

## MCA 1.1 FUNDAMENTALS OF COMPUTERS

### Unit – I

**Computer Basics:** Algorithms, A Simple Model of a Computer, Characteristics of Computers, Problem Solving Using Computers.

**Data Representation:** Representation of Characters in Computers, Representation of Integers, Representation of Fractions, Hexadecimal Representation of Numbers, Decimal to Binary Conversion, Error Detecting Codes.

**Input / Output Units:** Description of Computer Input Units, Other Input Methods, Computer Output Units.

**Computer Memory:** Memory Cell, Memory Organization, Read Only Memory, Serial Access Memory, Physical Devices Used to Construct memories, Magnetic Hard Disk, Floppy Disk Drives, Compact Disk Read Only Memory (CDROM), Magnetic Tape Drive.

### Unit – II

**Processor:** Structure of Instructions, Description of a Processor, A Machine Language Program, An Algorithm to Simulate the Hypothetical Computer. **Computer Architecture:** Interconnection of Units, Processor to Memory Communication, I/O to Processor Communication, Interrupt Structures, Bus Architecture of Personal Computers, Multiprogramming, Processor Features, Reduced Instruction Set Computers (RISC), Virtual Memory.

**Programming Languages:** Why Programming Language?, Assembly Language, High Level Programming Languages, Compiling High Level Language Program, Some High Level Languages.

**Operating System:** Why Do We Need an Operating System?, Batch Operating System, Multiprogramming Operating System, Time Sharing Operating System, Other Facilities Provided by Operating Systems, Personal Computer Operating System, The UNIX Operating System, Microkernel based Operating System, On – line and Real – time Systems.

### Unit – III:

**Microcomputers:** An Ideal Microcomputer, An Actual Microcomputer, Memory Systems for Microcomputers, A Minimum Microcomputer Configuration, Evolution of Microcomputers, Special Purpose Microprocessors, Special Purpose Microcomputer Software, Special Purpose Applications of Microcomputers, Smart Cards and RFID.

**Computer Generations and Classifications:** First Generation of Computers, The Second Generation, The Third Generation, The Fourth Generation, The Fifth Generation, Moore's Law, Classification of Computers, Distributed Computer System, Parallel Computers.

**Voice and Data Communications:** Types of Communications with and Among Computers, Characteristics of Communication Channels, Allocation of Channel, Physical Communication Media, Public Switched Telephone Networks, Multiplexing Techniques in Wireless Communication, Cellular Communication System, Establishing Communication Paths, ATM Networks.

**Computer Networks:** Need for Computer Communication Networks, Internet and the World Wide Web, Communication Protocols, Local Area Networks, Token Ring Local Area Network, Interconnecting Networks, The Future of Internet Technology.

### Unit – IV

**Computer Graphics:** Computer Graphics Applications, Display Devices, Overview of Display Method, Raster Scan Display Processing Unit, Input Devices for Interactive Graphics, Programmers' Model of Interactive Graphics Systems, Image Acquisition and Storage, Storage Formats for Pictures, Image Acquisition with a Digital Camera.

**Multimedia Data Acquisition and Processing:** Capturing a Moving Image with a Video Camera, Compression of Video Data, MPEG Compression Standard, Acquiring and Storing Audio Signals, Audio Signal Processing, Speech Processing.

**Emerging Computing Environments:** Current Computing Scenario, Peer to Peer Computing, Grid Computing, Cloud computing, Utility Computing.

### Prescribed Book:

Fundamentals of Computers, by V.Rajaraman, PHI, Fifth Edition, April 2010.

### Reference Book:

Fundamentals of computers , E.Balagurusamy, TMH, second reprint 2010.

Chapters: 1, 2, 3, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17.

### **Unit-I**

**Introductory Concepts:** Types of Programming Languages, Introduction to C, Desirable Program Characteristics

**Introduction to C Programming:** The C Character Set, Writing First Program of C, Identifiers and Keywords, Datatypes, Constants, Variables and Arrays, Declarations, Expressions Statements, Symbolic Constants

**Operators and Expressions:** Arithmetic Operators, Unary Operators, Relational and Logical Operators, Assignment Operators, The Conditional Operator, Library Functions.

**Data Input and Output:** Preliminaries, Single Character Input-The Getchar Function, Single Character Output – The Puchar Function, Enter Input Data – The Scanf Function, More About the Scanf Function, Writing Output Data – The Printf Function, More About the Printf Function, The Gets and Puts Functions

**Preparing and Running A Complete C Program:** Planning a C Program, Writing a C Program, Error Diagnostics, Debugging Techniques

### **Unit-II**

**Control Statements:** Preliminaries, Branching: The IF-ELSE Statement, Looping: The while Statement, More Looping: The do-while Statement, Still More Looping: The for Statement, Nested Control Structures, The Switch Statement, The break Statement, The continue Statement, The comma Statement, The goto Statement.

