

# **Annexure A**

**M.Sc Computer Science Syllabus**  
**w.e.f 2019-2020**

# **MASTER OF SCIENCE (COMPUTER SCIENCE)**

## **MSc(CS)**

### **Course Structure and Scheme of Examination**

#### **w.e.f 2019-20**

#### **Objectives**

1. To produce software professionals enriched with knowledge and skill who can be employed in IT
2. Induct knowledge needed for problem solving techniques.
3. To develop entrepreneurs who can establish small Enterprises.
4. To develop equip students with right objective, logical thinking, right moral and ethical values with a sense of social responsibility.
5. To develop students to communicate effectively.
6. To enrich students in breadth and depth of knowledge in IT field.

#### **Outcomes**

1. Ability to understand the general principles of Computer Science
2. Ability to develop own programming skills and computer applications
3. Ability to provide up to date technologies, methodologies for the advance career prospects
4. Ability to develop in professional, ethical, moral and social responsibilities
5. Ability to communicate effectively
6. Develop the Intellectual Skills for effectively problem solving
7. Ability to design, analyze, implement the candidate system

## FIRST YEAR – FIRST SEMESTER

Sub Code	Name of the Subject	No. of Credits	Int. Marks	Ext. Marks	Total Marks	Hours/Week
MCS 101	Data Structures in C	5	30	70	100	4
MCS 102	Object Oriented Programming with JAVA	4	30	70	100	4
MCS 103	Computer Organization	5	30	70	100	4
MCS 104	Discrete Mathematical Structures	4	30	70	100	4
MCS 105	Software Engineering	5	30	70	100	4
MCS 106	Data Structures Lab using C	3	30	70	100	6
MCS 107	Java Programming Lab	3	30	70	100	6
MCS 108	Seminar	1	50	--	50	3
TOTAL		30	260	490	750	35

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

### 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.

## 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.

**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

Students upon completion of this unit will be able to

1. Principles of C programming
2. Array and structures concepts
3. Stacks, Queues and Linked list

### UNIT – II

**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

- Demonstrate different traversal methods for trees.

### UNIT-III

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

## **UNIT- IV**

**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)

# Model Question Paper

## MCS-101 DATA STRUCTURES IN C

**Time: 3Hrs**

**Max.Marks: 70**

**Answer Question No.1 Compulsory**

**7 x 2 = 14 M**

**Answer ONE Question from each unit**

**x 14 = 56 M**

1.

- a) Abstract data type
- b) What is BFS?
- c) Hash function
- d) What are threaded binary trees
- e) Sparse matrix
- f) Circular Linked list
- g) Convert the following infix expressions to post-fix form.  
 $A+B*C-D/E+F*G*H$
- h) Depth first search

### **Unit -I**

- 2.
    - a) Write short notes on structures and Unions.
    - b) Write a program to insert and delete nodes form single linked list
- (OR)**
- 3.
    - a) Explain stacks with deletion and insertions algorithms
    - b) Develop an algorithm to delete an element from a Queue.

### **Unit-II**

- 4.
    - a) Explain the various representations of trees.
    - b) Explain binary search trees
- (OR)**
- 5.
    - a) Explain Threaded binary trees.
    - b) Explain the tree traversals.

### **Unit-III**

- 6.
    - a) Illustrate Heap sort through an example.
    - b) Write short notes on Insertion sort.
- (OR)**
- 7.
    - a) What is Merge sort ?
    - b) Explain static hashing.

### **Unit-IV**

- 8.
  - a) Write short notes on Representation of Graphs.
  - b) Explain Kruskals Algorithm.

**(OR)**

- 9.
  - a) Explain Breadth first search and Depth first search.
  - b) Explain all pairs shortest path.

<b>MCS 102</b>	<b>OBJECT ORIENTED PROGRAMMING WITH JAVA</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 4</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### **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.

### **Syllabus**

#### **UNIT I**

**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.



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

### **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**

**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.

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

### **Learning Outcomes**

Students upon completion of this unit will be able to

- To learn how to produce robust programs in Java using exception handling and extensive program testing.
- Learn how to implement real time applications using multithreading concept.

## **UNIT IV**

**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.

**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, Lightweight 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.
- choose an engineering approach to solving problems, starting from the acquired knowledge of programming and knowledge of operating systems

**Prescribed Text Books**

1. Java the complete reference, 7<sup>th</sup> edition, 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 ,8<sup>th</sup> 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 Question No.1 Compulsory**  
**Answer ONE Question from each unit**

**7 x 2 = 14 M**  
**4 x 14 = 56 M**

1. a) Inheritance vs polymorphism  
b) Define abstract class.  
c) Explain bytesteam  
d) explain java.io package  
e) Differences between multiple processes and multiple threads  
f) life cycle of an applet  
g) explain layout manager

#### UNIT – I

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

#### UNIT – II

4. Is there any alternative solution for Inheritance. If so explain the advantages and disadvantages of it.  
(OR)  
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) 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?

#### UNIT – IV

7. Differentiate following with suitable examples  
a) Frame, JFrame    b) Applet, JApplet    c) Menu, Jmenu  
(OR)
8. Explain the following  
a) Creating an applet    b) Passing parameters to appletsc) Adding graphics

<b>MCS 103</b>	<b>COMPUTER ORGANIZATION</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 5</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### Objectives

The course is designed to meet the objectives of

1. Helping the students to develop an understand the nature and characteristics of the organisation and design of the digital computer systems,
2. focusing on the organisation and instruction set architecture of the CPU.

## 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. **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”, 3<sup>rd</sup> 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-103 COMPUTER ORGANIZATION

**Time: 3Hrs**

**Max.Marks: 70M**

**Answer Question No.1 Compulsory**  
**Answer ONE Question from each unit**

**7 x 2 = 14 M**  
**4 x 14 = 56 M**

1.
  - a) Truth table of a full subtractor.
  - b) Multiplexer
  - c) 2's complement
  - d) Name different types of shift micro-operations.
  - e) Give an example for three address instruction.
  - f) Memory Hierarchy
  - g) Specify Hardware requirements for Division Algorithm
  - h) Handshaking

### UNIT-I

2.
    - 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)**
3.
    - 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

4.
    - a) Design a combination circuit for 4 bit Adder subtractor.
    - b) Give the block diagram of control unit of a basic computer.
- (OR)**
5.
    - a) Explain the steps performed in the 1<sup>st</sup> 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

6.
  - a) Draw and Explain the block diagram of a typical Micro program sequences for a control memory.
  - b) i) Explain any four Address modes.
  - ii) Give the difference between Hardwire control and microgram control.

**(OR)**

7. a) Explain Booth Multiplication Algorithm.  
b) i) Give the Block diagram of BCD Adder.  
ii) write about different types of Interrupts.

**UNIT-IV**

8. a) Explain DMA Data transfer.  
b) write about Virtual Memory.

**(OR)**

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

<b>MCS 104</b>	<b>DISCRETE MATHEMATICAL STRUCTURES</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 4</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### 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.

## 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 or is not valid.
- Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.

### UNIT – II

Set Theory Properties of binary Relations, Equivalence, Compatibility & Partial ordering relations, Hasse Diagram, 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

### UNIT – III

**Algebraic Structures** - Semi groups and Monoids, Groups, Homomorphism, group codes. **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 – IV**

**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 bruising 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", 5<sup>th</sup> 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 Question Paper**  
**MCS-104 DISCRETE MATHEMATICAL STRUCTURES**

**Time 3Hrs**

**Max. Marks: 70**

**Answer Question No.1 Compulsory**  
**Answer ONE Question from each unit**

**7 x 2 = 14 M**  
**4 x 14 = 56 M**

1.
  - (a). Draw Hasse diagram of set below under the partial ordering "divides"  $\{3, 9, 27, 54\}$
  - (b). Define a well formed formula? Give truth table for the following formula  $p \leftrightarrow q$
  - (c). Define Abelian group and homomorphism.
  - (d). Prove the following Boolean identity  $a \oplus (a^1 * b) = a \oplus b$
  - (e). State four color problem.
  - (f). Prove that any edge of a connected simple graph is an edge of some spanning tree of G
  - (g). Give an example of a finite semi-group that does not have identity element and has cardinality greater than 2.
  - (h). What is a chromatic number

**UNIT - I**

2. (a). Obtain the principal disjunctive normal form of  $P \rightarrow ((P \rightarrow Q) \wedge (\neg Q \vee \neg P))$   
 (b). Show that RVS follows logically from the premises.  
 $CVP, (CVP) \rightarrow \neg H, \neg H \rightarrow (A \wedge \neg B)$  and  $(A \wedge \neg B) \rightarrow (RVS)$   
**(OR)**
3. (a). Show that  $\neg(P \wedge Q)$  follows from  $\neg P \wedge \neg Q$ .  
 (b). Prove that  $(A \wedge B) \vee (C \wedge D) = (A \vee C) \wedge (B \vee D)$ .

**UNIT-II**

4. (a). Determine whether the following is a tautology inconsistency or neither of two.  $(P \rightarrow Q) \vee (P \rightarrow \neg Q)$  [Where  $\vee$  stands for OR]  
 (b). State and prove Lagrange's theorem.  
**(OR)**
5. (a). For any connected planar graph.  
 Prove that  $v - e + r = 2$ . Where  $v$  - no of vertices  $e$  - no of edges  
 $r$  - no of regions of the graph respectively.  
 (b). Define adjacency matrix and path matrix of a graph G.  
 Whose adjacency matrix is given by
 
$$\begin{bmatrix} 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \\ 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 \end{bmatrix}$$

**UNIT -III**

6. (a). How many 6 digit number without repetition of digit are there. Such that the digits are all non-zero and '1' and '2' do not appear consecutively in either order  
 (b). How many ways are there to roll two distinguishable dice to yield a sum that is divisible by 3?

**(OR)**

7. (a). Show that in a group  $\langle G, * \rangle$ , if for any  $a, b \in G$ ,  $(a * b)^2 = a^2 * b^2$  then  $\langle G, * \rangle$  must be abelian
- (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

8. (a). Show that the following equivalence

$$(P \rightarrow Q) \wedge (R \rightarrow Q) \Leftrightarrow (P \vee R) \rightarrow Q$$

- (b). consider the statements.

S1 All cats are animals.

S2 Some cats are black.

S3. Some animals are black.

Show S3 follows from S1 and S2.

**(OR)**

9. (a). In any boolean algebra prove that  $(a+b)(a^1+c) = ac + a^1b + bc$ .

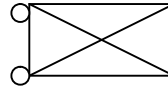
- (b). Write down the adjacency matrix of the following graph.

Also find (I) .the indegree & outdegree of each node.

- (ii). Transitive closure.

a

c



<b>MCS 105</b>	<b>SOFTWARE ENGINEERING</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 5</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### **Objectives**

The course is designed to meet the objectives of

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

## **SYLLABUS**

### **UNIT – I**

Introduction to software engineering (chapter 1)  
The Process (chapters 2, 3)  
Metrics for Process and Project (chapter 22)  
Project management (chapter 21)

### **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**

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 - III**

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 - IV**

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**  
**MCS105 - SOFTWARE ENGINEERING**

**Time: 3 Hours**

**Max. Marks:70M**

**Answer Question No.1 Compulsory**

**7 x 2 = 14 M**

**Answer ONE Question from each unit**

**4 x 14 = 56 M**

1. Write Short note on
  - a. Process
  - b. waterfall model
  - c. use case
  - d. specification review
  - e. modality
  - f. testability
  - g. stakeholders
  - h. metrics

**UNIT-I**

2. (a) What are software measurements explain them in detail  
(b) What are software myths explain  
(Or)
3. (a)What is an RAD model explain  
(b) What is the role of the project and process in management spectrum?

**UNIT-II**

4. (a) Explain the elicitation requirement  
(b) Explain the flow oriented modeling  
(Or)
5. (a) Explain the creation of behavioral modeling  
(b) Explain the design concepts

**UNIT-III**

6. (a) Explain the architectural styles.  
(b) Discuss the golden rules of interface design.  
(OR)
7. (a) Explain the transform, transaction mappings  
(b) What are the design steps involved in user interface.

**UNIT-IV**

8. Discuss the following  
(i)White box testing. (ii) Black box testing.  
(OR)
8. Write short notes on Test strategies for conventional software.

<b>MCS 106</b>	<b>DATA STRUCTURES LAB USING C</b>	
<b>Instruction 6 periods / week</b>		<b>Credits 3</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### **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 BFS.
32. Program to estimate shortest path for a graph.

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

### 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

## FIRST YEAR – SECOND SEMESTER

<b>Sub Code</b>	<b>Name of the Subject</b>	<b>No. of Credits</b>	<b>Int. Marks</b>	<b>Ext. Marks</b>	<b>Total Marks</b>	<b>Hours/ Week</b>
<b>MCS 301</b>	Web Technologies	4	30	70	100	4
<b>MCS 202</b>	Database Management Systems	5	30	70	100	4
<b>MCS 203</b>	Operating Systems	5	30	70	100	4
<b>MCS 204</b>	Computer Networks	4	30	70	100	4
<b>MCS 205</b>	Design & Analysis of Algorithms	5	30	70	100	4
<b>MCS 206</b>	Web Technologies Lab	3	30	70	100	6
<b>MCS 207</b>	DBMS Lab	3	30	70	100	6
<b>MCS 208</b>	Communication Skills	1	50	--	50	3
	TOTAL	30	260	490	750	35
	MOOCS	4	--	--	--	--

<b>MCS 201</b>	<b>WEB TECHNOLOGIES</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 4</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### Objectives

The course is designed to meet the objectives of

1. To complete an in-depth knowledge of web technology
2. To know and to have the idea for different web application that most web developers are likely to use
3. To be aware of, and to have used, the enhancements of the web applications
4. To know the different types of web application software.

