employees as well; every pilot is certified for aircraft and only pilots are certified to fly. Resolve the following queries

1. For each pilot who is certified for more than three aircraft, find the eid's and the maximum cruising range of the aircraft that he (or She) certified for.
2. Find the names of pilots whose salary is less than the price of the cheapest route from Los Angeles to Honolulu.
3. Find the name of the pilots certified from some Boeing aircraft.
4. For all aircraft with cruising range over 1,000 miles, find the name of the aircraft and the average salary of all pilots certified for this aircraft.
5. Find the aid's of all aircraft than can be used from Los Angels to Chicago.
6. Print the enames of pilots who can operate planes with cruising range greater than 3,000 miles, but are not certified by Boeing aircraft.
7. Find the total amount paid to employees as salaries.
8. Find the eid's of employees who are certified for exactly three aircrafts.
9. Find the eid's of employee who make second highest salary.
10. Find the aid's of all than can be used on non-stop flights from Bonn to Chennai.

Cycle IV

Employee Database

Aim: An enterprise wishes to maintain a database to automate its operations. Enterprise divided into to certain departments and each department consists of employees. The following two tables describes the automation schemas

DEPT (DEPTNO, DNAME, LOC)
EMP (EMPNO,ENAME,JOB,MGR,HIREDATE,SAL,COMM,DEPTNO)
1. Create a view, which contain employee names and their manager names working in sales department.
2. Determine the names of employee, who earn more than there managers.
3. Determine the names of employees, who take highest salary in their departments.
4. Determine the employees, who located at the same place.
5. Determine the employees, whose total salary is like the minimum salary of any department.
6. Update the employee salary by 25%, whose experience is greater than 10 years.
7. Delete the employees, who completed 32 years of service.
8. Determine the minimum salary of an employee and his details, who join on the same date.
9. Determine the count of employees, who are taking commission and not taking commission.
10. Determine the department does not contain any employees.
11. Find out the details of top 5 earners of company. (Note
    Employee Salaries should not be duplicate like 5k,4k,4k,3k,2k)
12. Display those managers name whose salary is more than an average salary of his employees.

13. Display the names of the managers who is having maximum number of employees working under him?

14. In which year did most people join the company? Display the year and number of employees.

15. Display ename, dname even if there no employees working in a particular department(use outer join).

MongoDB

1. Create students and teacher objects in MongoDB. The teacher object must consist of students enrolled.
   - List all the teachers
   - Display the information of the teacher based on id
   - Updates the teachers name for id value 2
   - Delete data with id =2 from student
   - List all the students assigned to a teacher
   - List all the teacher without students
   - List teachers of a student.

2. Create a login template to check whether the user is a valid user

3. Repeat the above cycle III & IV with MongoDB

Semester	MCS 207: WEB TECHNOLOGIES LAB	L	T	P	C
II		0	0	6	3

1. Develop and demonstrate a HTML document that illustrates the use external style sheet, ordered list, table, borders, padding, color, and the <span> tag.

2. Write HTML code to provide intra document linking.

3. 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.

4. to create a webpage with the following using html

   a. to embed an image in web page

   b. to fix the hot spots

   c. show all the related information when a hot spot is clicked in the map

5. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and Displays the result.

6. Create a HTML form that has number of Textboxes. When the form runs in the Browser fill the textboxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textboxes has been left empty, popup an alert indicating which textbox has been left empty.

7. Write a JavaScript code to find the sum of N natural Numbers. (Use user-defined function)

8. Write a JavaScript code to find factorial of N. (Use recursive function)

9. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.

10. 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.

11. 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.

12. 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

13. write a program for implementing student information using XML

14. write a java program to illustrate java to database connectivity using JDBC

15. Write a program to print the Fibonacci numbers using RMI.

16. Write a program using RMI to access the database using the primary key value and return the data to the client.

17. Write a html program for invoking servlet from applet

18. write a java servlet program to conduct online examination and to display student mark list available in a database

19. 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.

20. Write a JSP program to calculate income tax, login and data capture.

Semester	MCS 207: WEB SERVICES LAB	L	T	P	C
II		0	0	6	3

1. Write a program to implement WSDL Service (HelloService.WSDL File)

2. Write a program the service provider can be implement a single get price (), static bind () and get product operation.

3. Write a program to implement the operation can receive request and will return a response in two ways.
      a) One-Way operation   b) Request - Response

4. Write a program to implement to create a simple web service that converts the temperature from Fahrenheit to Celsius (using HTTP Post Protocol)

5. Write a program to create a simple XML document with attributes

6. Write a program to illustrate XMLSchema

7. Write a program to To create a simple XSLT transformation from XSL to XML

8. Write a asp.net program for web service.

9. Write a program to implement business UDDI Registry entry

10. Write a program to implement
      a) Web based service consumer   b) Windows application based web service consumer

Semester		L	T	P	C
II	**MCS 208: COMMUNICATION SKILLS**	**2**	**0**	**2**	**1**

Prescribed Books

1. Raymond Murphy, "Essential English Grammar", Second Edition, Cambridge University Press (2008)

2. Leena Sen, "Communication Skills", Second Edition, PHI (2008)

Reference Books

1. Aysha Viswamohan, "English for Technical Communication", TMH (2008)

2. P. Kiranmai Dutt, Geetha Rajeevan, "Basic Communication Skills", Foundation Books (2007)

3. T.M. Farhathullah, "Communication Skills for Technical Students", Orient Longman (2002)

4. E.Suresh Kumar, P. Sreehari, "Communicative English", Orient Longman (2007)

MOOCs
Credits: 4

Semester	MCS 301: OBJECT ORIENTED MODELLING AND DESIGN USING UML	L	T	P	C
III		3	1	0	5

Learning Objective (LO):

LO1	To understand the object oriented concepts for designing object oriented models.
LO2	To understand the use of UML (Unified Modeling Language) for object oriented analysis and design.
LO3	To describe the step by step object oriented methodology of software development from problem statement through analysis, system design, and class design.
LO4	To understand the concept of different patterns for constructing software architectures through object oriented models.
LO5	To understand the problems, communicating with application experts, modeling enterprises, preparing documentation, and designing programs by using object oriented models.