**Functions:** A Brief Overview, Defining a Function, Accessing a Function, Function Prototypes, Passing Arguments to a Function, Recursion

**Program Structure:** Storage Classes, Automatic Variables, External (Global) Variables, Static Variables.

### **Unit-III**

**Arrays:** Defining an Array, Processing an Array, Passing Arrays to Functions, Multidimensional Arrays, Arrays and Strings

**Pointers:** Fundamentals, Pointer Declarations, Passing Pointers to a Function, Pointers and One-dimensional Arrays, Dynamic Memory Allocation, Operations on Pointers, Pointers and Multidimensional Arrays, Arrays of Pointers, Passing Functions to Other Functions

**Structures and Unions:** Defining a Structure, Processing a Structure, User-defined Data Types (Typedef), Structure and Pointers, Passing Structures to Functions, Self-referential Structures, Unions

**Data Files:** Why Files, Opening and Closing a Data File, Reading and Writing a Data File, Processing a Data File, Unformatted Data Files, Concept of Binary Files

### **Unit-IV**

**Low-Level Programming:** Register Variables, Bitwise Operations, Bit Fields

**Some Additional Features of C:** Enumerations, Command Line Parameters, More About Library Functions, Macros, The C Processor

**Appendix H Library Functions**

### **Prescribed Book:**

Byron S Gottfried, "Programming with C", Second Edition, Schaum Out Lines, TATA Mc Graw Hill (2007)

**Chapters:** 1.8 to 1.10, 2,3,4,5,6,7,8.1 to 8.4,9,  
10.1 to 10.9,11,12,13,14 and Appendix H

**Reference Book:**

1. Behrouy A. Foreuyan & Richard F. Gilberg, “Computer Science A structured programming Approach using C”, Third Edition, Cengage Learning (2008).
2. Herbert Schildt, “The Complete Reference C”, Fourth Edition, TMH (2008)
3. Ashok N. Kamthane, “Programming with ANSI and Turbo C”, Pearson Education (2008)
4. Mullish Cooper, “The Spirit of C – An Introduction to Modern Programming”, Jaico Books (2006)

**Model Paper**

**MCA 102 : Programming in ‘C’**

**Time: 3 Hrs**

**Max. Marks: 80**

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**Answer ALL the following questions. Each carries Two Marks.**

**8 \* 2=16**

**1.**

- (a)Importance of storage class.
- (b)What is the purpose of typedef.
- (c)Define type casting.
- (d)Difference between macro and procedure.
- (e)What is the difference between array of characters and a string.
- (f)Why ‘C’ is called middle level language.
- (g)How pointers are used to access structure elements.
- (h)Explain argv and argc.

**Answer ONE question from each unit. Each Question carries sixteen Marks.**

**Unit – I**

**2.**

- (a)Explain with suitable examples different data types in ‘C’. **8M**
- (b)Briefly explain different operators in ‘C’. **8M**  
(or)
- (c)With suitable examples explain structure of ‘C’ program. **8M**
- (d)Explain gets() and puts() with examples. **8M**

**Unit –II**

**3.**

- (a)Explain loop structures in ‘C’. **8M**
- (b)Write a program for sum of digits of a number and no.of digits in a number. **8M**  
(or)
- (c)Write about different storage classes in ‘C’. **8M**
- (d)Write a program to pass n arguments to a function and return average of n values. **8M**

**Unit –III**

**4.**

- (a)Explain declaration, accessing and processing of two dimensional arrays in ‘C’. **8M**
- (b)Write a program to sort strings using pointers. **8M**  
(or)
- (c) What is a pointer ? How pointers are useful in self referential structures ? What are the advantages of pointers? **8M**

**Unit – IV**

**5.**

(a) Explain File processing in 'C'.

**8M**

(b) Write a program to update a record in a file.

**8M**

(or)

(c) With examples explain different pre-processor directives. **8M**

(d) Write a program to calculate no.of vowels, words in a given text.

**8M**

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## **MCA 103: Computer Organization**

### **Unit-I**

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

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

**Data Representation:** Data Types, Complements, Fixed Point Representation, Floating Point Representation, Other Binary Codes, error Detection Codes.  
(Chapters:)

### **Unit-II**

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

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

### **Unit-III**

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

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

### **Unit-IV**

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

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

**Memory Organization:** Memory Hierarchy, Main Memory, Auxiliary memory, Associative Memory, Cache Memory.  
(Chapters:)

### **Prescribed Book:**

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

**Chapters :** 1,2,3, 4, 5.1 to 5.7, 7, 8.1 to 8.7, 10.2 to 10.5,  
11.1 to 11.5, 12.1 to 12.5

### **Reference Books:**

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

Model Paper

MCA 103: Computer Organization

Time: 3 hours

Maximum: 80 Marks.

Answer the Following questions. Each Question carries 16 Marks.

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

UNIT-I

2. a) Simplify the following Boolean functions using K-maps and draw the relevant logic diagram.  
 $f(abcd) = \sum m(0,3,7,8,9,11,12,13) + \sum d(1,4,14,15)$
- b) Explain the operation of Full- Adder circuit.  
(or)
- c) Design a 4-bit Synchronous counter using T-Flip Flops.
- d) Explain the Operation of Bidirectional Shift Register.

UNIT-II

3. a) Explain about Instruction cycle in detail.
- b) Explain various Memory reference instructions.  
(or)
- c) Explain any one stage of arithmetic logic shift unit.
- d) What are various logic micro operations and their implementation?

UNIT-III

- 4.a) Explain different addressing modes with an example.
- b) What is an interrupt ? Explain various types of interrupts.  
(or)
- c) What is Control memory ? Explain address sequencing with suitable diagram.
- d) Prepare 3-address, 2-address, 1-address, 0-address instructions to solve the following statement.

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

UNIT-IV

- 5.a) Explain Booth multiplication Algorithm with an example.
- b) Explain memory mapped I/O and Isolated I/O.  
(or)
- c) What is Locality of reference? Explain various organizations of Cache memory.
- d) What is an I/O Interface? Explain DMA data transfer in detail.