## SYLLABUS

### UNIT I

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

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

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

#### **Learning Outcomes**

Students upon completion of this unit will be able to

- Install Tomcat Server and execution of programs on server side.
- Identify the problems in Servlets and overcome those using Java Server Pages also develop JSP applications with Model View Control architecture.

#### **Prescribed Textbooks**

1. Web Programming, building internet applications, Chris Bates 2<sup>nd</sup> 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 201 WEB TECHNOLOGIES**

**Time: 3 Hrs**

**Max. Marks: 70M**

**Answer Question No.1 Compulsory**

**7 x 2 = 14 M**

**Answer ONE Question from each unit**

**4 x 14 = 56 M**

1. (a) What are HTML tags?  
(b) What are the features of JavaScript?  
(c) What is XML? How is it different from HTML?  
(d) What is DTD?  
(e) What is meant by Session?  
(f) List the JSP implicit objects?  
(g) Define Servlet

**UNIT – I**

2. (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
3. (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**

4. a) Explain the five possible keywords in a DTD declaration with suitable examples.  
(b) Define an XML schema. Show how an XML schema can be created.  
OR
5. (a) explain CGI.pm module  
(b) explain clearly the steps involved in executing a CGI program

**UNIT – III**

6. (a) Discuss the four types of JDBC drivers.  
(b) Give a note on javax.sql package.  
OR
7. What is the RMI layer model. What are the steps involved in writing an RMI Application?

**UNIT – I V**

8. (a) What are the limitations of Servlets? How JSP over comes these Problems.  
(b) Discuss about Tomcat Server.

OR

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

<b>MCS 202</b>	<b>DATABASE MANAGEMENT SYSTEMS</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 5</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### Objectives

The course is designed to meet the objectives of

1. the need of a database management system (DBMS)
2. the concept of data normalization
3. the concept of entity relationships
4. the concept of a client/server database, and
5. the concepts of MongoDB

## 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.

**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

- have a broad understanding of database concepts and database management system software
- Compare the basic database storage structures and access techniques file and page organizations, indexing methods including B  $\square$  tree, and hashing.

- Explain and use design principles for logical design of databases, including the E-R method and normalization approach

## **UNIT-II**

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

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

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

### **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 for 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-III**

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

**Relational Database Design Algorithms and Further Dependencies** Properties of Relational Decompositions, Algorithms for 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-IV

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

**Queries and Aggregation** e-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 MongoDB 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 Text**

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

**Chapters** 1.1 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,5thEd

3. MongoDB Learn MongoDB in a simple Way, Dan Warnock

## Model Paper

### MCS 202 Database Management Systems

**Time: 3 Hrs**

**Max. Marks: 70M**

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**Answer Question No.1 Compulsory**

**7 x 2 = 14 M**

**Answer ONE Question from each unit**

**4 x 14 = 56 M**

1.
  - a) Aggregate Functions
  - b) failure of a transaction
  - c) Entity types.
  - d) functional dependencies
  - e) Null Values
  - f) Centralized databases
  - g) MongoDB Schema design
  - h) First normal Form

#### **UNIT-I**

2.
  - a) Discuss about three level architecture with representation of data in each level.
  - b) Discuss about levels of RAID.

**(OR)**

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

#### **UNIT-II**

4.
  - a) Discuss about Arithmetic functions in SQL with example?
  - b) Express the following statements in terms of Relational Algebra
    - i) Fetch the Department Numbers consisting of more than three employees.
    - ii) Fetch the Employee aggregated salary for a department.

**(OR)**

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

#### **UNIT-III**

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

**(OR)**

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

#### **UNIT-IV**

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

<b>MCS 203</b>	<b>OPERATING SYSTEMS</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 5</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### 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.

## 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 – Interprocess 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.

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

### **Learning Outcomes**

Students upon completion of this unit will be able to

- Evaluate the requirement for process synchronization and coordination handled by operating system
- Understand the process management policies and scheduling of processes by CPU

### **UNIT-III**

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

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

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

### **Learning Outcomes**

Students upon completion of this unit will be able to

- Apply various concept related with Deadlock to solve problems related with Resources allocation, after checking system in Safe state or not.
- Identify use and evaluate the storage management policies with respect to different storage management technologies

### **UNIT-IV**

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

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

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

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

### **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 management of memory, 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, Pearson Education (2007)
2. Achyut S Godbole, “Operating Systems”, Second Edition, TMH (2007).
3. Flynn/McHoes, “Operating Systems”, Cengage Learning (2008).
4. Deitel & Deitel, “Operating Systems”, Third Edition, Pearson Education (2008).

**Model Paper**

**MCS 203 OPERATING SYSTEMS**

**Time : 3 Hrs**

**Max. Marks: 70**

**Answer Question No.1 Compulsory**

**7 x 2 = 14 M**

**Answer ONE Question from each unit**

**4 x 14 = 56 M**

- 1.a) Advantages of Multiprocessor Systems.
- b) What is a System Call ?
- c) Importance of PCB
- d) Difference between Thread and Process.
- e) Advantages of Segmentation.
- f) Virtual Memory is Logical or Physical, Why ?
- g) Why Operating System requires Secondary Storage Support for its Operation ?
- h) What are file attributes ?

**UNIT – I**

- 2.a) Explain Traditional computing, Client-Server computing and peer-to-peer computing
  - b) Describe Storage device Hierarchy
- (OR)**
- 3.a) Discuss different types of Operating System Structures
  - b) Explain Process Scheduling

**UNIT – II**

- 4.a) Discuss different threading issues.
  - b) Explain semaphores with suitable examples.
- (OR)**
5. Compare different types of Process Scheduling Algorithms.

**UNIT – III**

6. a) Explain Deadlock avoidance mechanisms.
  - b) Describe swapping with diagram.
- (OR)**
7. A) explain segmentation.
  - b) Write about LRU page replacement and Optimal page replacement.

**UNIT – IV**

8. a) Explain different file access methods.
  - b) Describe linked file allocation methods.
- (OR)**
9. a) Explain different RAID levels.
  - b) Discuss about interrupt driven I/O cycle.

<b>MCS 204</b>	<b>COMPUTER NETWORKS</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 4</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### Objectives

The course is designed to meet the objectives of

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

## SYLLABUS

### UNIT – I

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

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

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

## **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 – II**

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

## **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.

**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

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

## **UNIT – IV**

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

### **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)

## MODEL PAPER

### MCS 204 COMPUTER NETWORKS

**Time : 3 hrs**

**Max Marks: 70**

**Answer Question No.1 Compulsory**  
**Answer ONE Question from each unit**

**7 x 2 = 14 M**  
**4 x 14 = 56 M**

1. a) Difference between Protocol and Service.
- b) Describe Ethernet.
- c) Why Repeaters are required.
- d) Give any two applications of Bluetooth.
- e) What are the problems with Flooding.
- f) Where UDP protocol is used.
- g) Define HTTP.
- h) Define User Agent.

#### UNIT – I

2. a) Compare OSI and TCP/IP reference models.
  - b) Describe Go Back N protocol.
- (OR)**
3. a) Explain the architecture of the Internet
  - b) Write about design issues of a Data Link layer.

#### UNIT – II

4. a) Explain Spanning tree Bridges.
  - b) Give and explain 802.11 frame structure, services
- (OR)**
5. a) Describe architecture, applications, protocol stack of Bluetooth
  - b) Explain Switched Ethernet

#### UNIT – III

6. a) Explain IP Header Format and IP addresses
  - b) Discuss about Tunneling and Fragmentation
- (OR)**
7. a) Explain Distance Vector Routing Algorithm
  - b) write about TCP Congestion Control

#### UNIT – IV

8. a) Explain about DNS
  - b) Write about URL's
- (OR)**
9. a) Explain Electronic Mail concept
  - b) Discuss JPEG Compression mechanism

<b>MCS 205</b>	<b>DESIGN AND ANALYSIS OF ALGORITHMS</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 5</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### **Objectives**

The course is designed to meet the objectives of

1. learning specification of the concept of algorithm and analysis of its computational complexity
2. learning design principles of algorithms and their application to computing problems
3. making analysis accessible to all levels of readers.

## **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.

The Greedy Method - Knapsack Problem, Tree vertex splitting, Job sequencing, with dead lines, 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-III**

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-IV**

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, Addison Wesley(200)
2. Cormen TH et al - Introduction to Algorithms, PHI(2001)
3. Brassard & Bralley - Fundamentals of Algorithms, PHI(2001)

## MODEL PAPER

### MCS205 Design And Analysis Of Algorithms

Time 3 hrs

Max Marks: 70

Answer Question No.1 Compulsory  
Answer ONE Question from each unit

7 x 2 = 14 M  
4 x 14 = 56 M

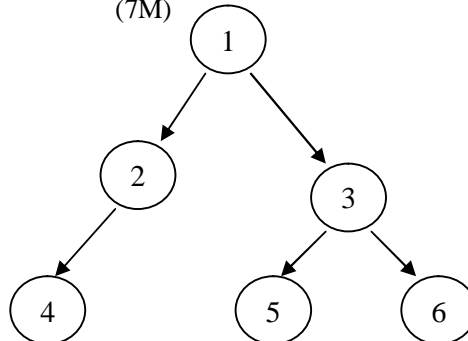
1. a) What are Huffman codes ?  
b) Explain dominance rule.  
c) State the general method for dynamic programming.  
d) Write the difference between divide-and-conquer and the greedy method.  
e) State the principle of optimality ?  
f) Write the formulae developed by strassen to multiply matrices ?  
g) What is the average time complexity for constructing a heap tree ?

#### UNIT – I

2. a) Explain control abstraction for divide – and – conquer strategy.  
b) Explain the process of constructing convex hull. Also write its algorithm and complexity  
(OR)
3. a) Derive the average time complexity for quick sort.  
b) Write a randomized algorithm to perform primality testing.  
(7M)

#### UNIT – II

4. a) State the problem of “optimal storage on tapes”. If three programs of length (11,12,13) = (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  $p(1\ 3) = (3,3,1)$  and  $q(0\ 3) = (2,3,1,1)$ . Solve it using dynamic programming  
(OR)
5. a) Write the problem of tree vertex splitting. Find the places where boosters are needed for the following tree, for  $\delta=5$   
(7M)

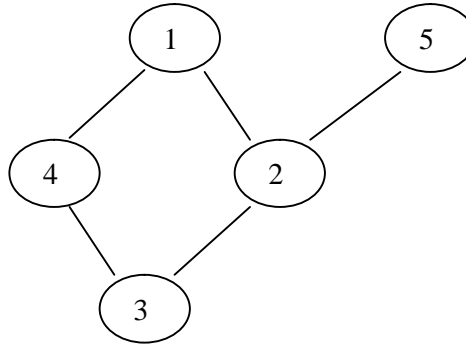


- b) Solve O/I Knapsack, If the Knapsack instance  $n=3$

$(w_1, w_2, w_3) = (2, 3, 4)$  &  $(p_1, p_2, p_3) = (1, 2, 5)$  and  $m = 6$ . (7M)

### UNIT – III

6. a) Solve sum of subsets problem for  $n=6, m=30$ ,  
 $w[1..6] = \{5, 10, 12, 13, 15, 18\}$ . (7M)  
b) Find connected components & spanning tree for (7M)



(OR)

7. a) Solve 8-queens problem  
b) Write different traversal techniques for graphs.

### UNIT – IV

8. a) Write a complete LC branch and bound algorithm for Knapsack problem  
b) Write a non-deterministic algorithm to sort array elements.

(OR)

9. 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

<b>MCS 206</b>	<b>WEB TECHNOLOGIES LAB</b>	
<b>Instruction 6 periods / week</b>		<b>Credits 3</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

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, Branch, 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.