Course Outcomes (CO):

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

CO1	Demonstrate the ability to apply the knowledge of object oriented concepts for solving system modeling and design problems.	K2
CO2	Design and implement object oriented models using UML appropriate notations.	K5
CO3	How to apply the concepts of object oriented methodologies to design cleaner software from the problem statement.	K1
CO4	Apply the concept of domain and application analysis for designing UML Diagrams.	K3
CO5	Illustrate the concept of patterns for constructing software architecture	K2

<center>**SYLLABUS**</center>

UNIT-I

Introduction: what is Object Orientation, What is OO Development, OO Themes, Evidence for Usefulness of OO Development.

Modeling as Design Technique: Modeling, Abstraction, Three Models

Class Modeling: Object and Class Concepts, Link and Association concepts, Generalization and Inheritance, A Sample Class Model.
Advanced Class Modeling: Advanced Object and Class Concepts, Association Ends, N-Ary Association, Aggregation, abstract Classes, Multiple Inheritance, Metadata, Reification, Constraints, Derived data, Packages.

Learning Outcomes
Students upon completion of this unit will be able to
- Analyze, design, document the requirements through use case driven approach
- Understand object oriented modeling
- Demonstrate the ability to apply the knowledge of object oriented concepts for solving system modeling and design problems.

UNIT-II
State Modeling: Events, States, Transitions and Conditions, state diagrams, state diagram behavior.
Advanced State Modeling: Nested State Diagrams, Nested states, signal generalization, concurrency, A Sample State Model.
Interaction Modeling: Use Case Models, Sequence Models, Activity Models.
Advanced Interaction Modeling: Use Case Relationships, Procedural Sequence Models, Special Constructs for Activity Models.

Learning Outcomes
Students upon completion of this unit will be able to
- Comprehend the concept of state modeling approaches for system design and implementation issues for various interaction models
- Develop, explore the state and interaction modeling on various scenarios and applications

UNIT-III
Process Overview: Development Stages, Development Life Cycle.

System Conception: Devising a system Concept, Elaborating a Concept, Preparing a Problem Statement.

Domain Analysis: Overview of analysis, Domain Class Model, Domain State model, Domain Interaction Model, Iterating the Analysis.

Application Analysis: Application Interaction Model, Application Class Model, Application State Model, Adding Operations.

Learning Outcomes

Students upon completion of this unit will be able to
- Create interaction diagrams that model the dynamic aspects of a software system.
- Explain the facets of the Domain and Application analysis

UNIT-IV

System Design: Overview of system Design, Estimating Performance, Making a Reuse Plan, Breaking a System into Subsystem, Identifying Concurrency, Allocation of Subsystems, Management of data storage, Handling Global Resources, Choosing a Software Control Strategy, Handling Boundary Conditions, Setting Trade-off priorities, Common Architecture of ATM System.

Class Design: Overview of Class Design, Bridging the Gap, Realizing Use Cases, Designing Algorithms, Recursing Downward, Refactoring, Design Optimization, Reification of Behavior, Adjustment of Inheritance, Organizing a class design.

Learning Outcomes

Students upon completion of this unit will be able to
- Understand various concepts of System design, class design

UNIT-V

Implementation Modeling: Overview of Implementation, Fine Tuning classes, fine tuning Generalization, Realizing Associations, Testing.

Programming Style: Object-Oriented Style, Reusability, Extensibility, Robustness, Programming-in the Large.

Learning Outcomes

Students upon completion of this unit will be able to
- Knowledge on various programming styles.

Prescribed Book

Michael R Blaha, James R Rumbaugh, "Object-Oriented Modeling and Design with UML", Second Edition, PHI.

Chapters   1.1 to 1.4, 2, 3.1 to 3.4,4, 5, 6.1 to 6.5, 7, 8, 10, 11, 12, 13, 14, 15, 17, 20

Reference Books

1. Meilir Page-Jones, "Fundamentals of Object Oriented Design in UML", Pearson Education (2008).
2. Hans-Erik Eriksson, "UMLZ Took Kit", Wiley (2008).
3. Pascal Roques, "Modeling Software Systems Using UML2",   Wiley (2008).
4. Simon Benett, Steve Mc Robb, "Object Oriented Systems Analysis and Design using UML", Second Edition, TMH (2007).
5. Mark Priestley, "Practical Object Oriented Design with UML", Second Edition, TMH (2008).
6. Grady Booch, James Rumbaugh "The Unified Modeling Language User Guide", Pearson (2008).

MODEL PAPER
MCS 303: <u>OBJECT-ORIENTED MODELING AND DESIGN USING UML</u>

Time 3 Hrs   **Max. Marks 70**

Answer ONE Question from each unit   **5 x 14 = 70 M**

UNIT-I

1. a) What is Modeling? What are different Object Modeling Techniques?

   b) Discuss how was object oriented development methodology is Different from Traditional approach.

(OR)

2. Explain the following terms
- i.   Association.
- ii.   Aggregation.
- iii.   Generalization.
- iv.   Composition.

UNIT-II

3. a) What is State modeling? How does dynamic behavior of a system represented ?

   b) What is an Event? Discuss about types of Events with example.