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## **MCA 104: Discrete Mathematical Structures**

### **UNIT-I:**

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

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

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

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

### **UNIT-II:**

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

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

### **UNIT-III:**

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

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

### **UNIT-IV:**

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

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

### **Prescribed Book:**

Kenneth H Rosen, “Discrete Mathematics & its Applications”, 6<sup>th</sup> Edition, McGraw-Hill (2007)

**Chapters :** 1 to 10

### **Reference Books:**

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

Model Paper

MCA 104: Discrete Mathematical Structures

Time: 3 hours

Maximum: 80 M.

Answer Question No.1 Compulsory: 8 x 2 = 16 M

Answer ONE Question from each unit: 4 x 6 = 64 M

1. (a) Find the truth table of the proposition  $(p \rightarrow q) \vee (\sim p \rightarrow r)$  is p and r are true and q is false.

(b) Find the inverse of  $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 3 & 0 \\ 0 & 1 & 2 \end{bmatrix}$

(c) Express the integer 325 as a product of powers of primes.

(d) How many ways are there to seat 8 boys and 8 girls around a circular table.

(e) Define equivalence relation with example.

(f) Define an Euler circuit in a graph.

(g) Write Warshalls Algorithm.

(h) State the generalized Pigeon hole principle.

UNIT-I

2. (a) Verify whether the following is a tautology by using truth table.  $\{(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow R)\} \rightarrow R$ .

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

(or)

(c) Find LCM and GCD of 540 and 504.

(d) Show that if we select 151 distinct computer science courses numbered between 1 and 300 inclusive at least two are consecutively numbered.

UNIT-II

3. (a) Show that if any five numbers from 1 to 8 are chosen then two of them will add to 9.

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

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

(or)

(c) Solve the following recurrence relation  $a_n = 4a_{n-1} + 5a_{n-2}$   
 $a_1 = 2, a_2 = 6$ .

(d) Find a generating function for  $a_r =$  the no. of ways of distributing r similar balls in to n numbered boxes where each box is non empty.

UNIT-III

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

ii) Determine whether the following relation R on a set A is reflexive, irreflexive, symmetric asymmetric,

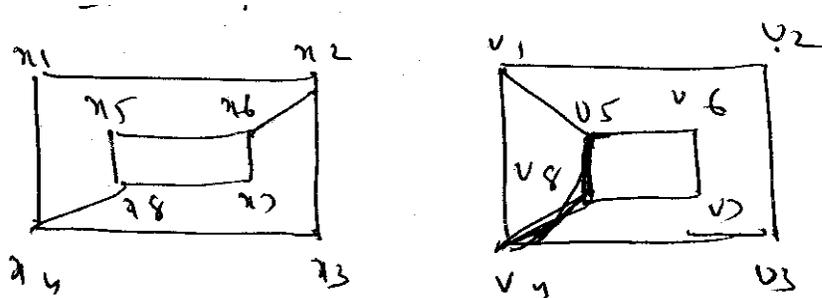
Antisymmetric or transitive  $A = Z^+ \quad aRb \Leftrightarrow a = b^k$  for some  $K \in Z^+$ .

(b) Let  $A = \{1, 2, 3, 4\}$

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

(or)

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

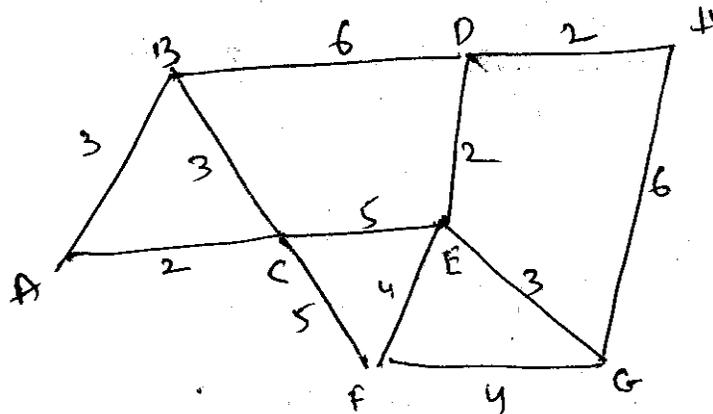


(d) Show that the sum of all vertex degree is equal to twice the number of edges.

UNIT-IV

5. (a) Show a tree with  $n$  vertices has exactly  $n-1$  edges.

(b) Use prim's algorithm to find minimal spanning tree for a connected graph.



(c) Use K-map for the expression to find a minimal sum of products

$$f(a,b,c) = \Sigma (0,1,4,6).$$

(d) Use Quine – meclusky to find minimal expression for

$$f(a,b,c) = \Sigma (0,2,3,7)$$

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## **MCA 105: Accounting And Financial Management**

### **UNIT I:**

Cost Accounting

- 1.1 Accounting concepts
- 1.2 Double entry system
- 1.3 Journal-ledger, trial balance, preparation of final accounts (problems)
- 1.4 Nature of financial statement-preparation of trading-profit and loss accounts-balance sheet of joint stock companies

### **UNIT II:**

Cost Accounting

- 1.1 cost sheet
- 1.2 marginal costing (problems)
- 1.3 budget and budgetary control
- 1.4 standard costing (Problems)

### **UNIT III:**

Financial Management

- 3.1 nature and scope of finance function-goals of financial management-modern concept of finance function.
- 3.2 Nature of financial decisions: concept-major financial decision areas-investment decision-financing decision and dividend decision.
- 3.3 Financial analysis: concept of financial analysis-types of analysis-tables of analysis-ratio analysis-tables of analysis-funds flow and cash flow analysis (Problems)