<b>MCS 207</b>	<b>DBMS LAB</b>	
<b>Instruction 6 periods / week</b>		<b>Credits 3</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

## Lab cycle

**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 first 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,WEIGHT,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

<b>MCS 208</b>	<b>COMMUNICATION SKILLS</b>	
<b>Instruction 3 periods / week</b>		<b>Credits 1</b>
<b>Internal 50 marks</b>	<b>--</b>	<b>Total 50 Marks</b>

#### **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)

## SECOND YEAR – THIRD SEMESTER

Sub Code	Name of the Subject	No. of Credits	Int. Marks	Ext. Marks	Total Marks	Hours/ Week
MCS 301	Python Programming	5	30	70	100	4
MCS 302	.Net Programming	5	30	70	100	4
MCS 303	Object Oriented Modeling & Design using UML	5	30	70	100	4
MCS 304.1 /304.2	Artificial Intelligence /Microprocessors & Interfacing	4	30	70	100	4
MCS 305.1 /305.2	Cryptography & Network Security / Blockchain Technology	4	30	70	100	4
MCS 306	Python Programming Lab	3	30	70	100	6
MCS 307	.Net Programming Lab	3	30	70	100	6
MCS 308	Seminar	1	50	--	50	3
	TOTAL	30	260	490	750	35
	MOOCS	4	--	--	--	--



## MCS301- PYTHON PROGRAMMING

<b>MCS 301</b>	<b>PYTHON PROGRAMMING</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 5</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### Objectives

The course is designed to meet the objectives of

1. Install and run the Python interpreter
2. Create and execute Python programs
3. Understand the concepts of file I/O
4. Be able to read data from a text file using Python
5. Plot data using appropriate Python visualization libraries

## 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 decodings

### UNIT III

**Object Oriented Programming** Fundamental Concepts, Defining a New Python Class, User-Defined Classes, Designing New Container Classes, Overloaded Operators, Inheritance, User-Defined Exceptions, Namespaces Encapsulation in Functions, Global versus Local Namespaces, Exception Control Flow, Modules and Namespaces. **Objects and Their Use** Software Objects, Turtle Graphics, Modular Design Modules, Top-Down Design, Python Modules, Recursion Introduction to Recursion, Examples of Recursion, Run Time Analysis, Searching, Iteration Vs Recursion, Recursive Problem Solving, Functional Language Approach.

### **Learning Outcomes**

Students upon completion of this unit will be able to

- Understanding objects
- Design of modules
- recursions

## **UNIT IV**

**Numerical Computing in Python** NumPy, Vectorized Algorithms, Graphical User Interfaces Basics of tkinter GUI Development, Event-Based tkinter Widgets, Designing GUIs, OOP for GUI, The Web and Search The World Wide Web, Python WWW API, String Pattern Matching, Database Programming in Python

### **Learning Outcomes**

Students upon completion of this unit will be able to

- understand GUI
- Events

## **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-301 PYTHON PROGRAMMING

Time 3Hrs

Max. Marks 70

Answer Question No.1 Compulsory

7 x 2 = 14 M

Answer ONE Question from each unit

4 x 14 = 56 M

1.
  - a. How to declare and assign variables in python
  - b. What is List
  - c. Define container
  - d. explain top-down design
  - e. define recursion
  - f. what is NumPy
  - g. what is GUI

#### UNIT I

- 2 (a) Write Python statements corresponding to the following
    - (i) Assign to variable flowers a list containing strings 'rose', 'bougainvillea', 'yucca', 'marigold', 'daylilly', and 'lilly of the valley'.
    - (ii) Write a Boolean expression that evaluates to True if string 'potato' is in list flowers, and evaluate the expression.
    - (iii) Assign to list thorny the sublist of list flowers consisting of the first three objects in the list.
    - (iv) Assign to list poisonous the sublist of list flowers consisting of just the last object of list flowers.
  - (b) Write a python program to implement string reverse function
- (OR)**
- 3 (a) Explain execution control structures
  - (b) How to achieve parameter passing in Python.

#### UNIT- II

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

#### UNIT- III

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

#### UNIT- IV

8. Explain the concept designing GUIs
- (OR)**
9. Explain Python WWW API

<b>MCS 302</b>	<b>.NET PROGRAMMING</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 5</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### Objectives

The course is designed to meet the objectives of

1. Set up a programming environment and Configure ASP.net programs.
2. Creating ASP.Net applications using standard .net controls.
3. Develop a data driven web application.
4. Connecting to data sources and managing them.
5. Maintain session and controls related information for user used in multi-user web applications
6. Understand the fundamentals of developing modular application by using object oriented methodologies

## SYLLABUS

### UNIT-I Visual basic 2005

**Getting started with Visual Basic 2005** Arithmetic Operators, Data type, Statements, Control Statements, Loops, Arrays, Structures, Val and Structure functions, Creating Visual studio Applications, Saving Visual Basic 2005 Application.

**Object Oriented Programming** Basic Principles of ObjectOriented Programming, Member Access Modifiers, Define Class, Creating Objects, Constructors, Inheritance, Abstract Classes, Interfaces, Polymorphism

**Windows Forms** Introduction to the windows forms, Setting the title Bar Text, Minimizing and Maximizing a form, Setting initial position of a form, Working with multiple forms, Creating adding controls to a form, Setting controls Tab order, Naming Controls, Setting Properties at design time, Setting properties at run time, Creating a message box, Creating a Input box, Creating MDI Applications, Creating Dialog box, Commenting the code

**Label, TextBox, Button, ComboBox and ListBox Controls** Label control, Button Control, ComboBox Control, ListBox Control, Project

**Panel, PictureBox, Progress Bar and Timer Controls** Panel Control, Picture box Control, Progress Bar Control, Timer Control, Project

**Checkbox, radio button, and group box controls** Checkbox control, Radio button control, Progress bar control, Timer control, Project. **Menus, built-in dialog box, printing and tree view controls**

Menus, Folder Browser Dialog Control, Open File Dialog Control Save File Dialog Control, Font File Dialog Control, Color File Dialog Control, Print Document Control, Tree View Control, Project

**Mouse Events and Keyboard Events**

Mouse Events, Keyboard Events

## **Handling Errors and Exceptions** Errors, Exceptions

### **Learning Outcomes**

Students upon completion of this unit will be able to

- Understand .NET Framework and describe some of the major enhancements to the new version of Visual Basic.
- Describe the basic structure of a Visual Basic.NET project and use main features of the integrated development environment (IDE)

## **UNIT-II ASP.NET 2.0**

**ASP.NET 2.0 Essentials** Introduction to Asp.NET, Benefits of Asp.NET, What's new Asp.NET?, Introduction Asp.NET 2.0 IDE

**Developing a Web Application** HTML, DHTML, PHP, JSP, PERL, ASP.NET 2.0 Provider Model, ASP.NET 2.0 Coding Model, Code Sharing, Compilation in ASP.NET

**Standard Controls** Introduction to standard controls, Label Control, TextBox Control, Button Control, Image Button Control ListBox Control, Radio Button Control

**Navigation Controls** Introduction to Navigation Controls, Site Map Path Controls, Menu Controls, Tree View Controls

**Validation Controls** Introduction to validation control, Base validator class, Required field validator control,

Range validator control, Regular Expression validator control, Compare validator control, Custom validator control,

Validation summary control

**Login controls** Introduction to login controls, Login control Login view control, Login name control, Login status control Password recovery control

**Master pages and Themes** Need for Master Pages and Themes, Creating a Simple Master Page, Creating a Nested Master Page Themes, Creating Themes, Applying Themes on controls at Run time

### **Learning Outcomes**

Students upon completion of this unit will be able to

- Use the features of Dot Net Framework along with the features of ASP.NET
- Create a Web form with various controls.
- Separate page code from content by using code-behind pages, page controls, and components.

## **UNIT-III C# 2005**

**Introduction to Visual C# 2005** Introduction, Features of Visual C# 2005, Creating Visual C# 2005, Key words, Identifiers, Data Types, Variables, Scope of Variables, Constants, Operators Operator Precedence and Associativity, Expressions, Punctuators Control Statements, Loops, Interrupting Loops using Jump Statements, Creating Arrays, Creating Enumerations, Creating Structures, Methods

**Object Oriented Programming** Basic Principles of Object Oriented Programming, Member Access Modifiers, Defining a Class, Creating Objects, Constructors, Static Members, Inheritance, Abstract Class, Interfaces, Polymorphism, Operator Overloading

**Windows Forms** Introduction to Windows form, Setting the title bar Text, Minimizing or Maximizing a forms, Working with multiple Forms, Setting the startup form, Adding controls to a form, Setting controls Tab order, Setting properties at Design time, Setting properties at Run time, Showing and Hiding controls and Forms, Creating a message box, Commenting the code, Handling Events.

**Label, TextBox, Button, ComboBox and ListBox Controls** Label Control, TextBox Control, Button Control, ComboBox Control ListBox Control, Project

**Panel, PictureBox, Progress Bar and Timer Controls** Panel Control, PictureBox Control, Progress bar Control, Timer Control Project

**Checkbox, Radio button and Group box controls** Checkbox control, Radio button control, GroupBox Control, Project

**Menus, built-in dialog box, printing and tree view controls**

Menus, Folder Browser Dialog Control, Open File Dialog Control Save File Dialog Control, Font File Dialog Control, Color File Dialog Control, Print Document Control, Tree View Control, Project

**Mouse Events and Keyboard Events** Mouse Events, Keyboard Events

**Handling Errors and Exceptions** Errors, Exceptions

## **Learning Outcomes**

Students upon completion of this unit will be able to

- Use the features of Dot Net Framework along with the features of C#
- Be able to understand use of C# basics, Objects and Types, Inheritance
- To develop, implement and creating Applications with C#

## **UNIT-IV ADO.Net & Data Binding**

**Accessing Data using ADO.NET (C# 2005)** What are Databases? Basic SQL Statements, Working with ADO.NET, Overview of ADO.NET Objects Data Grid View Control, Accessing Data using Server Explorer, Creating a new data connection, Accessing data using data adaptors and data sets, Previewing data from data adaptors Connecting to an MS Jet database

**Data Binding(C# 2005)** Introduction, Simple Data Binding, Complex Data Binding, Implementing Data Binding, Project

**Working with Databases (ASP.NET 2.0)** What are Databases?, Working with ADO.NET, Overview of ADO.NET Objects, Basic SQL statements, ASP.NET 2.0 data display controls, ASP.NET 2.0 data source controls, Accessing data with server explorer, Creating a web applications using data display controls

**Accessing data using ADO.NET (Visual Basic 2005)** What are Databases?, Basic SQL statements, Working with ADO.NET, Overview of ADO.NET objects, Data Grid View Control, Accessing data using server explorer, Creating a new data connection, Accessing data using Data Adapters and Datasets, Previewing data from Data Adapters, Connecting to an MS Jet database

**Data Binding (Visual Basic 2005)** Introduction, Simple Data Binding, Complex Data Binding, Implementing Data Binding, Project.

### **Learning Outcomes**

Students upon completion of this unit will be able to

- Display dynamic data from a data source by using Microsoft ADO.NET and data binding.
- Explain Security in the .NET framework and Deployment in the .NET

### **Prescribed Book**

Vikas Gupta, “.Net Programming”, Dream Tech (2008).

### **Chapters**

UNIT – I - 1 to 8, 11 chapters in Visual Basic 2005

UNIT – II – 1 to 7, 9 chapters in ASP.NET 2.0

UNIT – III – 1 to 8, 11 chapters in C# 2005

UNIT – IV – 9, 10 chapters in Visual Basic 2005

8 chapter in ASP.NET 2.0

9, 10 chapters in C# 2005

### **Reference Books**

1. Xue Bai, Michael Ekedah, “The Web Warrior Guide to Web Programming”, Thomson (2006).
2. Kogent Solutions Inc., “.Net Programming”, Black Book, Dream Tech (2008).
3. Joe Duffy, “Professional.Net Programming 2.0”, Wiley.
4. George Shepherd, “ASP.NET 3.5 Microsoft”, PHI (2008).

**MODEL PAPER**

**MCS 302 .NET PROGRAMMING**

**Time 3 Hrs**

**Max. Marks 70**

**Answer Question No.1 Compulsory**

**7 x 2 = 14 M**

**Answer ONE Question from each unit**

**4 x 14 = 56 M**

1. a) Define data binding  
b) Explain login controls  
c) What is master page  
d) Describe Data Adapter  
e) Explain docking and anchoring controls  
f) Give the difference between check box radio button and group box controls  
g) Define event and write different types of event  
h) What are the characteristics of interface

**UNIT-I**

2. a) Briefly explain about data types and keywords.  
b) Write the procedure for an application which checks whether the entered user is valid or not.

**(OR)**

3. a) Explain the following controls  
i. Menus ii. Timer iii. PictureBox iv. Tree view  
b) Explain mouse events and key board events.

**UNIT-II**

4. a) Explain all the validation controls.  
b) Write the procedure to design the application which allows the valid user to enter into it.

**(OR)**

5. a) Briefly explain about master pager and themes  
b) With suitable example explain the navigation controls.

**UNIT-III**

6. a) What are the concepts of object oriented programming.  
b) Explain the following controls  
i. ComboBox ii. ListBox  
iii. Panel iv. Builtin dialogBox

**(OR)**

7. a) Explain the steps involved in windows form design and interface  
b) Write the procedure for coffee shop billing application (use checkbox)

**UNIT-IV**

8. a) What is data binding? Explain the types of data binding how data binding can be implemented.  
b) What are the ADO.NET objects.  

(or)
9. Develop an application for student details which  
i. Can access database ii. Can bound to the controls iii. Can display the details in a form



<b>MCS 303</b>	<b>OBJECT ORIENTED MODELLING AND DESIGNING USING UML</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 5</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### Objectives

The course is designed to meet the objectives of

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

## SYLLABUS

### 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, Realizing Use Cases, Designing Algorithms, Recursing Downward, Refactoring, Design Optimization, Reification of Behavior, Adjustment of Inheritance, Organizing a class design. **Implementation Modeling** *Overview of Implementation, Fine Tuning classes, fine tuning Generalization, Realizing Associations, Testing.* **Programming Style** Object Oriented Style, Reusability, Robustness, Extensibility, Programming-in the Large.