(OR)

4. a) What is Use Case? How was Use Case diagrams were helpful in Analysis of a System.

   b) What is Concurrency? Discuss the concurrency with the help of an example.

UNIT-III

5. a) Discuss about Domain Class Model.

   b) Discuss about Application Class Model.

(OR)

6. a) Explain about Domain State Model.

   b) Explain about Application State Model.

UNIT-IV

7. a) What is the task of a design? How would you differentiate a good design from bad design?

   b) Write about Breaking a System into Subsystems.

(OR)

8. a) Explain about Designing Algorithms.

   b) Explain about Design Optimization.

UNIT-V

9. a) Explain about Fine-tuning Classes.

b) Discuss about System Testing.

(OR)

10.a) Discuss about the Reusability.

b) Discuss about good programming style.

Semester		L	T	P	C
III	**MCS 302: CLOUD COMPUTING**	**3**	**1**	**0**	**5**

Learning Objective (LO):

LO1	The student will learn about the cloud environment, building software systems and components that scale to millions of users in modern internet
LO2	Cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas
LO3	Developing cloud based software applications on top of cloud platforms.
LO4	To provide students a sound foundation of the Cloud Application Architecture
LO5	To gain knowledge on various security issues in cloud architecture.

Course Outcomes (CO):

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

CO1	Understanding the key dimensions of the challenge of Cloud Computing	K2
CO2	Assessment of the economics, financial, and technological implications for selecting cloud computing for own organization	K5
CO3	Obtain knowledge on cloud components, infrastructure and services	K3
CO4	Analyze various cloud application architectures.	K3
CO5	Apply various security measures on cloud architecture in solving real time security issues	K3

SYLLABUS

UNIT-I

Introduction Cloud computing at a glance, Historical Developments, Building Cloud Computing Environments, Computing Platforms and Technologies.

Principles of Parallel and Distributed Computing Eras of Computing, Parallel Vs Distributed computing, Elements of Parallel Computing, Elements of Distributed Computing, Technologies for Distributed Computing.

Learning Outcomes
Students upon completion of this unit will be able to
- Understand historical developments of Cloud Environments
- Understand the concepts of Parallel and Distributed Computing.

UNIT-II

Virtualization Introduction, Characteristics of Virtualized Environments, Taxonomy of Virtualization Techniques, Virtualization and Cloud Computing, Pros and Cons of Virtualization, Technology Examples.

Cloud Computing Architecture Introduction, Cloud reference model, Types of clouds, Economics of the cloud, open challenges.

Learning Outcomes
Students upon completion of this unit will be able to
- identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.
- Describe importance of virtualization along with their technologies

UNIT-III

Aneka Cloud Application Platform Framework Overview, Anatomy of the Aneka Container, Building Aneka Clouds, Cloud programming and Management.

Concurrent Computing Thread Programming Introducing Parallelism for Single machine Computation, Programming Application with Threads, Multithreading with Aneka, Programming Applications with Aneka Threads.

Learning Outcomes
Students upon completion of this unit will be able to
- Understand the Aneka Cloud Application Platform
- Understand concurrent programming in cloud computing.

UNIT-IV

High- Throughput Computing Task Programming Task Computing, Task-based Application Models, Aneka Task-Based Programming.

Data Intensive Computing Map-Reduce Programming What is Data-Intensive Computing, Technologies for Data-Intensive Computing, Aneka MapReduce Programming.

Learning Outcomes
Students upon completion of this unit will be able to
- Understanding the high throughput Computing
- Understanding data intensive computing

UNIT-V

Cloud Platforms in Industry Amazon Web Services, Google AppEngine, Microsoft Azure, Observations.

Cloud Applications Scientific Applications, Business and Consumer Applications.

Advanced Topics in Cloud Computing Energy Efficiency in Clouds, Market Based Management of Clouds , Federated Clouds/ InterCloud, Third Party Cloud Services.

Learning Outcomes
Students upon completion of this unit will be able to
- Understand different Cloud Applications
- Understanding the key dimensions of the challenge of Cloud Computing

Prescribed Book
Rajkumar Buyya, Christian Vecchiola, S.Thamarai Selvi, "Mastering Cloud Computing", Mc Graw Hill Education.

REFERENCES

1. Michael Miller, "Cloud Computing", Pearson Education, New
2. Haley Beard, Cloud Computing Best Practices for Managing and MeasuringProcesses for On-demand Computing, Applications and Data Centers in theCloud with SLAs, Emereo Pty Limited, July 2008.
3. Cloud Application Architectures, George Reese, ISBN 8184047142,Shroff/O' Reilly, 2009.

MODEL PAPER

MCS 302 Cloud Computing

Time 3 Hrs   Max. Marks 70

Answer ONE Question from each unit   **5x 14 = 70 M**

UNIT – I

1. Discuss about the historic developments from early computing to the contemporary cloud computing.

OR

2. Discuss in detail about Parallel Vs Distributed computing and Elements of Parallel Computing

UNIT – II

3. a) What are characteristics of Virtualization?
   b) Explain Pros and Cons of Virtualization?

OR

4. c) Discuss about Machine Reference Model.
   d) What are different types of clouds? Explain.

UNIT – III

5. a)Discuss about the cloud architecture.
   b) What is Concurrent computing and Programming Application with Threads?

OR

6. a) Explain about Aneka Framework overview.
   b) Discuss about Aneka SDK.

UNIT - IV

7. a)What is Task computing and what are its frame works?
   b)Discuss about Task based application models.

OR

8. a) What is Data Intensive Computing? Explain about its characteristics.
   b) What are the technologies required for Data Intensive computing? Explain about them.