### **UNIT IV:**

Working capital management

- 4.1 concepts of working capital-importance of working capital-components of working capital-determination of working capital-source of working capital.
- 4.2 Inventory management-accounts of receivable management-cash management
- 4.3 Forecasting of working capital management

### **Prescribed Book:**

K.Rajeswara Rao & G.Prasad, Accounting and finance, Jaibharath publishers, 2002 (Chapters 1 to 19)

### **Reference Books:**

1. Vanherne & James C, John M.Wachewiez J.R., Fundamentals of Financial management, PHI, 2002
2. Horngren, Sundem Blliott, Introduction to financial accounting, pearson education, 2002
3. Ambrish Gupta, "Financial Accounting for Management", Third Edition, Pearson Education (2009)
4. Paresh Shah, "Basic Financial Accounting for Management", Oxford Higher Education (2008)

Model Paper

MCA 105: Accounting and Financial Management

Time: 3hours

Maximum: 80 M

Answer questions carry equal Marks.

Answer question No.1 Compulsorily (8 x 2 = 16M)

Answer ONE question from each unit. (4 x 16 = 64M)

1.

- a) State the different parties interested in accounting information and briefly mention the uses to them.
- b) What is Process Costing ?
- c) Net present value.
- d) What is B.E.P ?
- e) Uses of cash flow analysis.
- f) Significance of 'Ratio Analysis'.
- g) Funds flow analysis.
- h) Cash Management.

UNIT – I

2. a) From the following Trial Balance prepare Trading and Profit and Loss Account for the year ended 31<sup>st</sup> March 2008.

<u>Particulars</u>	<u>Debit</u>	<u>Credit</u>
	Rs.	Rs.
Opening Stock	51,000	---
Capital	---	72,000
Purchases	2,50,000	---
Sales	---	4,00,000
Carriage inwards	12,000	
Wages	50,000	
Salaries	26,000	
Commission	3,000	
Bad debts	2,000	
Insurance	4,000	
Rent, Rates and Taxes	12,000	
Postage and Telegram	2,800	
Carriage outwards	7,700	
Machinery	40,000	
Furniture	5,000	
Debtors	60,000	
Creditors	---	53,500
	-----	-----
	5,25,500	5,25,500
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Additional information :

- (i) Stock on 31-3-2007 was Rs.60,000.
- (ii) Depreciation on furniture is charged at 10%.
- (iii) Out standing salaries Rs.4,000.
- (iv) Bad debts Rs.1,000.
- (v) Reserve for doubtful debts @ 5% on debtors.

(or)

- b) How do you classify the accounts. Explain the rules of accounts.

UNIT – II

3. a) From the following particulars you are required to Calculate  
i) P/V Ratio ii) BEP for sales iii) Sales required to earn a profit Rs.40,000. (iv) Margin of safty in second year.

Year	Sales	Profit
	Rs.	Rs.
2006	2,40,000	18,000
2007	2,80,000	26,000

(or)

- b) Define the terms 'Budget and budgetary control'. Write Main objectives of budgetary control system.

### **UNIT-III**

4. a) Define Finance function. What are the functions of a financial Manager? Explain.

(or)

- b) From the following information prepare a statement of Balance Sheet.  
Current Ratio 2.5, Liquidity ratio 1.5  
Proprietary ratio 0.75 (Fixed assets / Proprietary fund)  
Working Capital Rs.60,000.  
Reserves and surplus : Rs.40,000  
There is no long term loan.

### **UNIT-IV**

5. a) Define working capital concepts. What are the determinants of working capital of a manufacturing company ?

(or)

- b) Explain the concept of working capital. What are the various sources of working capital? Give examples for long term sources and short term sources of working capital.

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## **MCA 106: PC Software Lab**

### **Lab Cycle**

#### **MS-WORD**

1. Design an Invitation to invite Staff, students to a seminar on “Emerging Trends in Computers”.
2. Assignment using Mail merge.
3. Creation of Bio-Data: consisting Name, email-id, Contact Address, Carrier Objective, Educational qualifications, social activities, achievements.
4. Assignment to implement macro operations.

#### **MS-POWERPOINT**

1. Make a Power point presentation on your carrier planning.
2. Make a Power point presentation on any Current affair.
3. Make a Power point presentation to represent a Software Company Profile.
4. Make a Power point presentation about things you learned during student life.

#### **MS-ACCESS**

1. Create a database using MS-ACCESS with atleast 5 records

TABLE1 STRUCTURE:

EMPLOYEE NUMBER NAME DOB GENDER DEPARTMENT

TABLE2 STRUCTURE:

EMPLOYEE NUMBER BASIC HRA DA DEDUCTIONS GROSS SALARY

Maintain the relationship between two tables with REGISTER NUMBER as a Primary Key and answer the following queries:

Show the list of Employees with the following fields as one query

EMPLOYEE NUMBER NAME GENDER GROSS SALARY

2. Maintain the relationship between above two tables with EMPLOYEE NUMBER as a Primary Key and generate following reports:

Report 1: EMPLOYEE NUMBER, NAME, BASIC HRA DA DEDUCTIONS

Report 2: EMPLOYEE NUMBER, DEPARTMENT, NET SALARY.