### **Learning Outcomes**

Students upon completion of this unit will be able to

- Understand various concepts of System design, class design
- Knowledge on various programming styles.

### **Prescribed Book**

Michael Blaha, James 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 OBJECT ORIENTED MODELING AND DESIGN WITH UML**

**Time 3 Hrs**

**Max. Marks 70**

**Answer Question No.1 Compulsory**  
**Answer ONE Question from each unit**

**7 x 2 = 14 M**  
**4 x 14 = 56 M**

1.
  - a) Distinguish between object diagram and ER-diagram.
  - b) Define Meta class.
  - c) Distinguish between Aggregations versus generalization.
  - d) Explain Constraints.
  - e) What is analysis document?
  - f) Need for State-transition diagram?
  - g) Define modeling?
  - h) What is multiplicity?

**UNIT-I**

2.
  - a) What is Modeling? What are different Object Modeling Techniques.
  - b) Discuss how was object oriented development methodology is different from Traditional approach.

(or)
3. Explain the following terms
  - i. Association.
  - ii. Aggregation.
  - iii. Generalization.
  - iv. Composition.

**UNIT-II**

- 4.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)
- 5.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**

6. Discuss about the steps involved in Analysis of a System.

(or)
- 7.a) Define state diagram for ATM Model.
  - b) Discuss about nested state diagram.

**UNIT-IV**

- 8.a) What is the task of a design? How would you differentiate a good design from bad design?
  - b) Discuss about System Testing?

(or)
- 9.a) Discuss the programming style in the large complex systems.
  - b) Discuss about good programming style.

<b>MCS 304.1</b>	<b>ARTIFICIAL INTELLIGENCE</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 4</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### **Objectives**

The course is designed to meet the objectives of

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

## **SYLLABUS**

### **UNIT I**

What is Artificial Intelligence,

Technique, Defining problem as a state space search, production systems, problem characteristics, production system characteristics.

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

Introduction to nonmonotonic reasoning, augmenting a problem solver, implementation of depth first search and breadth first search.

### **Learning Outcomes**

**Students acquire knowledge of**

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

### **UNIT III**

Weak slot-and-filler structures

semantic nets, frames.

strong slot-and-filler structures

conceptual dependency, scripts.

## **Learning Outcomes**

### **Student acquire deep knowledge about**

1. Tackling the facts that are uncertain
2. Representation of varying knowledge
3. Different planning techniques

## **UNIT IV**

### **Natural Language Processing**

syntactic processing, augmented transition networks, semantic analysis, case grammars.

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.

**Computer science**  
**Paper MCS 304.1 Artificial Intelligence**

**Time 3 Hrs**

**Max Marks 70**

**Answer Question No.1 Compulsory**  
**Answer ONE Question from each unit**

**7 x 2 = 14 M**  
**4 x 14 = 56 M**

1. Explain the following
  - a) Define Artificial Intelligence?
  - b) What are various task domains of AI?
  - c) What is heuristic?
  - d) What is dependency directed backtracking?
  - e) What is semantic net?
  - f) What is abduction? Give an example?
  - g) Define truth maintenance system?
  - h) What is frame problem?

**UNIT-I**

2. 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)
3. Write about AO\* algorithm

**UNIT-II**

4. 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))
  - iii) f(Marcus, g(x,y)) & f(x,g(carsar,Marcus))(OR)
5. a) Represent the following sentences using semantic nets  
"All students answered all questions in all possible ways"  
b) Built-up the CD structure for the following sentences
  - i) "While crossing sea , Hanuman saw a cannibal"
  - ii) "Americans bombed Hiroshima"

**UNIT-III**

6. a) Give the architecture of an expert system?  
b) What are expert system shells  
(OR)
7. Discuss briefly about frames

**UNIT-IV**

8. a) What is a production system ? Explain it's characteristics?  
b) Write a script to visit to a restaurant  
(OR)
- a) What is non-monotonic reasoning  
b) Explain a Justification Based Truth Maintenance System(JTMS)

<b>MCS 304.2</b>	<b>MICROPROCESSORS AND INTERFACING</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 4</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### **Objectives**

The course is designed to meet the objectives of

1. To introduce 8085 architecture and programming in assembly language.
2. To introduce basic concepts of interfacing memory and peripheral devices to a microprocessor.
3. To introduce serial and parallel bus standards.
4. To introduce 8051 microcontroller.
5. To introduce various advanced processor architectures such as 80X86, Pentium and Multicore Processors.

## **SYLLABUS**

### **UNIT - I**

**Introduction** Overview of Microcomputer Systems Hardware – Software, Addresses – General Operation of a Computer – Microprocessors in Digital System Design.

**8086 Architecture** CPU Architecture – Internal Operation , Machine Language Instruction Addressing modes – Instruction Formats.

**Assembler Language Programming** Assembler Instruction Format – Data Transfer Instructions , Arithmetic Instructions Binary Arithmetic – Packed BCD Arithmetic – Unpacked BCD Arithmetic, Branch Instructions Conditional Branch Instructions - Unconditional Branch Instructions, Loop Instructions – NOP and HLT Instructions – Flag Manipulation Instructions – Logical Instructions – Shift and Rotate Instructions , Directives and Operators Data Definition and Storage allocation – Structures – Records – Assigning Names to Expressions – Segment Definitions – Program Termination – Alignment Directives – Value returning attribute operators.

### **Learning Outcomes**

#### **Students develop understanding on**

- Understand instruction set and format
- Directives and operators

### **UNIT - II**

**Modular Programming** Linking and Relocation Segment Combination – Access to External Identifiers, Stacks , Procedures calls, returns, and Procedure Definitions – Saving and Restoring Registers – Procedure Communication – Recursive Procedures, Interrupts and Interrupt Routines, Macros ASM-86 Macro Facilities – Local Labels – Nested Macros – Controlled Expansion and Other Functions.



**I/O Programming** Fundamental I/O Considerations – Programmed I/O – Interrupt I/O – Block Transfers and DMA.

### **Learning Outcomes**

#### **Students develop understanding on**

- Understand procedure communication
- macros

### **UNIT - III**

**System Bus Structure** Basic 8086/8088 Configurations Minimum Mode – Maximum Mode, System Bus Timing, Interrupt Priority Management Interrupt System Based on a Single 8259A.

**I/O Interfaces** Serial Communication Interfaces Asynchronous Communication – Synchronous Communication – Physical Communication Standards – 8251A Programmable Communication Interface, Parallel Communication 8255A Programmable Peripheral Interface - A/D and D/A Example, Programmable Timers and Event Counters Intel's 8254 Programmable Interval Timer – Interval Timer Application to A/D, DMA Controllers.

### **Learning Outcomes**

#### **Students develop understanding on**

- understand bus configurations
- interfaces of peripherals
- dma controllers

### **UNIT - IV**

**Advanced Microprocessors** The 80386 Introduction – Operating Modes – Processor Model – Programming Model, The 80486 Introduction – Processor Model – Programming Model, The Pentium Introduction – Processor Model – Programming Model – The Pentium Evolves – The Pentium MMX, The P6 Processors Introduction – Overview – Processor Model – New Architectural Features.

### **Learning Outcomes**

#### **Students develop understanding on**

- understand advanced techniques of microprocessor and new evaluations
- 

### **Prescribed Books**

1. Yu-Cheng Liu, Glenn A Gibson, “Microcomputer Systems The 8086/8088 Family”, Second Edition, Pearson Education (2008)

**Chapters** 1.1, 1.3 – 1.5, 2.1 - 2.3, 3.1 – 3.10, 4.1 – 4.5, 6.1 – 6.4, 8.1 – 8.2, 8.3.1, 9.1.1, 9.1.2, 9.1.4, 9.2, 9.3, 9.5

2. John Uffenbeck, “The 80x86 Family Design, Programming and Interfacing”, Third Edition, Pearson Education(2006)

**Chapters** 3.3, 3.5 – 3.7

### **Reference Book**

1. Douglas V Hall, “Microprocessors and Interfacing”, Second Edition, TMH
2. N.Mathivanan, “Microprocessors, PC Hardware and Interfacing”, PHI(2007).
3. Kenneth J.Ayala, “ The 8086 Microprocessor Programming & Interfacing The PC”, Cengage Learning (2008)
4. Barry B.Brey, “The Intel Microprocessors”, Seventh Edition, PHI

## Model Paper

### MCS 304.2 MICROPROCESSORS AND INTERFACING

**Time 3 Hrs**

**Max. Marks 70**

**Answer Question No.1 Compulsory**

**7 x 2 = 14 M**

**Answer ONE Question from each unit**

**4 x 14 = 56 M**

- 1.a) Role of address lines.
- b) Difference between control flag and status flag.
- c) Give and explain the instruction to access stack pointer.
- d) Difference between INT and INTO instructions.
- e) Why an interfacing is required.
- f) Difference between Pentium and Pentium MMX.
- g) What is the width of Pentium address bus?
- h) Any two differences between 80386 and 80486.

#### UNIT - I

- 2.a) Explain addressing modes of 8086 with suitable example.
  - b) Describe the memory segmentation in 8086.
- (OR)**
- 3.a) With suitable example explain data transfer and logical group instructions of 8086.
  - b) Explain different assembler directives of 8086 assembler.

#### UNIT - II

- 4.a) Explain the concept of stack.
  - b) How 8086 macro's are declared and used in the program.
- (OR)**
5. Describe interrupt I/O.

#### UNIT – III

- 6.a) Draw and explain timing diagram for input operation in 8086 minimum mode.
  - b) Explain operation of 8086 in its maximum mode.
- (OR)**
7. Draw and explain functions of 8255A programmable peripheral interface.

#### UNIT - IV

8. Described Architectural details of Pentium processor.
- (OR)**
9. Described the architectural details of 80486.

<b>MCS 305.1</b>	<b>CRYPTOGRAPHY AND NETWORK SECURITY</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 4</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### **Objectives**

The course is designed to meet the objectives of

1. security breaches can be very expensive in terms of business disruption and the financial losses that may result,
2. increasing volumes of sensitive information are transferred across the internet or intranets connected to it,
3. networking that make use of internet links are becoming more popular because they are cheaper than dedicated leased lines. This, however, involves different users sharing internet links to transport their data,
4. directors of business organizations are increasingly required to provide effective information security.

## **SYLLABUS**

### **UNIT I**

#### ***Introduction***

Security Trends, 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.

***Fire Walls*** Firewall design principles , trusted systems

## **Learning Outcomes**

### **Students will develop understanding regarding**

1. Mail security and ip security
2. Design principles to develop a firewall

## **Prescribed Book**

William Stallings Cryptography & Network Security Principles and Practices 4<sup>th</sup> 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, Wiley (1984)

**Model Paper**  
**MCS 305.1 CRYPTOGRAPHY AND NETWORKING SECURITY**  
**Time 3 Hours** **Max. Marks 70**

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<b>Answer Question No.1 Compulsory</b>	<b>7 x 2 = 14 M</b>
<b>Answer ONE Question from each unit</b>	<b>4 x 14 = 56 M</b>

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1.
  - (a) Define Avalanche effect.
  - (b) Explain digital signature.
  - (c) Explain S/MIME.
  - (d) What is a firewall.
  - (e) Differentiate between Symmetric encryption and Public key cryptography.
  - (f) What are the two keys used for public key encryption?
  - g) What is firewall?
  - (h) State Fermats Theorem

**UNIT – I**

2.
  - (a) Discuss about playfair and hill cipher techniques.
  - (b) Briefly explain about DES encryption algorithm.

(OR)
3.
  - (a) Define OSI security Architecture
  - (b) Discuss about random number generation techniques in cryptography.

**UNIT – II**

4.
  - (a) Explain RSA algorithm
  - (b) Perform encryption and decryption using RSA algorithm for the following  
 $p=3, q=11, d=7, M=5$

(OR)
5.
  - (a) Discuss Diffie hellman key exchange algorithm
  - (b) Differentiate between Link level and End to end encryption

**UNIT – III**

7.
  - (a) Explain in detail about authentication requirements.
  - (b) Define Message authentication codes and its requirements

(OR)
8. (a) Explain about Digital signature standard (DSS).
9. (b) List out the uses of hash functions.

**UNIT – IV**

8.
  - (a) Write short notes on Firewalls and list various types of firewalls
  - (b) Explain the usage of Pretty good privacy

(OR)
9. Explain IP Security in detail

<b>MCS 305.2</b>	<b>Blockchain Technology</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 4</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### **Objectives**

The course is designed to meet the objectives of

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

## **SYLLABUS**

### **UNIT – I**

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

### **Learning Outcomes**

Students upon completion of this unit will be able to

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

### **UNIT – II**

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

### **Learning Outcomes**

Students upon completion of this unit will be able to

- Work with openSSL command line environment
- Apply cryptography systems

### **UNIT – III**

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

**Learning Outcomes**

Students upon completion of this unit will be able to

- Understand how blockchain system Bitcoin works

**UNIT – IV**

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

**Learning Outcomes**

Students upon completion of this unit will be able to

- Perform payment operations with Bitcoin Network

**Prescribe Book**

Mastering Blockchain 2<sup>nd</sup> Edition, Imran Bashir, PACKT Publication

**Reference Books**

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



## Model Question Paper

MCS 305.2 Blockchain Technology

Time 3Hrs

Max.Marks 70

Answer Question No.1 Compulsory

7 x 02 = 14 M

Answer ONE Question from each unit

4 x 14 = 56 M

### 1. Explain the following terms.

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

### UNIT-I

2.
  - a. Explain the types of Blockchain?
  - b. Describe smart contracts?
- (OR)
3. Explain methods of decentralization.