UNIT – V

9. Discuss about Amazon Web Services.

OR

10.Give a reference model for MOCC. What are the technologies for MOCC?

Semester	MCS 303: ARTIFICIAL INTELLIGENCE	L	T	P	C
III					

Learning Objective (LO):

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

Course Outcomes (CO):

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

CO1	Understand the history, development and various applications of artificial intelligence	K2
CO2	Illustrate knowledge base system	K2
CO3	Solve different problems using AI algorithm	K3
CO4	Analyze how uncertainty is being tackled in the knowledge representation and reasoning process	K4
CO5	Classify the expert systems	K2

SYLLABUS

UNIT   **I**

What   is   Artificial   Intelligence, Technique,Defining problem as a state space search, production systems, problem characterstics, production system characterstics.

Heuristic search techniques Generation and test - Hill climbing - Best-first search - problem reduction – constraint satisfaction - means–ends analysis.

Learning Outcomes
Student will get a basic understanding about

1. Importance of Artificial Intelligence
2. Different search algorithms and their significance
3. Need of a Heuristic Algorithm

UNIT   **II**

Knowledge Representation

Issues ,using predicate logic, resoulution,forward versus backward reasoning, matching, control knowledge.

Symbolic reasoning under uncertainty

Learning Outcomes
Students acquire knowledge of

1. Programming of Artificial Intelligence
2. Different ways of representing knowledge using rules

UNIT III

Introduction to nonmonotonic reasoning, augmenting a problem solver, implementation of depth first search and breadth first search. Weak slot-and-filler structures,semantic nets, frames.

Learning Outcomes
Student acquire deep knowledge about

1. Tackling the facts that are uncertain
2. Representation of varying knowledge
3. Different nets used to represent the knowledge

UNIT IV

strong slot-and-filler structures
conceptual dependency, scripts.

Natural Language Processing
syntatic processing,augmented transition networks,semantic analysis, case grammars.

Learning Outcomes
1. Primivitives used to represent knowledge
2.How to process the data in NLP using Grammers

UNIT V

Common sense Qualitative physics, commonsense ontologies, memory organization, case based reasoning.
Expert systems - representing using domain knowledge-expert system shell.

Learning Outcomes
Student will be able to acquire deep sense of understanding about
1. The methods that are used to make machines develop commonsense reasoning

2. Importance of developing an expert system and their applications

Prescribed Book
Rich E & Knight k   Artificial Intelligence TMH(1991)

Reference Book
Winston P.H   Artificial Intelligence, Addison Wesley (1993)
Russell & Norvig   Artificial Intelligence A Modern approach, Pearson education Asia
Donald A. Waterman A guide to expert systems, Pearson Education India.

Time 3 Hrs   Max Marks 70

Answer ONE Question from each unit   **5 x 14 = 70M**

UNIT-I

1. a) Explain the concept of problem reduction with an example?

   b) Trace the constraint satisfaction procedure solving the

   following crypt arithmetic problem

                         BEST   MADE   MASTER

           (OR)

2. a.Write about AO* algorithm

   b. Explain Means Ends Analysis

UNIT-II

3. Trace the operation of unification algorithm on each of the following pairs of literals
            i)   f(Marcus) and (Caesar)   ii) f(x) and f(g(y))
            ii)   f(Marcus, g(x,y)) & f(x,g(carsar,Marcus))
                    (OR)

4. a) Represent the following sentences using semantic nets

   "All students answered all questions in all possible ways"

   b) Explain Forward Vs Backward Reasoning

UNIT-III

5. a. Explain Non monotonic Reasoning in detail.

   b. Explain a Justification Based Truth Maintenance System(JTMS)

(OR)

6.   a. Discuss Semantic Nets with detailed structures

   b. Discus briefly about frames

UNIT-IV

7. a) Explain Conceptual Dependency using primitivites. Give Examples

   b) Write a script to visit to a restaurant

(OR)

8. a). Discuss the steps in NLP

   b) Explain in detail about Syntactic Processing

UNIT-V

9. a) Explain Commonsense Ontologies.

   b) Write about Case Based Reasoning

(OR)

10. a) Give the architecture of an expert system?

   b) What are expert system shells

Semester	MCS 304: CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
III		2	1	1	4

Learning Objective (LO):

LO1	To provide introduction to the concept of Network Security Model and Cryptography systems.
LO2	To give the knowledge of Digital Signature and other Security Measures available.
LO3	To familiarize with the various techniques like PGP and S/MIME.
LO4	To showcase IP Security Architecture & Transport Layer Security to identify the vulnerability of the Internet systems and recognize the mechanisms of the attacks
LO5	To explain the firewall design principles and various intrusion detection system.

Course Outcomes (CO):

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

CO1	Identify and classify particular examples of attacks,	
CO2	Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack, and explain the characteristics of hybrid systems,	
CO3	Describe the use of hash functions and explain the characteristics of one-way and collision-free functions,	
CO4	Describe and distinguish between different mechanisms to assure the freshness of a message,	
CO5	Explain the role of third-party agents in the provision of authentication services,	

SYLLABUS

UNIT I

Introduction - securityTrends,OSI security Architecture ,security attacks,security services, security mechanisms,A model for network security

Conventional Encryption   Classical Techniques - Symmetric cipher model ,substitution techniques ,transposition techniques,rotor machines ,steganography

Conventional Encryption Modern Techniques -Block cipher principles,DES,strength of DES,Differential and linear cryptanalysis ,Block cipher design principles

Learning Outcomes
Students will get knowledge about
1. Different types of attacks
2. Symmetric encryption mechanisms
3. Important Symmetric algorithms