Use forms to enter data in to tables

3. Create a table and form with following fields  
Book Number, Book Name, Author, Publisher, Price  
Generate the report with following fields  
All Books with price between Rs.500 and Rs.1000

#### **MS-EXCEL**

1. Create an electronic spreadsheet to convert
  - a. Decimal Numbers to Hexa decimal, Octal, Binary
  - b. Binary to Decimal, Octal, Hexadecimal
  - c. Hexadecimal to Decimal, Octal, Binary
2. The Cement Company shows the sales of different products for 5 years. Create column chart, Pie Chart and Bar chart for the following data

<b>YEAR</b>	<b>PRODUCT-1</b>	<b>PRODUCT-2</b>	<b>PRODUCT-3</b>	<b>PRODUCT-4</b>
<b>2004</b>	1000	800	900	1000
<b>2005</b>	800	80	500	900
<b>2006</b>	1200	190	400	800
<b>2007</b>	400	200	300	1000
<b>2008</b>	1800	400	400	1200

3. Demonstrate Hyper Linking in Excel.

## **MCA 107: C Programming Lab**

### **Lab Cycle**

1. Program to calculate compound interest.
2. Program to calculate roots of a quadratic equation.
3. Program to average of 'n' numbers.
4. Program to find wheather the given number is
  - (i) Prime number or not
  - (ii) Perfect number or not
  - (iii) Armstrong number or not
  - (iv) Palindrome or not
5. Program to demonstrate function calling multiple times.
6. Program to read two integers and print the quotient and remainder of the first number divided by the second number.
7. Program to get the following output.

Row 1:	1	2	3	4	5
Row 2:	1	2	3	4	5
Row 3:	1	2	3	4	5
8. Program for sum of digits of an integer number.
9. Program for following using Recursion
  - (i) Factorial of a number
  - (ii) Fibonacci series
10. Program to write records in to a file.
11. Program to read records from a file sequentially.
12. Program to search a record in a file.
13. Program to update a record in a file.
14. Program to delete a record in a file.
15. Program to calculate average of n no's in an array.
16. Program for addition of matrix.
17. Program for multiplication of matrix.
18. Program for sorting an array.
19. Program for row and column total of a two dimensional array.
20. Program to sort strings using pointers.
21. Program to calculate
  - (i) No.of lines
  - (ii) No.of words
  - (iii) No.of special characters.
22. Program to demonstrate string palindrome.
23. Program to demonstrate union in structure.
24. Program for (i) String Comparison (ii) String Copy
25. Program to demonstrate call by value and call by reference.
26. Program to calculate area of a Hall using macros.
27. Program to calculate no.of vowels, words in a text.

### **MCA 108 : Seminar**

## **MCA 201: Language Processors**

### **Unit-I**

**Language Processors:** Introduction - Language processing activities - Fundamentals of language processing - Fundamentals of language specification - Language processor development tools.0

**Data Structures for language processing:** Search data structures, Allocation data structures.

### **Unit-II**

**Scanning and parsing:** Scanning - Parsing

**Assemblers:** Elements of assembly language programming - A simple assembly scheme - Pass structure of assemblers - Design of a two pass assembler - A single pass assembler for IBM PC.

### **Unit-III**

**Macros and Macro processors:** Macro definition and call - Macro expansion - Nested macro calls - Advanced Macro facilities - Design of a macro preprocessor.

**Compilers and Interpreters:** Aspects of compilation - Memory allocation - compilation of expressions - compilation of control structures - code optimization - Interpreters.

### **Unit-IV**

**Linkers:** Relocation and linking concepts - Design of a linker, self relocating programs - A linker for MS DOS - Linker for overlays - loaders.

**Software tools:** Software tools for program development - Editors - Debug monitors - Programming environments - User Interfaces.

**Prescribed Book:** D.M. Dhamdhere, "Systems programming and Operating systems", 2nd revised edition, TMH (2008).

Chapters : 1 through 8

**Model Paper**

**MCA 201: Language Processor**

**Time: 3 Hrs**

**Max. Marks: 80**

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**Answer ALL the following Questions. Each Question carries equal Marks**

**I.**

- a) Construct a parse tree for the expression  $a := b+i$ .
- b) Define binding.
- c) Write generic search procedure to search for an element 'S'.
- d) What is reduction ?
- e) Write an assembly language problem to find the biggest of 2Nos.
- f) Define semantic gap.
- g) Pure vs impure interpreters.
- h) What is relocation logic ?

**UNIT - I**

2. a) Discuss different passes and phases of a language processor.
- b) Explain in brief different allocation data structures.  
(or)
- c) Discuss various collision handling methods.
- d) Define language processor development tools. Explain LEX.

**UNIT - II**

3. a) Define DFA. Construct DFA for recognizing identifiers, unsigned integers & real nos with fractions.
- b) Explain Pass I of an assembler.  
(or)
- c) Explain the features of assembly language.
- d) Write about top down parsing with out back tracking.

**UNIT - III**

4. a) Explain different data structures needed to design a macro preprocessor.
- b) Discuss different parameter passing mechanism.  
(or)
- c) Write the procedure to access non-local variables.
- d) Discuss expansion time variables.

**UNIT - IV**

5. a) Explain the generation of intermediate codes for expressions.
- b) Write an algorithm for performing relocation.  
(or)
- c) Explain : Dead code elimination, frequency reduction and strength reduction.
- d) Briefly explain different object record formats.

## **MCA 202: Database Management Systems**

### **Unit-I**

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

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

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

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

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

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

### **Unit-II**

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

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

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

### Unit-III

#### **Functional Dependencies and Normalization for Relational Databases:**

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

#### **Relational Database Design Algorithms and Further Dependencies:**

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

### Unit-IV

#### **Introduction to Transaction Processing Concepts and Theory:**

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

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

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

#### **Prescribed Text :**

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

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

#### **Reference Books :**

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

Model Paper

MCA 202: Database Management Systems

Time: 3 Hrs

Max. Marks: 80

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Answer the following questions. Each question carries 16 marks.