### UNIT-II

4.
  - a. Explain working with the OpenSSL command line.
  - b. Explain digital Signatures.
- (OR)
5.
  - a. How asymmetric cryptography is used in blockchain?
  - b. Explain the terms public key and private key.

### UNIT-III

6.
  - a. Explain various interactive picture construction techniques.
  - b. Describe Bitcoin. Explain how Bitcoin works?
- (OR)
1. Explain the limitation of blockchain?

### UNIT-IV

8. How to pay with Bitcoin and Bitcoin cash?
- (OR)
9.
  - a. Describe wallets.
  - b. Describe Bitcoin mining.

<b>MCS 306</b>	<b>PYTHON PROGRAMMING LAB</b>	
<b>Instruction 6 periods / week</b>		<b>Credits 3</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### 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 returned 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 1. Integer Arithmetic 2. Real Arithmetic
---

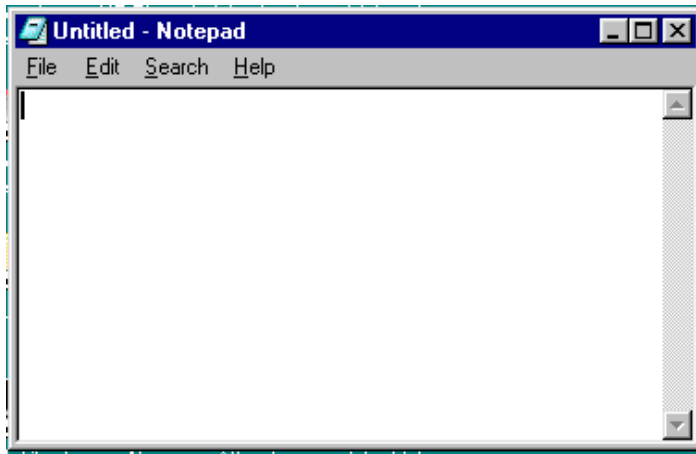
Operations 1. Addition 2. Subtraction 3. Multiplication
--

<b>MCS 307</b>	<b>.NET PROGRAMMING LAB</b>	
<b>Instruction 6 periods / week</b>		<b>Credits 3</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

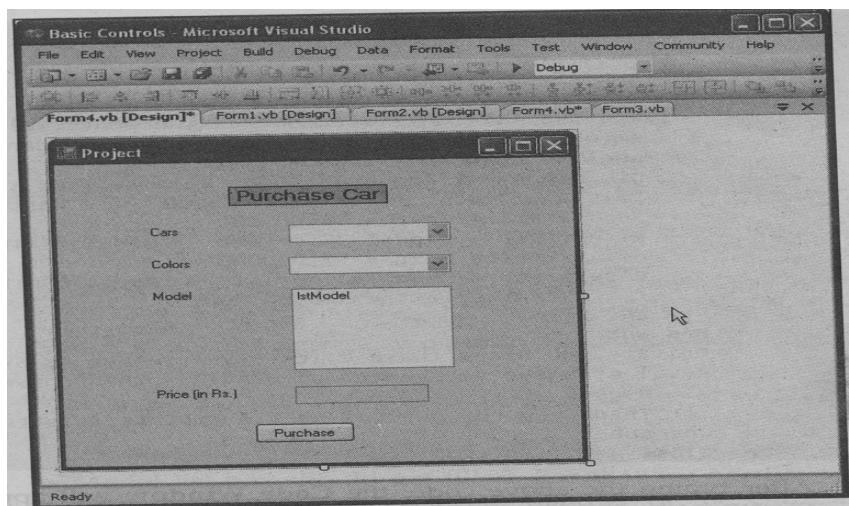
### Lab Cycle

#### VB .NET

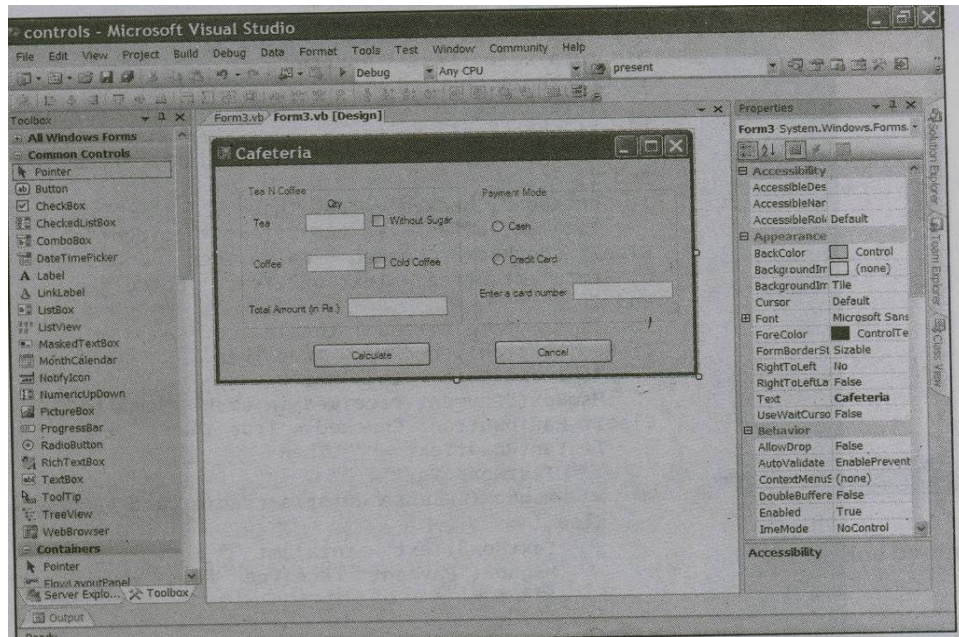
- 1) Develop an application which is similar to “Notepad” using menus.



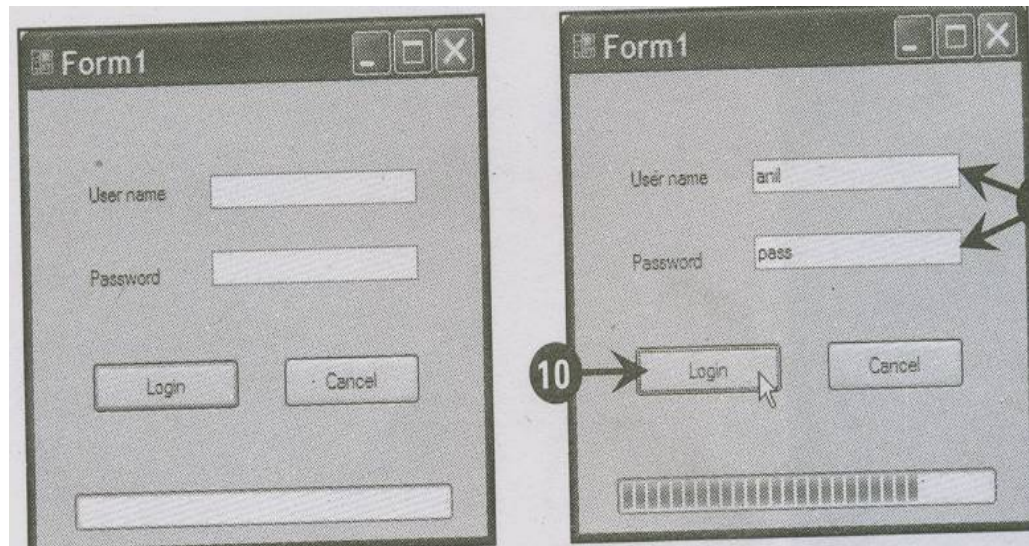
- 2) (a) Develop an application for facilitating purchasing order which will look like as shown below



- (b) Develop an application for billing system in coffee shops which will look like as shown below

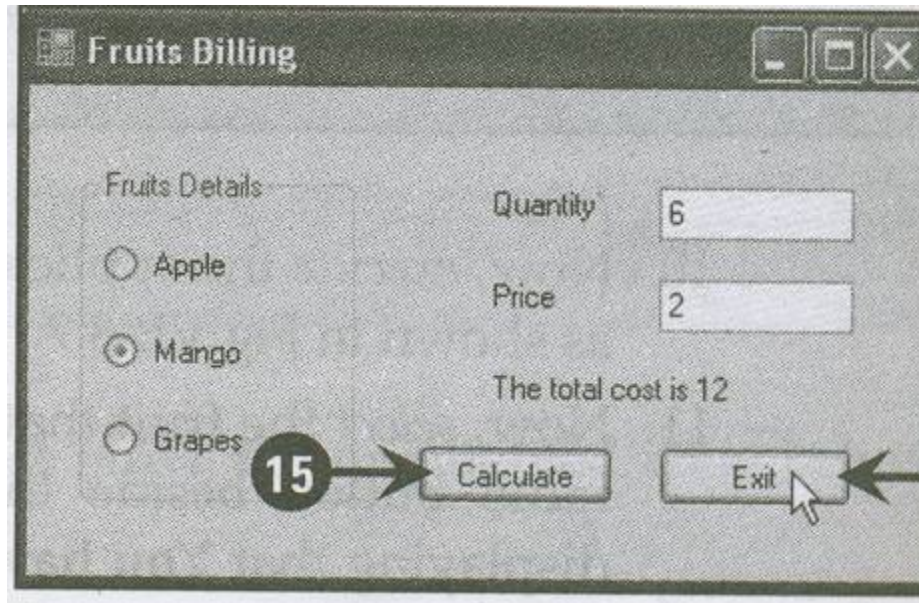


- 3) (a) Develop an application which is similar to login form including the progress bar controls.

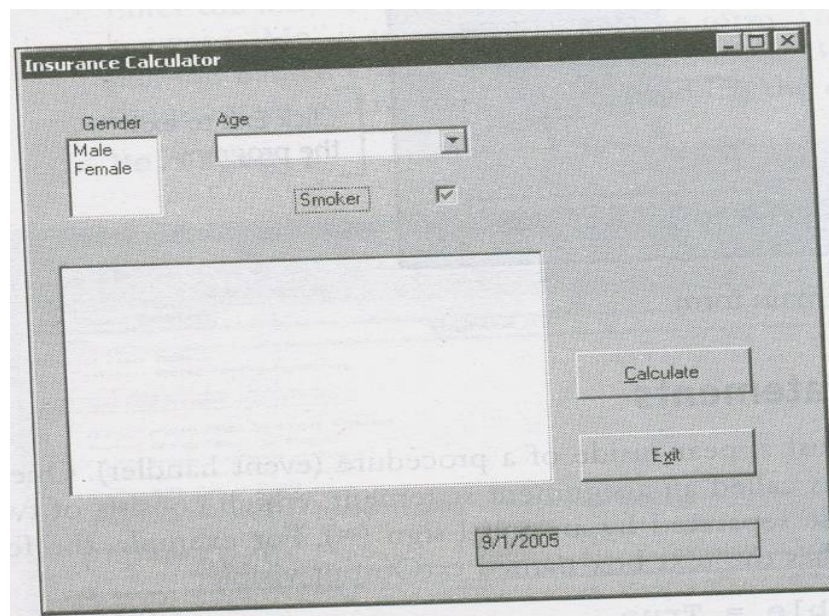


- (b) Develop an application for fruits billing system which will look like as shown below

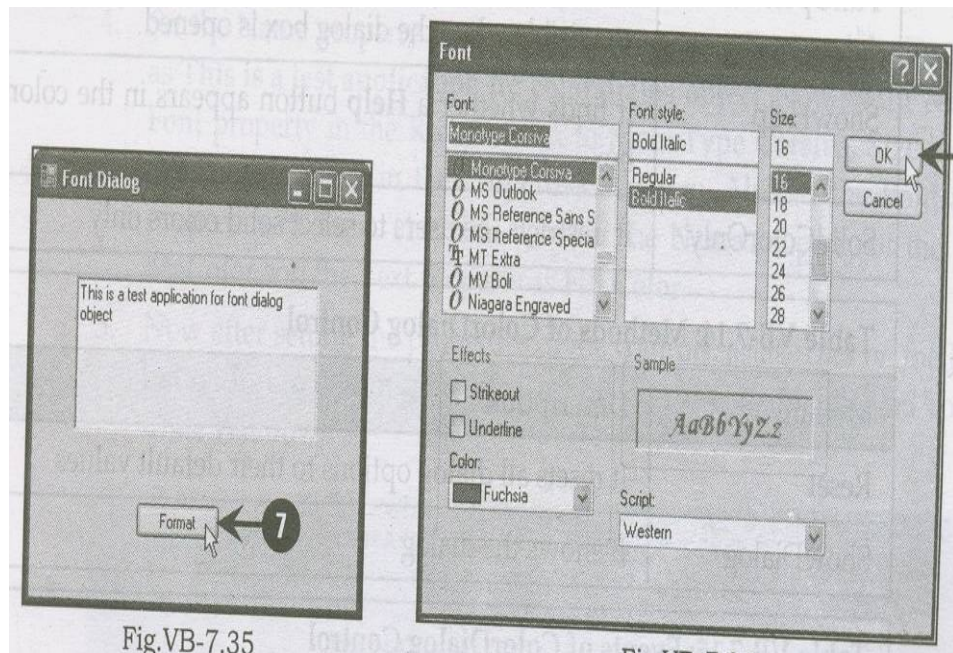




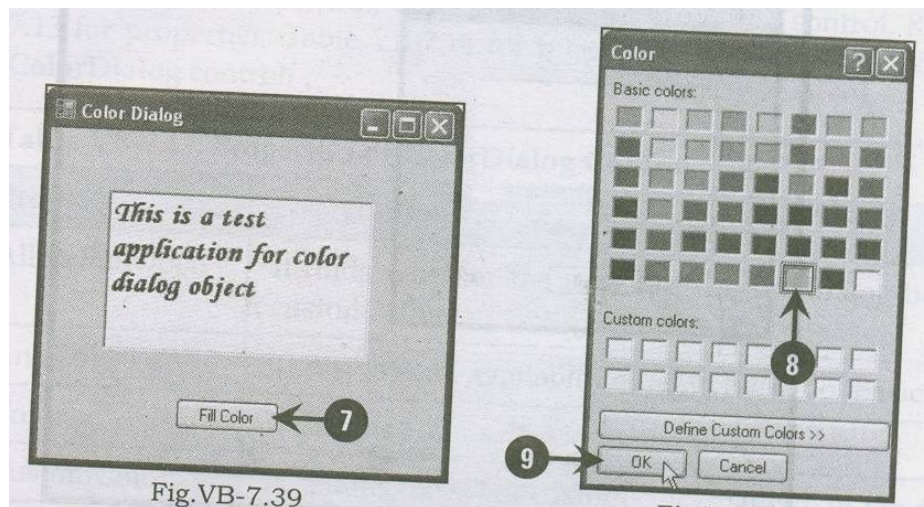
- 4) Develop an application which is helpful for calculating the insurance.