UNIT II

Confidentiality using Symmetric encryption - Placement of encryption function,traffic confidentiality,key distribution,random number generation

Public - key cryptography & RSA -   Principles of Public key crypto systems ,RSA algorithm ,Key management ,Diffie Hellman key exchange ,elliptic curve cryptography

Learning Outcomes

Students will develop understanding regarding
1. Asymmetric cryptosystem
2. Encryption using private

UNIT III

Message authentication and Hash functions - Authentication requirements , Authentication functions,Message Authentication codes,Hash functions,Security of MAC's and hash functions

Digital signatures and Authentication Protocols - Digital signatures , Authentication Protocols,DSS

Learning Outcomes

Students acquire knowledge about
1. Various Authentication Services
2. Importance of Message Authentication Codes and digital signatures

UNIT IV

Electronic Mail Security - PGP, S/MIME

IP Security - IP Security Overview, IP Security architecture,Authentication header,encapsulating security payload,combining security associations,key management.

Learning Outcomes

Students will develop understanding regarding
1. Mail Security
2. IP Secrutity

UNIT V

Fire Walls - Firewall design principles ,trusted systems

Learning Outcomes

Students will develop understanding regarding
      1. Design principles to develop a firewall
      2. Trusted Systems & Bastion Host

Prescribed Book

William Stallings   Cryptography & Network Security Principles and Practices 4th Edition Pearson Education

Chapters   1,2,3,7,8,9,10,11,13,15,16,20

Reference Books

Bruce Schneier - Applied Cryptography - Wiley - second edition

Davies & Price   Security for computer Networks, Wilsey (1984)

Model Paper
MCS 304 CRYPTOGRAPHY AND NETWORKING SECURITY
Time 3 Hours   Max. Marks 70

Answer ONE Question from each unit   **5 x 14 = 70 M**

UNIT – I

1.   (a) Discuss about playfair and hill cipher techniques.
        (b) Briefly explain about DES encryption algorithm.
                                        (OR)
2.   (a) Define OSI security Architecture
         (b) Discuss about random number generation techniques in cryptography.

UNIT – II

3.   (a) Explain RSA algorithm
        (b) Perform encryption and decryption using RSA algorithm for the following p=3, q=11, d=7, M=5
                                        (OR)
4.   (a) Discuss Diffie hellman key exchange algorithm
        (b) Differentiate between Link level and End to end encryption

UNIT – III

5.   (a) Explain in detail about authentication requirements.
        (b)Define Message authentication codes and its requirements
                                        (OR)
6.   (a) Explain about Digital signature standard (DSS).
         (b) List out the uses of hash functions.

UNIT – IV

7.   (a) Write short notes on PGP Operation
        (b) Explain the usage of S/MIME headers & types.
                                        (OR)
 8.   a) Explain IP Security architecture with a neat diagram.
        b) Write in brief notes on Encapsulating Security Payload

UNIT - V

9.   a) Explain in brief on Firewall configurations.
        b) Explain firewall types.
                                        (OR)
10**.**   Explain about Trusted Systems.

Semester	MCS 305.1: PROGRAMMING AND PROBLEM SOLVING USNG PYTHON	L	T	P	C
III		**3**	**1**	**0**	**5**

Learning Objective (LO):

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

Course Outcomes (CO):

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

CO1	Demonstrate understanding of modern version control tools.	K2
CO2	Exhibit facility with a Linux command line environment.	K1
CO3	Demonstrate understanding of the role of testing in scientific computing, and write unit tests in Python.	K2
CO4	Use command line tools to write and edit code.	K3
CO5	Develop publication-ready graphics from a dataset.	K3

SYLLABUS

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. –

Learning Outcomes
Students upon completion of this unit will be able to
- Basics of python language

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.

Learning Outcomes
Students upon completion of this unit will be able to
- Control structures
- Dictionaries
- Encoding and decoding

UNIT III

Namespaces Encapsulation in Functions, Global versus Local Namespaces, Exception Control Flow, Modules and Namespaces. Object Oriented Programming Fundamental Concepts, Defining a New Python Class, User-Defined Classes, Designing New Container Classes, Overloaded Operators, Inheritance, User-Defined Exceptions.

Learning Outcomes
Students upon completion of this unit will be able to
- Understanding objects
- Design of modules
- recursions

UNIT IV
Graphical User Interfaces Basics of tkinter GUI development, event-based tkinter widgets, designing GUIs, OOP for GUIs, Recursion Introduction to Recursion, Examples of Recursion, Run Time Analysis, Searching, Iteration Vs Recursion, Recursive Problem Solving, Functional Language Approach.

Learning Outcomes
Students upon completion of this unit will be able to
- GUI using tkinter
- Recursions

UNIT V

Numerical Computing in Python NumPy, Basics of turtle graphics, The Web and Search The World Wide Web, Python WWW API, String Pattern Matching, Database Programming in Python

Learning Outcomes
Students upon completion of this unit will be able to
- NUMPY
- WWW

TEXT BOOK

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

REFERENCES

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

MODEL PAPER

MCS 305.1 PYTHON PROGRAMMING

Time 3Hrs   **Max. Marks 70**

Answer ONE Question from each unit   **5 x 14 = 70 M**

UNIT I

1 (a) Write about Computer Systems
  (b) Write a python program to implement string reverse function
                                     (OR)

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

UNIT- II

3. (a) Explain built in Exception in python with examples
     (b) Write short notes on Dictionaries
                                     (OR)
4.   Explain String functions

UNIT- III

5. (a) differentiate Global and local namespaces
     (b) explain Multiple exception handlers
                                     (OR)
6.   Explain class, object and instance variables.