- 1.a) Discuss about Security Management in DBMS.
- b) What is failure? Mention different causes for failure of a transaction?
- c) What is Entity? Give Examples for Entity types.
- d) What is closure set of functional dependencies?
- e) What is the use for Trigger? Give any two advantages of Triggers.
- f) What are the pros and cons of distributed database over centralized databases?
- g) What is Data Fragmentation?
- h) What is partitioned Hashing?

Unit-I

- 2.a) Discuss about three level architecture with representation of data in each level.
- b) Discuss about levels of RAID.  
(or)
- c) Compare and Construct the indexing of data by using B and B<sup>+</sup> Trees.
- d) Discuss about Data Independency with an example.

Unit-II

- 3.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)
- c) Discuss about Views and its Limitations?
  - d) What is Index? Create an index for the employees belongs to the Accounts and Sales departments.

Unit-III

- 5.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)
- c) What is Non-Loss Dependency? Explain with an example.
- d) Discuss the following
  - i. II NF
  - ii. Multi-valued Dependency.

Unit-IV

- 4.a) What is Lock? Discuss about Shared and Exclusive Locking Process
- b) Discuss about
  - i. Two-Phase Locking
  - ii. Time-Stamping Algorithm

(or)

- c) What is Dirty-Read Problem? Explain with an Example.
- d) What is serializability? Discuss with aid of an example to test the conflicts in serializability?

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## **MCA 203 : Data Structures Using C++**

### **Unit - I**

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

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

### **Unit - II**

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

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

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

### **Unit - III**

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

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

**Sorting Algorithms** : Selection Sort - Insertion Sort - Quick Sort - Merge Sort - Heap Sort.

### **Unit - IV**

**Trees** : Binary Trees - Binary Tree Traversal - Binary Search Tree - Nonrecursive Binary Tree Traversal Algorithms - AVL Trees.

**Graphs** : Graph Definitions and Notations - Graph Representation - Operations on graphs - Graph as ADT - Graph Traversals - shortest path Algorithm - Minimal Spanning Tree.

**Prescribed Book:**

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

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

**Reference Books:**

1. Mark Allen Weiss , "Data structures and Algorithm Analysis in C++" , Third Edition , Pearson Education (2008).
2. Adam Drozdek , "Data Structures and Algorithms in C++" , Cengage Learning , India Edition .

Answer the following questions. Each question carries 16 Marks.

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

**UNIT - I**

- 2.a) What is Class ? How can you define classes in C++.
- b) Explain how we can access class members by using Pointer Variable.  

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

**UNIT - II**

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

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

**UNIT - III**

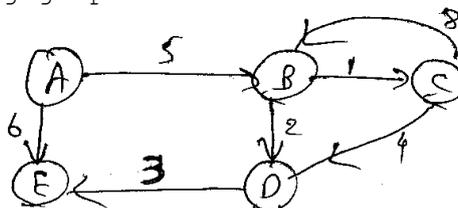
- 4.a) Define Stack. Implement operations on Stack using arrays.
- b) Write the procedure for selection sort.  

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

**UNIT - IV**

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

(or)
- c) Explain Different Graph traversal techniques.
- d) Using Kruskal's algorithm. Develop minimum cost spanning tree for the following graph.



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## **MCA 204: Operating System Principles**

### **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.

### **UNIT-II:**

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

**Process Scheduling:** Basic Concepts - Scheduling Criteria - Scheduling Algorithms - Multiple Processor Scheduling - Thread Scheduling.

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

### **UNIT-III:**

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

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

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

#### **UNIT-IV:**

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

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

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

**I/O Systems:** Overview - I/O Hardware - Application I/O Interface - Kernel I/O Interface - Transforming I/O requests to Hardware Operations - Streams - Performance.

#### **Prescribed Book:**

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

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

#### **Reference Book:**

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

**Model Paper**

**MCA 204: Operating System Principles**

**Time: 3 Hrs**

**Max. Marks: 80**

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**Answer all the following questions. Each question carries 16 marks.**

- 1.a) Advantages of Multiprocessor Systems.
- b) What is s System Call ?
- c) Importance of PCB
- d) Difference between Thread and Process.
- e) Advantages of Segmentation.
- f) Virtual Memory is Logical or Physical, Why ?
- g) Why Operating System requires Second Storage Support for its Operation ?
- 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)**
- c) Discuss different types of Operating System Structures
  - d) Explain Process Scheduling

UNIT - II

- 3.a) Discuss different threading issues.
  - b) Explain semaphores with suitable examples.
- (or)**
- c) Compare different types of Process Scheduling Algorithms.

UNIT - III

- 4.a) Explain Deadlock avoidance mechanisms.
  - b) Describe swapping with diagram.
- (or)**
- c) Explain segmentation.
  - d) Write about LRU page replacement and Optimal page replacement.

UNIT - IV

- 5.a) Explain different file access methods.
  - b) Described linked file allocation methods.
- (or)**
- c) Explain different RAID levels.
  - d) Discuss about interrupt driven I/O cycle.

## **M.C.A 205: Probability and Statistics**

### **Unit I:**

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

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

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

### **UNIT II:**

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

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

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

### **UNIT III:**

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

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

**UNIT IV:**

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

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

**Prescribed book:**

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

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

**Reference book:**

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

Model paper

MCA 205: Probability and Statistics

Time: 3hours

Maximum: 80 M.