- 5) (a) Develop an application using font dialog control



(b) Develop an application using color dialog control



6) Develop an application to display the file selected by the user in a web browser control.



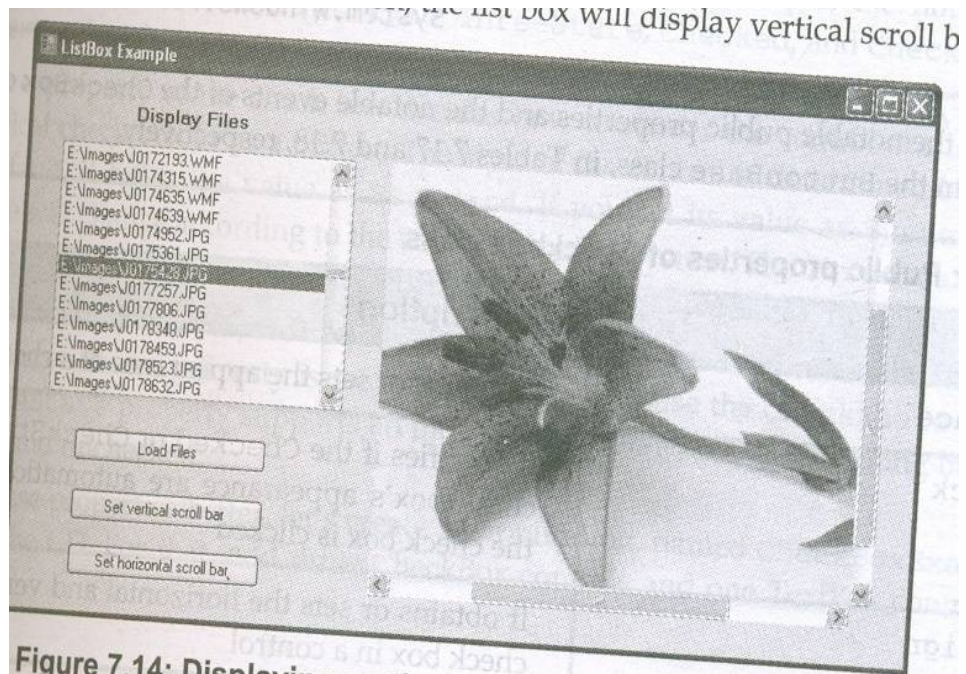
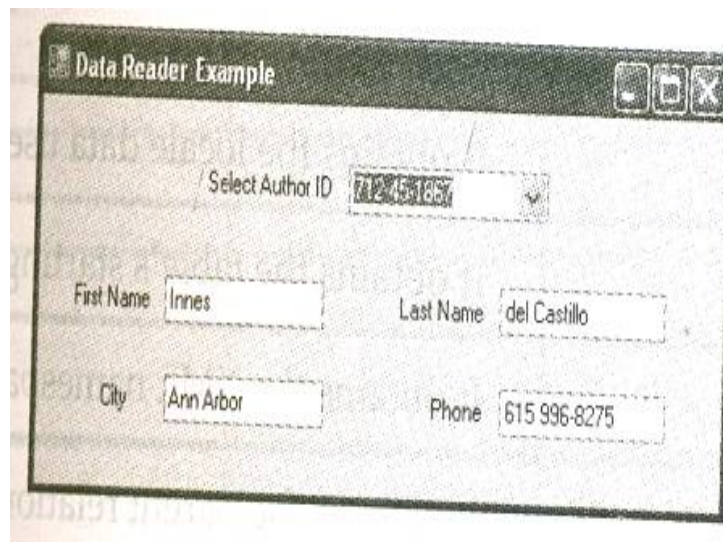


Figure 7.14: Displaying files in a list box

7) Develop an application using the data reader to read from a database.



## ASP.NET

8) Design an application for dynamically populating a checkbox list.

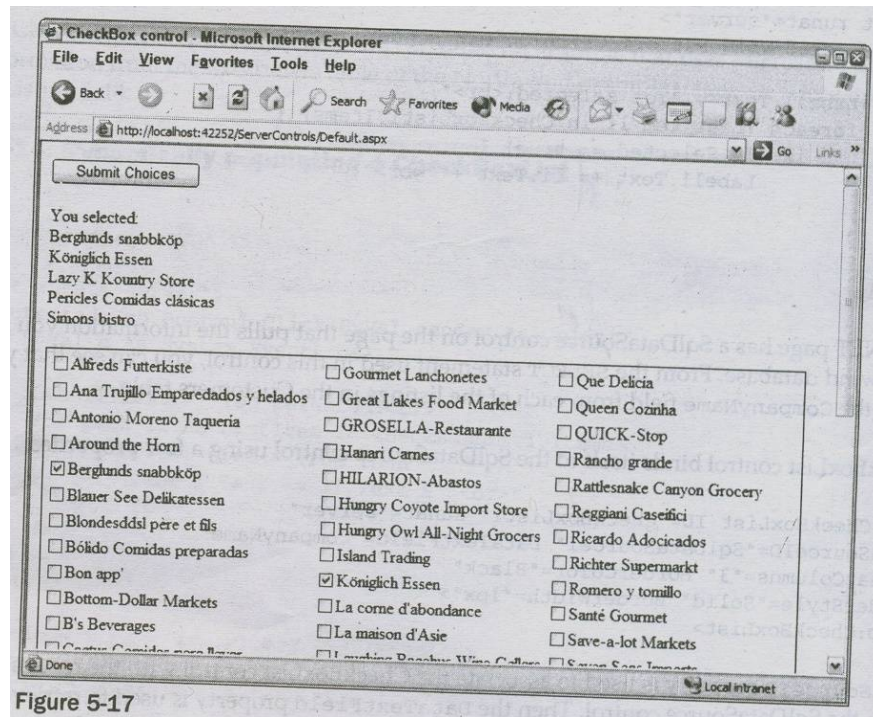


Figure 5-17

- 9) Develop an application for selecting a single day in the calendar control.

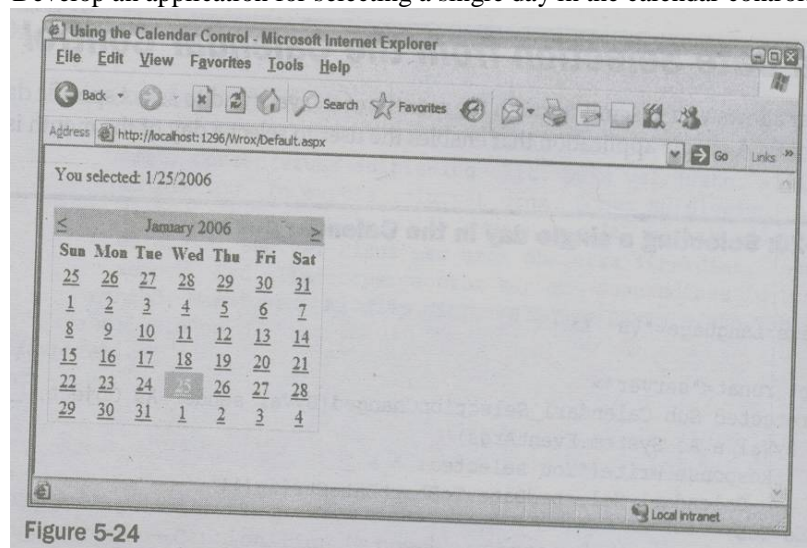
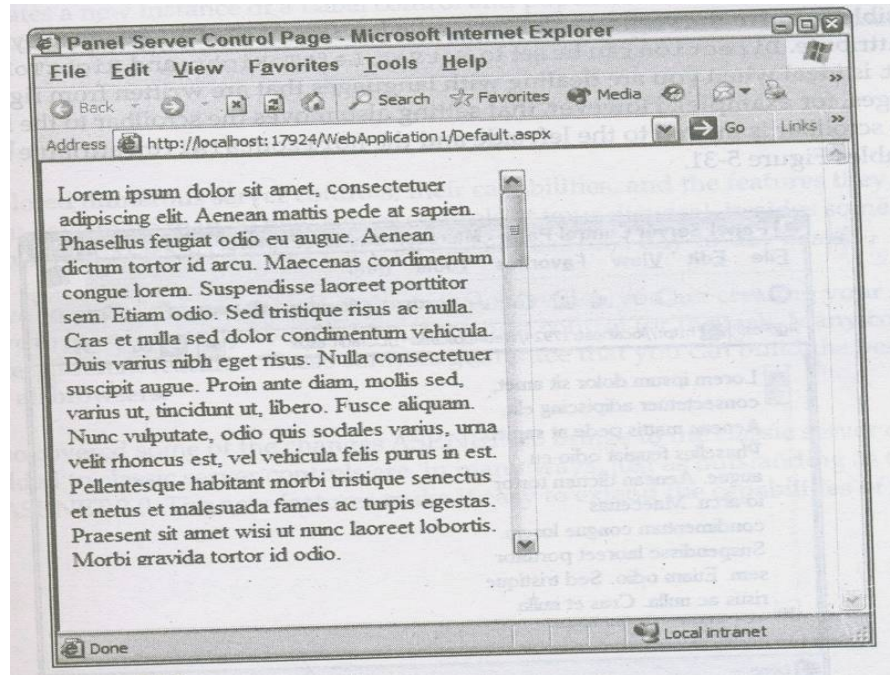


Figure 5-24

- 10) Design an application by using the new scroll bar feature with the panel server control.





11) Design an application with simple bulleted list control.