UNIT- IV

7. Explain GUI widgets and event-based widgets in tkinter
                                     (OR)
8.   Explain recursion using case studies.

UNIT- V

9.   Explain the string pattern matching
                                     (OR)
10. .Explain Python WWW API

Semester	MCS 305.2: INTRODUCTION TO R PROGRAMMING	L	T	P	C
III		3	1	0	5

Learning Objective (LO):

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

Course Outcomes (CO):

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

CO1	Explain critical R programming concepts	K2
CO2	Demonstrate how to install and configure RStudio	K2
CO3	Apply OOP concepts in R programming	K3
CO4	Explain the use of data structure and loop functions	K2
CO5	Apply various concepts to write programs in R	K3

UNIT I

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

UNIT II

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

UNIT III

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

UNIT IV

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

UNIT V

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

Prescribed Text Books:

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

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

Reference TextBooks:

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

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

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

MODEL PAPER

MCS 305.2   INTRODUCTION TO R PROGRAMMING

Time 3Hrs   **Max. Marks 70**

Answer ONE Question from each unit   **5 x 14 = 70 M**

UNIT I

1. Explain different types of operators in R

OR

2. Explain various packages in R and how to install them.

UNIT II

3. Write a program to find prime numbers from n natural numbers.

OR

4. Write about control statements in R

UNIT III

5. Explain in detail about vectors in R

OR

6.   Explain the working of logical subscripts.

UNIT IV

7. Explain in detail List indexing and how to add and delete elements from a list.

OR

8. Discuss about Data Frames in R

UNIT V

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

OR

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

Semester	MCS 306: CRYPTOGRAPHY AND NETWORK SECURITY LAB	L	T	P	C
III		0	0	6	3

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

   a) Ceaser Cipher

   b) Substitution Cipher

   c) Hill Cipher

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

3. Write a Java program to implement RSA Algorithm.

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

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

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

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

8. Write a program to implement digital signature.

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

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

Semester		L	T	P	C
III	**MCS 307: PYTHON PROGRAMMING LAB**	**0**	**0**	**6**	**3**

Lab Cycle

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

Functions
1. Write a recursive Python function that has a parameter representing a list of integers and returns the maximum stored in the list.
2. Write a recursive Python function to that generates the top 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

```
Choice
        Intege
   r
   Arithmetic

        Real
```

```
Operations

        ddition

        ubtractio
```

Semester		L	T	P	C
III	**MCS 308: SEMINAR**	**2**	**0**	**2**	**1**

MOOCs
Credits: 4

Semester	MCS 401 : Data Mining and Big Data	L	T	P	C
IV		4	0	0	5

Learning Objective (LO):

LO1	understand classical models and algorithms in data warehousing and data mining,
LO2	Enable students to analyse the data, identify the problems, and choose the relevant models and algorithms to apply
LO3	Assess the strengths and weaknesses of various methods and algorithms and to analyse their behavior.
LO4	Conceptualization and summarization of big data, big data computing technologies.
LO5	Demonstrate various challenges in processing Big Data.

Course Outcomes (CO):

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

CO 1	Learn implementation of classical algorithms in data mining and data warehousing	K1
CO 2	Learn to identify the application area of algorithms, and apply them	K1
CO 3	Learn clustering application and resent works in data mining	K1
CO 4	Understand the concepts of map and reduce and functional programming	K2
CO 5	Interpret the characteristics of datasets and compare the trivial data and big data for various applications.	K1

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SYLLABUS

UNIT – I

Data Warehouse: An Overview **,** What is Data Warehouse? Data warehouse Architecture - From Data Warehousing to Data Mining

OLAP Technology: A Multidimensional Data Model-Online Analytical Processing, OLAP Operations, ROLAP, HOLAP, MOLAP.

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

- Ability to identify the characteristics of datasets and compare the trivial data and big data for various applications.

UNIT – II

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

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.

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

- Understand the key issues in data management and its associated applications in intelligent business and scientific computing.
- Mining Association rules in Different types of Databases.

UNIT – III

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

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

- Decision trees
- Back propagation methods

UNIT – IV

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   STRING , Model based clustering method Statistical Approach, outlier analysis.

Learning Outcomes
Students upon completion of this unit will be able to
- Different Clustering Methods.
- Outlier Analysis.

UNIT – V

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

Learning Outcomes
Students upon completion of this unit will be able to
- understanding big data latest technology foundations.
- Acquire fundamental enabling techniques and scalable algorithms Hadoop, Map Reduce, HDFC architecture, HBase architecture in big data analytics.
- Interpret business models and scientific computing paradigms, and apply software tools for big data analytics

Prescribed TextBooks

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

MCS 401 Data Mining and Big Data

Time 3 Hrs   Max. Marks 70

Answer ONE Question from each unit   **4 x 14 = 56 M**

UNIT – I

1.   What is Data Ware House? Explain Data Ware House Architecture.

OR

2.   What is OLAP, Explain Data Cube Operations.

UNIT – II

3.   a) Explain the major issues in data mining

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

OR

4. Explain Apriori algorithm with example and how the efficiency of Apriori algorithm can be

   Improved.

UNIT – III

5. Write about Bayesian Classification and Back Propagation.

OR

6. a) What is Classification, Write a brief on Decision Tree Induction.