Answer Question No.1 Compulsory :

8 x 2 = 16 M

Answer ONE Question from each unit :

4 x 6 = 64 M

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

UNIT-I

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

(or)
- (c) Out of 800 families with 5 children each how many would you expect you have (i) 3 boys (ii) 5 girls (iii) Either 2 or 3 girls Assume equal probabilities for boys and girls.
- (d) The distribution function of a random variate X is given by the following function.  
$$f(x) = \begin{cases} 0 & ; \text{ if } x < -2 \\ 1/2 & ; \text{ if } -2 \leq x < 0 \\ 3/4 & ; \text{ if } 0 \leq x < 2 \\ 1 & ; x \geq 2 \end{cases}$$
  - (i) Sketch the graph of F(x)
  - (ii) Obtain P.D.F of f(x)
  - (iii) Compute the probabilities  
 $P(X \leq 1)$ ;  $P(X \leq 2)$ ;  $P(1 \leq X \leq 2)$

UNIT-II

3. (a) Derive the 100 (1- $\alpha$ )% confidence interval limits of the mean in Normal distribution.
- (b) Define the following terms :
- (i) Critical region; Composite hypothesis; level of Significance; Power of the test;
  - (ii) How can you derive the test statistic on significance test on the Mean
- (or)
- (c) How can you derive the test statistic on significance of Difference of Proportions.
- (d) Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men 325 women were in favour of the proposal. Test the hypothesis, that proportions of men and women in favour of the proposal are same against that they are not, at 5% level.

UNIT-III

4. (a) Derive the test statistic on F test.
- (b) Two random samples drawn from two normal populations are
- |             |    |    |    |    |    |    |    |    |    |    |
|-------------|----|----|----|----|----|----|----|----|----|----|
| Sample I :  | 20 | 16 | 26 | 27 | 23 | 22 | 18 | 24 | 25 | 19 |
| Sample II : | 27 | 33 | 42 | 35 | 32 | 34 | 38 | 28 | 41 | 43 |
|             |    | 30 | 37 |    |    |    |    |    |    |    |
- Obtain estimates of the variances of the populations and test whether the populations have same variances.
- (or)
- (c) Explain the statistical analysis of one way classification.
- (d) The following data represent the number of units of production per day turned out by 5 different workmen using different types of machines.

<u>Work Men</u>	<u>Machine Types</u>			
	A	B	C	D
1	46	40	49	38
2	48	42	54	45
3	36	38	46	34
4	35	40	48	35
5	40	44	51	41

- (i) Test whether the mean productivity is the same for the four brands of machine type.
- (ii) Test whether 5 different workmen differ with respect to productivity.

UNIT-IV

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

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

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

(a) Plot a scatter diagram of these data.

(b) Estimate the linear regression equation

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

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

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

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

The proposed model is  $\mu_{y/x} = \beta_0 + \beta_1 X + \beta_2 X^2$

Number of Units (X)	Cost in hundreds of dollars (Y)
5	14.0
5	12.5
10	7.0
10	5.0
15	2.1
15	1.8
20	6.2
20	4.9
25	13.2
25	14.6

(a) Draw the Scatter diagram.

(b) Estimate the constants of given model.

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MCA 206: Data Structures Using C++ Lab

Lab cycle

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

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

MCA 207: DBMS Lab

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, WEIGTH, CITY, COST)  
 SP (SNO, PNO, QTY)  
 J (JNO, JNAME, CITY)  
 SPJ (SNO, PNO, JNO, QTY)

33. Get Suppliers Names for Suppliers who supply at least one red part.
34. Get Suppliers Names for Suppliers who do not supply part 'P2'
35. Using Group by with Having Clause, Get the part numbers for all the parts supplied by more than one supplier.
36. Get supplier numbers for suppliers with status value less the current max status value.
37. Get the total quantity of the part 'P2' supplied.
38. Get the part color, supplied by the supplier 'S1'
39. Get the names of the parts supplied by the supplier 'Smith' and "Black"
40. Get the Project numbers, whose parts are not in Red Color, from London.
41. Get the suppliers located from the same city.
42. Get the suppliers, who does not supply any part.
43. Find the pnames of parts supplied by London Supplier and by no one else.
45. Find the sno's of suppliers who charge more for some part than the average cost of that part.
46. Find the sid's of suppliers who supply only red parts.
47. Find the sid's of suppliers who supply a red and a green part.
48. 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).

#### PL/SQL PROGRAMS

1. WRITE A PL/SQL PROGRAM TO CHECK THE GIVEN NUMBER IS STRONG OR NOT.
2. WRITE A PL/SQL PROGRAM TO CHECK THE GIVEN STRING IS PALINDROME OR NOT.
3. WRITE A PL/SQL PROGRAM TO SWAP TWO NUMBERS WITHOUT USING THIRD VARIABLE.
4. WRITE A PL/SQL PROGRAM TO GENERATE MULTIPLICATION TABLES FOR 2,4,6
5. WRITE A PL/SQL PROGRAM TO DISPLAY SUM OF EVEN NUMBERS AND SUM OF ODD NUMBERS IN THE GIVEN RANGE.
6. WRITE A PL/SQL PROGRAM TO CHECK THE GIVEN NUMBER IS PALLINDROME OR NOT.
7. THE HRD MANAGER HAS DECIDED TO RAISE THE EMPLOYEE SALARY BY 15%. WRITE A PL/SQL BLOCK TO ACCEPT THE EMPLOYEE NUMBER AND UPDATE THE SALARY OF THAT EMPLOYEE. DISPLAY APPROPRIATE MESSAGE BASED ON THE EXISTENCE OF THE RECORD IN EMP TABLE.
8. WRITE A PL/SQL PROGRAM TO DISPLAY TOP 10 ROWS IN EMP TABLE BASED ON THEIR JOB AND SALARY.
9. WRITE A PL/SQL PROGRAM TO RAISE THE EMPLOYEE SALARAY BY 10%, FOR DEPARTMENT NUMBER 30 PEOPLE AND ALSO MAINTAIN THE RAISED DETAILS IN THE RAISE TABLE.
10. WRITE A PROCEDURE TO UPDATE THE SALARY OF EMPLOYEE, WHO ARE NOT GETTING COMMISSION BY 10%
11. WRITE A PL/SQL PROCEDURE TO PREPARE AN ELECTRICITY BILL BY USING FOLLOWING TABLE