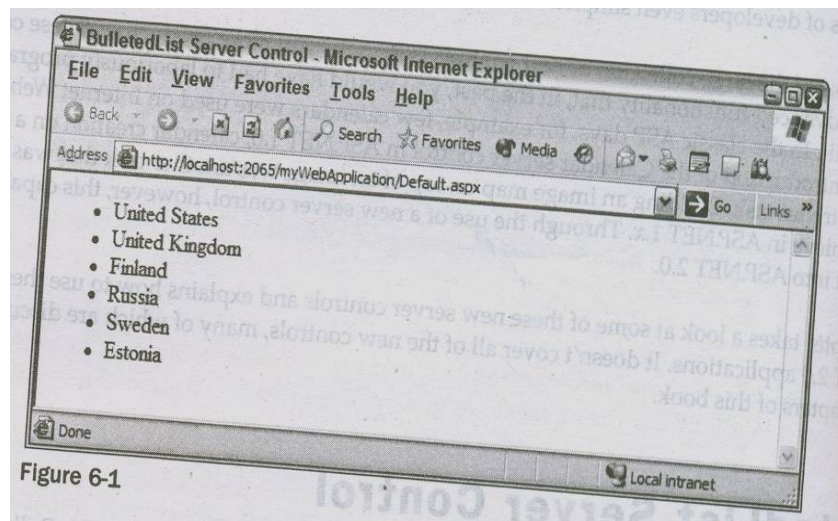
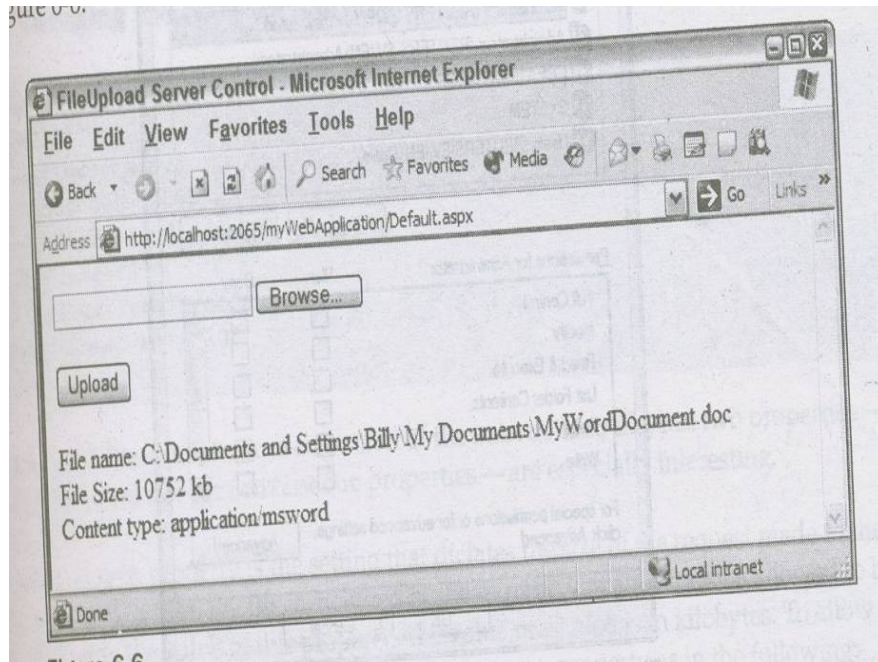
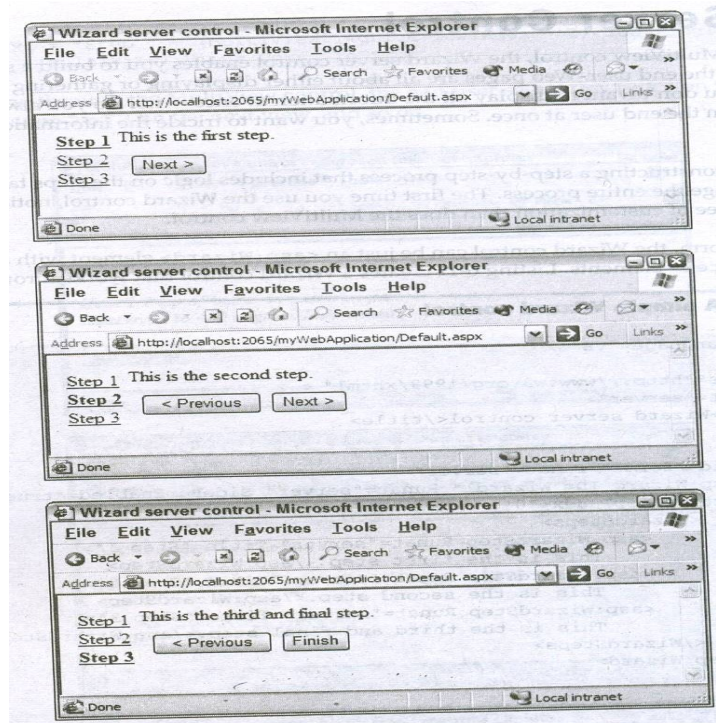


Figure 6-1

12) Design an application for uploading files using new file upload control.



13) Design an application for building a form in the wizard control.



14) Design an application by using the compare validator to test values against control values.

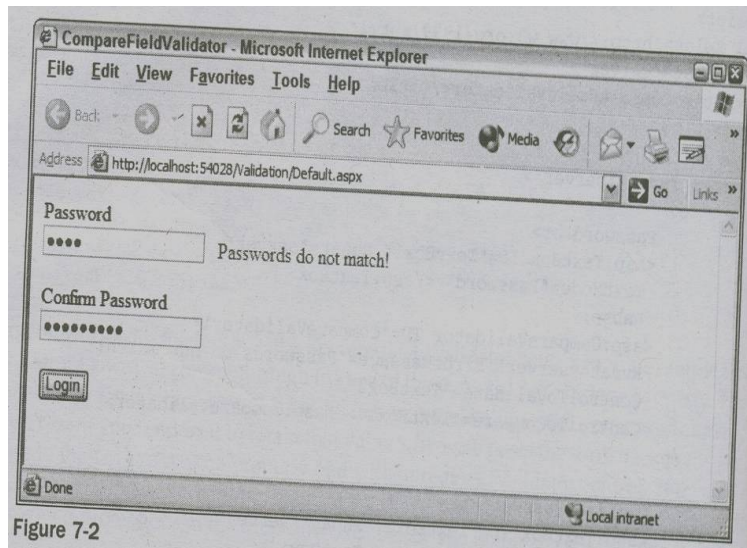


Figure 7-2

- 15) Design an application using the images, sounds for error notifications.

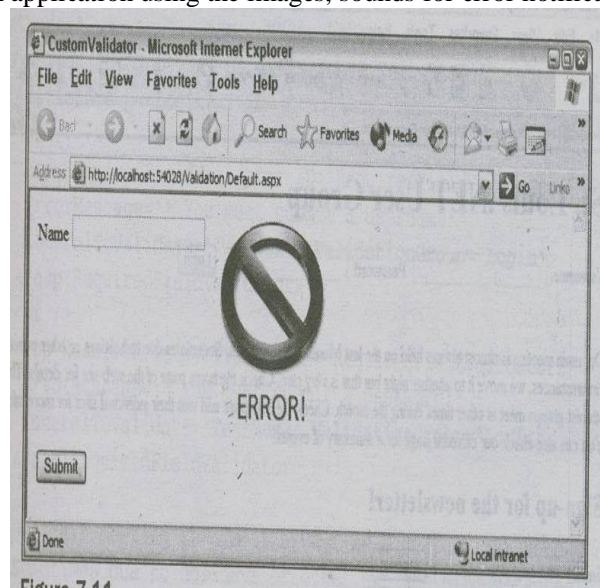


Figure 7.11

- 16) Design an application using the grid view control in an ASP.Net web page.



Unidentified Page - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://localhost:6404/Website1/Default3.aspx

CustomerID	CompanyName	ContactName	ContactTitle	Address	City	Region	PostalCode	Country	Phone	Fax
ALFKI	Alfreds Futterkiste	Maria Anders	Sales Representative	Obere Str. 57	Berlin		12209	Germany	030-0074321	030-0076545
ANATR	Ana Trujillo Emparedados y helados	Ana Trujillo	Owner	Avda. de la Constitución 2222	México D.F.		05021	Mexico	(5) 555-4729	(5) 555-3745
ANTON	Antonio Moreno Taquería	Antonio Moreno	Owner	Mataderos 2312	México D.F.		05023	Mexico	(5) 555-3932	
AROUT	Around the Horn	Thomas Hardy	Sales Representative	120 Hanover Sq.	London		WA1 1DP	UK	(171) 555-7788	(171) 555-6750
BERGS	Berglunds snabbköp	Christina Berglund	Order Administrator	Berggsvägen 8	Luleå		S-958 22	Sweden	0921-12 34 65	0921-12 34 67
BLAUS	Blauer See Delikatessen	Hanna Moos	Sales Representative	Forsterstr. 57	Mannheim		68306	Germany	0621-08460	0621-08924
BLONP	Blondel père et fils	Frédérique Citeaux	Marketing Manager	24, place Kléber	Strasbourg		67000	France	88.60.15.31	88.60.15.32
BOLID	Bólido Comidas preparadas	Martin Sommer	Owner	C/ Araquil, 67	Madrid		28023	Spain	(91) 555 22 82	(91) 555 91 99
BONAP	Bon app'	Laurence Leblan	Owner	12, rue des Bouchers	Marseille		13008	France	91.24.45.40	91.24.45.41
BOTTM	Bottom-Dollar Markets	Elizabeth Lincoln	Accounting Manager	23 Tsawassen Blvd.	Tsawassen BC		T2F 8M4	Canada	(604) 555-4729	(604) 555-3745
BSEEV	B's Beverages	Victoria Ashworth	Sales Representative	Fauntleroy Circus	London		EC2 5NT	UK	(171) 555-1212	
CACTU	Cactus Comidas para llevar	Patricio Simpson	Sales Agent	Cerrito 333	Buenos Aires		1010	Argentina	(1) 135-5555	(1) 135-4892
CENTC	Centro comercial Moctezuma	Francisco Chang	Marketing Manager	Sierras de Granada 9993	México D.F.		05022	Mexico	(5) 555-3392	(5) 555-7293
CHOPS	Chop-suey Chinese	Yang Wang	Owner	Hauptstr. 29	Bern		3012	Switzerland	0452-076545	

Done Local intranet

Figure 11-8

- 17) Design an application for adding an insert command to the sql data source control.

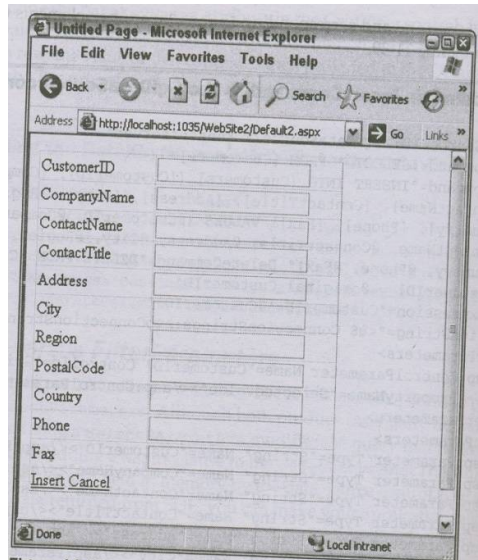


Figure 14.18

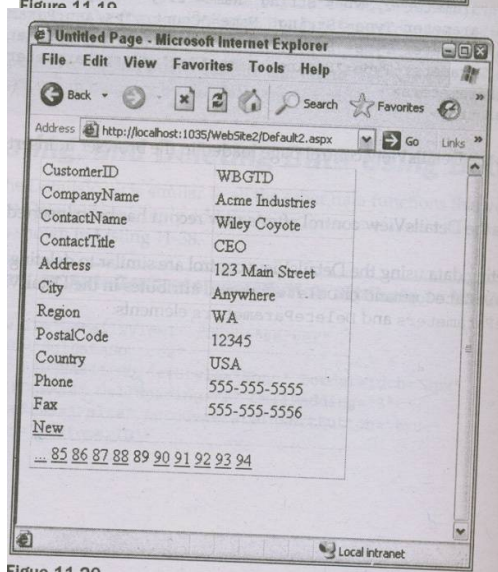
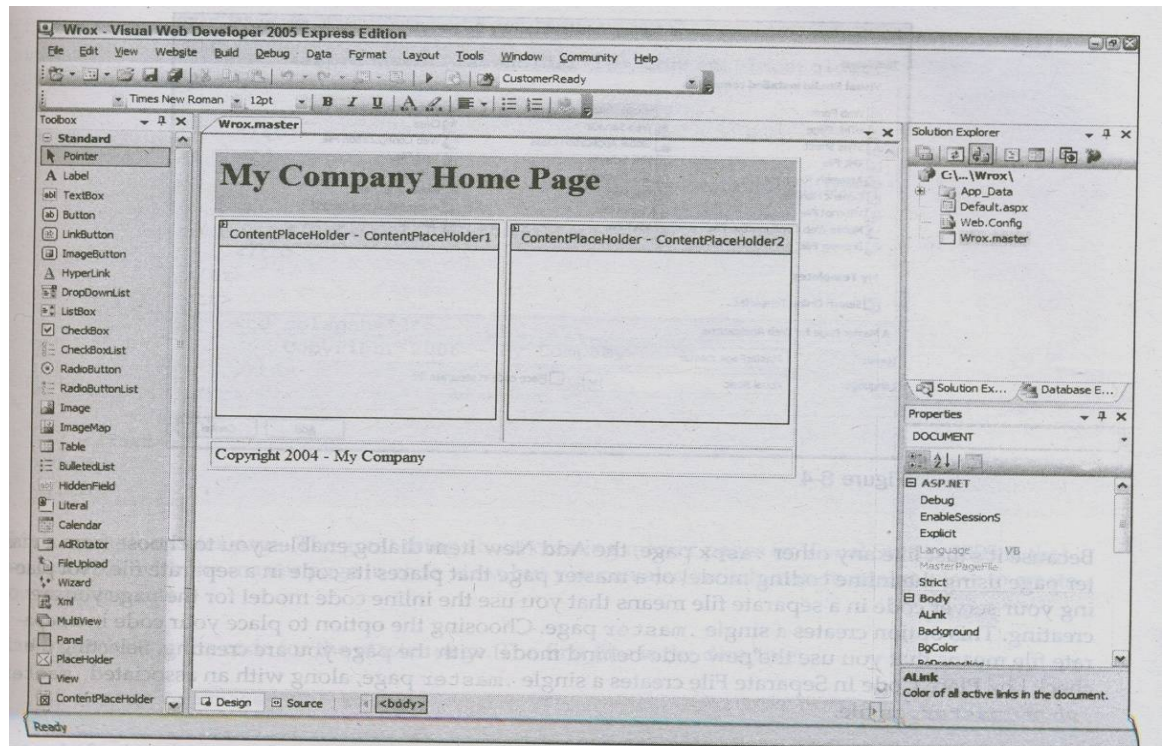


Figure 14.19

18) Design a web site using the concept of master pages.