UNIT – IV

7. a) Explain different grid-based clustering methods

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

OR

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

UNIT – V

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

OR

10. Discuss the design of HDFS(Hadoop Distributed File System) in detail

SEMESTER	MCS 402 MACHINE LEARNING	L	T	P	C
IV		4	0	0	5

Learning Objectives (LO):
The course is designed to meet the objectives of:

LO1	To introduce to the students the basic concepts and fundamentals of machine learning
LO2	To develop skills of implementing machine learning techniques
LO3	To familiarize the students with latest technologies
LO4	To implement machine learning solutions to classification, regression
LO5	To implement machine learning algorithms for clustering

Course Outcomes (CO):
Students successfully completing this module will be able to:

CO1	How to make a computer program learn from experience	K1
CO2	Illustrate the significance of concept learning	K2
CO3	Representation of decisions and decision making explicitly	K5
CO4	Construct finite and infinite Hypothesis spaces for computational learning	K3
CO5	Apply Inductive and Analytical learning in developing learning tasks	K3

SYLLABUS

UNIT - I

Introduction - Well-posed learning problems, Designing a learning system, Perspectives and issuesin 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

Learning Outcomes

Students acquire knowledge about

1. How to make a computer program to learn from experience
2. Importance of concept learning

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

Students acquire knowledge about

1. Representation of decisions and decision making explicitly
2. To come to a conclusion from the observations about an item
3. Prediction of probabilities

UNIT-III

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

Students acquire knowledge about

4. To know Bayes Therom
5. To classify the data using different algorithms

UNIT-IV

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 Neighbour Learning, Locally Weighted Regression, Radial Basis Functions, Case-Based Reasoning, Remarks on Lazy and Eager Learning

Students develop in-depth understanding of

1. Different learning theories
2. The methods to categorize and organize information

Unit- V

Genetic Algorithms – Motivation, Genetic Algorithms, An illustrative Example, Hypothesis SpaceSearch, 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

Learning Outcomes

Students acquire knowledge about

1. Generation of solutions to optimization and search problems
2. Different kinds of learning techniques
3. Describing the set of learning problems

TEXT BOOKS
Machine Learning – Tom M. Mitchell, - MGH

REFERENCE BOOKS
Introduction to Machine Learning,- Ethem Alpaydin, - PHI
Machine Learning An Algorithmic Perspective, Stephen Marsland, Taylor & Francis

MODEL PAPER

MCS 402 MACHINE LEARNING

Time 3 Hrs   Max. Marks 70

Answer ONE Question from each unit   5 x 14 = 70 M

UNIT-I

1 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
2 a. List and explain the steps to design a learning systems in detail.
   b. Illustrate the candidate elimination algorithm with suitable example.

UNIT-II

3 a. Describe the Inductive Bias in decision tree learning.
   b. Write about handling training examples with missing attribute values.
                                              OR
4 a . Explain with an example about the Decision Tree Learning algorithm
   b. Explain about estimating hypothesis accuracy.

UNIT - III

5 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
6 a. Explain Naïve Bayes Classifier with an Example.
   b. Explain the EM Algorithm in detail.

UNIT-IV
7 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
8. Explain the K – nearest neighbour algorithm for approximating a discrete – valued function
       with pseudo code

UNIT-V
9 a. Explain Genetic Algorithms in detail
   b. Explain Using Prior Knowledge to Initialize the Hypothesis
                                              OR
10 .a. Discuss about Inductive-Analytical Approaches to Learning
    b. Write about Q-Learning in detail.

Semester	MCS 403.1 : Mobile Computing with Android	L	T	P	C
IV		**4**	**0**	**0**	**4**

Learning Objective (LO):

LO1	To introduce the concept of mobile android
LO2	To introduce the concept of different views of android.
LO3	To understand the designing aspects of android mobiles
LO4	To make them familiar with SMS, email, service.
LO5	To make them familiar with binding and deploying APKs.

Course Outcomes (CO):

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

CO 1	Familiarized with mobile android Terminology.	K3
CO 2	Understand and building interfaces	K2
CO 3	Understand and creating menus	K2
CO 4	Familiarized with SMS, Email and web services.	K3
CO 5	Gain knowledge about the publishing, deploying APK files and Eclipse.	K1

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SYLLABUS

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.

Learning Outcomes
Students upon completion of this unit will be able to
- Understand the fundamentals of Android operating systems

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.

Learning Outcomes
Students upon completion of this unit will be able to
- Describe the components and structure of a mobile development framework
- Apply mobile application models/architectures and patterns to the development of a mobile software application

UNIT – III

Using images views to display pictures, using menus with views and some additional views. Saving and loading User preferences, persisting data to files, creating and using databases,

Learning Outcomes
Students upon completion of this unit will be able to
- develop software with reasonable complexity on mobile platform

UNIT – IV

Sharing data in android, using a content provider, creating your own content provider, SMS messaging, e-mails and networking. Displaying Maps

Learning Outcomes
Students upon completion of this unit will be able to
- develop software with reasonable complexity on mobile platform

UNIT – V

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

Learning Outcomes
Students upon completion of this unit will be able to
- deploy software to mobile devices
- debug programs running on mobile devices

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 403.1 <u>Mobile Computing with Android</u>

Time   3 Hrs   **Max. Marks 70**

Answer ONE Question from each unit   **5 x 14 = 70 M**

<u>UNIT – I</u>

1.   a. Explain features of android?
        b. What are the tools for android application development? Explain them.
                                            (OR)
2.   a. What are the languages used to develop android applications?
        b. Discuss about passing data to an activity.

<u>UNIT –II</u>

3.   a. Describe linear, table and frame layouts.
        b. Explain different orientations?
                                            (OR)
4.   Explain the working of radio button and checkbox?

<u>UNIT – III</u>

5.   Explain image and menus with views?
                                            (OR)
6.   Create a DBA helper class. Explain it with an example.

<u>UNIT –IV</u>
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.