## C#.NET

- 19) Develop a project for performing arithmetic, relational, logical operations.
- 20) Develop a project for demonstrating polymorphism, abstraction.
- 21) Develop a project for demonstrating switch statements.
- 22) Develop a project for implementing inheritance using abstract classes.
- 23) Develop a project for implementing interfaces using multiple inheritance.
- 24) Create a form that is the main window of a program using window class.
- 25) Create a form that is the main window with button program.
- 26) Create a form that is the main window of a program using the standard controls.
- 27) Create a form which displays the given inputs in the form of a tree view structure.
- 28) Develop a project for implementing exception handling in C#.
- 29) Develop a project which displays the student information in the relevant fields from the database which already exists.

## MCS 308 Seminar

## SECOND YEAR – FOURTH SEMESTER

Sub Code	Name of the Subject	No. of Credits	Int. Marks	Ext. Marks	Total Marks	Hours / Week
MCS 401	Data Mining And Big Data	5	30	70	100	4
MCS 402.1 / 402.2	Internet of Things / Cloud Computing	5	30	70	100	4
MCS 403.1 / 403.2	Machine Learning / Mobile Computing with Android	4	30	70	100	4
MCS 404	Soft Skills	1	50	--	50	3
MCS 405	Project	10	20	80	100	20
<b>TOTAL</b>		<b>25</b>	<b>160</b>	<b>290</b>	<b>450</b>	<b>35</b>

<b>MCS 401</b>	<b>DATA MINING AND BIG DATA</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 5</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### **Objectives**

The course is designed to meet the objectives of

1. understand classical models and algorithms in data warehousing and data mining,
2. enable students to analyse the data, identify the problems, and choose the relevant models and algorithms to apply,
3. assess the strengths and weaknesses of various methods and algorithms and to analyse their behaviour.
4. conceptualization and summarization of big data, big data computing technologies.

## **SYLLABUS**

### **UNIT – I**

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

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

### **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.
- Understand the key issues in data management and its associated applications in intelligent business and scientific computing

### **UNIT – II**

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

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



### **Learning Outcomes**

Students upon completion of this unit will be able to

- Decision trees
- Back propagation methods

### **UNIT – III**

**Cluster analysis** – Introduction types of data in cluster analysis a categorization of major clustering methods partitioning 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

- understanding big data latest technology foundations.

### **UNIT – IV**

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

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

### **Learning Outcomes**

Students upon completion of this unit will be able to

- Acquire fundamental enabling techniques and scalable algorithms Hadoop, Map Reduce, HDLC 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 Question No.1 Compulsory**

**7 x 2 = 14 M**

**Answer ONE Question from each unit**

**4 x 14 = 56 M**

1. a) Mention different OLAP operations  
b) Define Data Mining  
c) Explain in brief “Association Rule Mining”  
d) What is Prediction?  
e) Name the two data structures used in cluster analysis  
f) define primary and secondary name nodes.  
g) explain file read and write commands in hadoop

#### UNIT – I

2. a) What are the different data partitioning techniques and explain the importance of data partitioning?  
b) What is ETL Process and explain the ETL Architecture

**OR**

3. a) Explain the major issues in data mining  
b) Explain data mining as a step in the process of knowledge discovery

#### UNIT – II

4. a) How can we mine multilevel Association rules efficiently using concept hierarchies? Explain.  
b) Explain Apriori algorithm with example and how the efficiency of Apriori algorithm can be improved.

**OR**

5. a) Write a brief on classification of data mining systems  
b) Can we design a method that mines the complete set of frequent item sets without candidate generation? If yes, explain with example.

#### UNIT – III

6. a) Explain different grid-based clustering methods  
b) What are the typical requirements of clustering in data mining? Explain

**OR**

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

#### UNIT – IV

8. a) What is Bigdata? and discuss in detail why big data is more important with real time examples  
b) Discuss Bigdata in terms of three dimensions, volume, variety and velocity

**OR**

9. a) Discuss the design of Hadoop distributed file system and concept in detail  
b) Explain in detail about map-reduce in detail and discuss partitioning and combining

<b>MCS 402.1</b>	<b>INTERNET OF THINGS</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 5</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### **Objectives**

The course is designed to meet the objectives of

1. To introduce the concept of IoT
2. To introduce the concept of M2M
3. To understand the logical design
4. To make them familiar with IoT devices, endpoints and designing

## **SYLLABUS**

### **UNIT – I**

Introduction to Internet of Things, Introduction, physical design, logical design, IoT enabled technologies, IoT levels & deployment templates. Domain specific IoTs, Introduction, home automation, cities, environment, energy, retail, logistics, agriculture, Industry and health & lifestyle.

#### **Learning Outcomes**

Students upon completion of this unit will be able to

- Familiarized with IoT Terminology
- Understand the concept of IoT

### **UNIT – II**

IoT and M2M, Introduction, M2M, difference between IoT and M2M, SDN and NFV for IoT, IoT system management with NETCONF-YANG, need for IoT systems management, SNMP, network operator requirements, NETCONF, YANG.

#### **Learning Outcomes**

Students upon completion of this unit will be able to

- Realize the revolution of Internet in Mobile Devices
- Understand IoT System Management with NETCONF-YANG

### **UNIT – III**

IoT platforms design methodology, Introduction, IoT design methodology, case study, motivation for using Python. IoT Systems – Logical design using python, introduction, python data types and structures, control flow, functions, modules, packages, file handling, date/time operations, classes and packages.

#### **Learning Outcomes**

Students upon completion of this unit will be able to

- Understand various stages of IOT architecture
- Basic knowledge on Python programming.

## **UNIT – IV**

IoT physical Devices and endpoints, IoT devices, Raspberry Pi, Raspberry Pi interfaces, programming Raspberry Pi with Python. Case Studies Illustrating IoT Design, home automation, cities, environment and agriculture&productivity applications.

### **Learning Outcomes**

Students upon completion of this unit will be able to

- Understand Raspberry Pi interfaces.
- Evaluate case studies on IOT design

### **Prescribe Book**

Internet of Things – A Hands-On Approach, Arsdeep Bahga & Vijay Madisetti, Universities Press

### **Reference Books**

The Internet of Things Enabling Technologies, Platforms, and Use Cases, Pethuru Raj and Anupama C. Raman, CRC Press.

Iot Fundamentals Networking Technologies, Protocols and Use Cases for the Internet of Things , David, Hanes & Salgueiro Gonzalo, Pearson

**Model Paper**

**MCS 402.1 Internet of Things**

**Time 3 Hrs**

**Max. Marks 70**

**Answer Question No.1 Compulsory**

**7 x 02 = 14 M**

**Answer ONE Question from each unit**

**4 x 14 = 56 M**

1. Define these terms
  - a) Internet of Things
  - b) IoT Levels
  - c) SDN
  - d) M2M
  - e) Python Functions
  - f) IoT Devices
  - g) Applications of IoT
  - h) Process specification

**UNIT – I**

2.
  - a. Explain physical design of Internet of Things?
  - b. Describe communication models of IoT
- (OR)**
3. Discuss about three major application area of IoT.

**UNIT – II**

4.
  - a. Differentiate IoT and M2M.
  - b. Explain IoT system management with NETCONF-YANG.
- (OR)**
5.
  - a. Explain SNMP?
  - b. Discuss about network operator requirements.

**UNIT - III**

6.
  - a. Explain domain model specification?
  - b. Discuss about operational view specification?
- (OR)**
7. Explain python data types, classes and packages.

**UNIT – IV**

8.
  - a. Explain Raspberry Pi board.
  - b. Explain Raspberry Pi Interfaces.
- (OR)**
9. Design an IoT for Home automation and agriculture.

<b>MCS 402.2</b>	<b>CLOUD COMPUTING</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 5</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### **Objectives**

The course is designed to meet the objectives of

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

## **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.

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

### **Learning Outcomes**

Students upon completion of this unit will be able to

- Understand the concepts of Parallel and Distributed Computing.
- Describe importance of virtualization along with their technologies

### **UNIT-II**

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

**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

- identify the architecture and infrastructure of cloud computing, including SaaS, PaaS, IaaS, public cloud, private cloud, hybrid cloud, etc.
- understand concurrent programming in cloud computing.

## **UNIT-III**

**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-IV**

**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

- 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 Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.
3. Cloud Application Architectures, George Reese, ISBN 8184047142, Shroff/O' Reilly, 2009.



## MODEL PAPER

### MCA 402.2 Cloud Computing

**Time 3 Hrs**

**Max. Marks 70**

**Answer Question No.1 Compulsory**

**7 x 2 = 14 M**

**Answer ONE Question from each unit**

**4 x 14 = 56 M**

1. What is Service-Oriented Computing?
  - a) Define a Distributed System?
  - b) Give an example for full virtualization and brief about it.
  - c) What is a hybrid cloud?
  - d) Scalability
  - e) Give two examples of cloud applications in CRM and ERP.
  - f) What is a MOCC?

#### UNIT – I

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

**OR**

3. a) What are characteristics of Virtualization?
  - b) Discuss about Machine Reference Model.

#### UNIT – II

4. a) Discuss about the cloud architecture.
  - b) What are different types of clouds? Explain.

**OR**

5. a) Explain about Aneka Framework overview.
  - b) Discuss about Aneka SDK.

#### UNIT - III

6. a) What is Task computing and what are its frameworks?
  - b) Discuss about Task based application models.

**OR**

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

#### UNIT – IV

8. Discuss about Amazon Web Services.

**OR**

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

<b>MCS 403.1</b>	<b>MACHINE LEARNING</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 4</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### **Objectives**

The course is designed to meet the objectives of

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

### **SYLLABUS**

#### **UNIT - I**

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

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

#### **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

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**

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  
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. Classification of text and its importance
2. Different learning theories
3. The methods to categorize and organize information

### **Unit- IV**

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 Question No.1 Compulsory**

**7 x 2 = 14 M**

**Answer ONE Question from each unit**

**4 x 14 = 56 M**

1. a) Write the issues of machine learning.
- b) What is an unbiased learner?
- c) Define Hypothesis space search
- d) What is sampling theory?
- e) Write about Bayes optimal classifier
- f) What is regression?
- g) What is the use of genetic algorithm?
- h) Write about temporal difference learning

#### UNIT-I

- 2 a. What is Machine Learning? Explain different perspective and issues in machine learning.
- b. Describe the Find-s algorithm. Explain how to find a maximally specific hypothesis.

**OR**

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

#### UNIT-II

- 4 a. Describe the Inductive Bias in decision tree learning.
- b. Write about handling training examples with missing attribute values.

**OR**

- 5 a. Explain about estimating hypothesis accuracy.
- b. Write a note on practical considerations in comparing learning algorithms

#### UNIT - III

- 6 a. Write Bayes theorem. What is the relationship between Bayes theorem and the problem of concept learning?
- b. Explain Maximum Likelihood Hypothesis for predicting probabilities.

**OR**

- 7 a. Explain Naïve Bayes Classifier with an Example.
- b. Explain the EM Algorithm in detail. (08 Marks.)

#### UNIT-IV

- 8 a. Define the following terms  
i) Error of a Hypothesis. ii) Optimal Mistake Bounds iii) Weighted-Majority Algorithm
- b. Explain about sample complexity for finite hypothesis spaces

**OR**

- 9.a. Explain the K – nearest neighbour algorithm for approximating a discrete – valued function with pseudo code
- b. Write about locally weighted regression.

<b>MCS 403.2</b>	<b>MOBILE COMPUTING WITH ANDROID</b>	
<b>Instruction 4 periods / week</b>		<b>Credits 4</b>
<b>Internal 30 marks</b>	<b>University Exam 70 marks</b>	<b>Total 100 Marks</b>

### **Objectives**

The course is designed to meet the objectives of

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

## **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. Using images views to display pictures, using menus with views and some additional 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**

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

### **Learning Outcomes**

Students upon completion of this unit will be able to

- develop software with reasonable complexity on mobile platform

## **UNIT – IV**

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 403.2 Mobile Computing with Android

**Time 3 Hrs**

**Max. Marks 70**

**Answer Question No.1 Compulsory**

**7 x 2 = 14 M**

**Answer ONE Question from each unit**

**4 x 14 = 56 M**

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

#### **UNIT – I**

2.
  - a. Explain features of android?
  - b. What are the tools for android application development? Explain them.
- (OR)
3.
  - a. What are the languages used to develop android applications?
  - b. Discuss about passing data to an activity.

#### **UNIT – II**

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

#### **UNIT – III**

6. Create a DBA helper class. Explain it with an example.
- (OR)
7.
  - a. Discuss about projections, filtering and sorting in content provider?
  - b. Explain how to insert and delete records into and from a content provider.

#### **UNIT – IV**

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



<b>MCS 404</b>	<b>SOFT SKILLS</b>	
<b>Instruction 3 periods / week</b>		<b>Credits 1</b>
<b>Internal 50 marks</b>	<b>--</b>	<b>Total 50 Marks</b>

### **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)

# MCS 405 Project

<b>MCS 405</b>	<b>Project</b>	
		<b>Credits 10</b>
<b>Internal 30 Marks</b>	<b>External 70 Marks</b>	<b>Total 100 Marks</b>

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

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