                                            (OR)
8.   Explain how to send SMS and get feedback.

<u>UNIT –V</u>

9.   Explain how to create a service in the background?
                                            (OR)
10.   a. Write about the feature of eclipse.
        b. How to publish an android application.

Semester		L	T	P	C
IV	**MCS 403.2 : Block Chain Technology**	**4**	**0**	**0**	**4**

Learning Objective (LO):

LO1	To introduce the concept of Blockchain
LO2	To overcome the problems of centralization
LO3	To introduce the concept of Bitcoin
LO4	To make them familiar with Bitcoin network, payments, clients and APIs.
LO5	To make them familiar with payments with Bitcoin network

Course Outcomes (CO):

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

CO 1	Know the basics of Blockchain Terminology.	
CO 2	Understand the concept of Blockchain, Bitcoin	
CO 3	Understand de-centralization	
CO 4	Gain knowledge about the domain of blockchain in real time.	
CO 5	How to do payments with Bitcoin network.	

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SYLLABUS

UNIT – I

Blockchain , the growth of blockchain technology, distributed systems, the history of blockchain and Bitcoin, types of blockchain

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

UNIT –II

Decentralization , methods of decentralization , routes of decentralization, blockchain and full ecosystem decentralization, smart contracts, Decentralized organizations and platforms for decentralization.

Learning Outcomes
- Analyze the incentive structure in a blockchain based system and critically assess its functions, benefits and vulnerabilities;

UNIT – III

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 – IV

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 – V

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

Top of Form

Bottom of Form

Top of Form

Bottom of Form

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

Model Question Paper

MCS 403.2   Blockchain Technology

Time 3Hrs   Max.Marks 70

Answer Question No.1 Compulsory
Answer ONE Question from each unit   5 x 14 = 70M

UNIT-I

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

(OR)

2.   a. Explain Distributed Systems
        b. Explain block chain technology in detail

UNIT-II

1.   a. Explain methods of decentralization.
        b. Explain routes of decentralization

(OR)

4.   a. Explain smart contracts in detail

        b. Discuss Decentralized organizations and platforms for decentralization.

UNIT-III

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

(OR)

6.   a.How asymmetric cryptography is used in blockchain?
        b. Explain the terms   public key and private key.

UNIT-IV

7.   a. Explain various interactive picture construction techniques.
        b. Describe Bitcoin. Explain how Bitcoin works?

(OR)

8.   a. Explain the limitation of blockchain?

UNIT-V

9.   How to pay with Bitcoin and Bitcoin cash?

(OR)

10.   a.Describe wallets.   b. Describe Bitcoin mining.

Semester	MCS 403.3 : Microsoft Dynamics	L	T	P	C
IV		**4**	**0**	**0**	**4**

Learning Objective (LO):

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

Course Outcomes (CO):

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

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

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UNIT 1

Prerequisites

a) Install VS Code - https://code.visualstudio.com/download

b) Install Docker Engine - https://docs.docker.com/engine/install/

c) Install Al Visx file

I. Go to visual Studio code and then market place

II. Search AL and install the AL Language vsix file

d) Install BcContianerHelper -

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

#GetStartedHelper

e) Install Bc Container using BCContianerhelper -

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

#GetStartedRun

UNIT II

Business Central – Basic Functional Knowledge

a) Getting Started - https://learn.microsoft.com/en-us/training/paths/get-started-dynamics-365-business-central/

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

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

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

UNIT III

Business Central – AL Development

a) Getting Started - https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/devenv-get-started

b) Creating a Sample Project - https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/devenv-extension-example

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

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

d) Business Objects

I. Tables - https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/devenv-tables-overview

II. Pages - https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/devenv-pages-overview

III. Events - https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/devenv-events-in-al

IV. Reports - https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/devenv-reports

UNIT IV
Business Central – AL Programming - 1

a) Overview - https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/devenv-reference-overview

b) DataTypes &Methods - https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/methods-auto/library

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

UNIT IV
Business Central – AL Programming - 2

a) Triggers - https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/triggers-auto/devenv-triggers

b) AL Methods - https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/devenv-al-methods

c) AL Simple Statements - https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/devenv-al-simple-statements

d) AL Control Statements - https://learn.microsoft.com/en-us/dynamics365/business-central/dev-itpro/developer/devenv-al-control-statements

Model Question Paper

MCS 403.3   Microsoft Dynamics

Time 3Hrs   Max.Marks 70

Answer ONE Question from each unit   5 x 14 = 70M

UNIT-I

1. Explain dynamics 365 framework

(OR)

2. Write steps to install Bc Container using BCContianer helper

UNIT-II

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

(OR)

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

UNIT-III

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

(OR)

6. Write in detail about various business objects.

UNIT-IV

7. Explain various types of AL Methods

(OR)

8 Explain in detail about AL Control statements

UNIT-V

7. Explain various types of AL simple statements

(OR)

8 Explain in detail about AL Triggers

Semester	MCS 404: SOFT SKILLS	L	T	P	C
IV		4	0	0	1

Prescribed Books

1. Wallace, Masters, "Personality Development", Cengage Learning   (2008)
2. Edgar Thorpe, Showick Thorpe, "Winning at Interviews", Second Edition, Pearson Education (2007)

Reference Books

1. Peter Urs Bender, Dr. Robert A. Tracz, "Secrets of Face to Face Communication", Macmillan (2007)
2. Deepika Nelson, "Essential Key for Corporate Threshold", BS Publications (2008)

PROJECT WORK
Credits: 10

TOTAL MARKS FOR THE MSc (CS) COURSE   **2700**

TOTAL CREDITS FOR THE MSc (CS) COURSE   **145**