TABLE USED: ELECT

NAME	NULL?	TYPE
MNO	NOT NULL	NUMBER(3)
CNAME		VARCHAR2(20)
CUR_READ		NUMBER(5)
PREV_READ		NUMBER(5)
NO_UNITS		NUMBER(5)
AMOUNT		NUMBER(8,2)
SER_TAX		NUMBER(8,2)
NET_AMT		NUMBER(9,2)

12. WRITE A PL/SQL PROCEDURE TO PREPARE AN TELEPHONE BILL BY USING FOLLOWING TABLE. AND PRINT THE MONTHLY BILLS FOR EACH CUSTOMER  
TABLE USED : PHONE.

NAME	NULL?	TYPE
TEL_NO	NOT NULL	NUMBER(6)
CNAME		VARCHAR2(20)
CITY		VARCHAR2(10)
PR_READ		NUMBER(5)
CUR_READ		NUMBER(5)
NET_UNITS		NUMBER(5)
TOT_AMT		NUMBER(8,2)

13. WRITE A PL/SQL PROGRAM TO RAISE THE EMPLOYEE SALARY BY 10%, WHO ARE COMPLETED THERE 25 YEARS OF SERVICE AND STORE THE DETAILS AT PPROPRIATE TABLES (DEFINE THE RETAIR\_EMP TABLE) .

14. WRITE A PL/SQL PROCEDURE TO EVALUATE THE GRADE OF A STUDENT WITH FOLLOWING CONDITIONS:

FOR PASS: ALL MARKS > 40  
 FOR I CLASS: TOTAL%>59  
 FOR II CLASS: TOTAL% BETWEEN >40 AND <60  
 FOR III CLASS: TOTAL% =40  
 AND ALSO MAINTAIN THE DETAILS IN ABSTRACT TABLE.

TABLES USED

1. TABLE STD

NAME	NULL?	TYPE
NO	NOT NULL	NUMBER
NAME		VARCHAR2(10)
INTNO		NUMBER
CLASS	NOT NULL	VARCHAR2(10)
M1		NUMBER
M2		NUMBER
M3		NUMBER
M4		NUMBER
M5		NUMBER

2. TABLE ABSTRACT

NAME	NULL?	TYPE
STDNO		NUMBER
STDNAME		VARCHAR2 (10)
CLASS		VARCHAR2 (10)
MONTH		VARCHAR2 (10)
INTNO (INTERNAL NUMBER)		NUMBER
TOT		NUMBER
GRADE		VARCHAR2 (10)
PERCENT		NUMBER
DAT_ENTER		DATE

15. CREATE AN VARRAY, WHICH HOLDS THE EMPLOYEE PHONE NUMBERS (AT LEAST THREE NUMBERS)
16. CREATE AN OBJECT TO DESCRIBE THE DETAILS OF ADDRESS TYPE DATA.
17. WRITE A PL/SQL PROCEDURE TO READ THE DATA INTO THE TABLE AS PER THE FOLLOWING DESCRIPTION

Attribute Name	Data Type	DETAILS
EMPLOYEE NUMBER	NUMBER	
EMPLOYEE NAME	CHARACTER	
ADDRESS	OBJECT	STREET NUMBER
		STREET NAME
		TOWN
		DIST AND STATE
QUALIFICATION	CHARACTER	
PHONE NUMBER	OBJECT-VARRAY	HOLDS THREE PHONE NUMBER

## **MCA 208: Communication Skills**

### **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)

## **MCA 301: Object Oriented Programming with JAVA**

### **Unit-I**

**Object Oriented Programming** : Introduction to OOP, Objects and Classes, Characteristics of OOP, Difference between OOP and Procedure Oriented Programming, Summary

**Introduction to Java Programming** : Introduction, Features of Java, Comparing Java and other languages, Applications and Applets, Java Development Kit, More Complex Programs, Java Source file structure, Prerequisites for Compiling and Running Java Programs.

**Java Language Fundamentals** : The building Blocks of Java - Data types - variable declarations - wrapper classes - Operators and Assignment - Control structures - Arrays - Strings - The String Buffer Class.

### **Unit-II**

**Java as an OOP Language** : Defining classes - Modifiers - Packages - Interfaces.

**Exception Handling** : Introduction - Basics of Exception Handling in Java - Exception Hierarchy - Constructors and Methods in Throwable class - Unchecked and checked exceptions - Handling exceptions in Java - Exception and Inheritance - Throwing User defined Exceptions - Redirecting and Rethrowing Exceptions - Advantages of Exception - Handling Mechanism.

### **Unit-III**

**Multithreading** : Introduction : An Overview of Threads - Creating Threads - Thread Life - cycle - Thread priorities and Thread scheduling - Thread synchronization - Thread groups - Communication of Threads.

**Files and I/O Streams** : An Overview of I/O streams - Java I/O - File streams - File Input stream and File output stream - Filter streams - Random Access File - Serialization.

**Applets** : Introduction - Java applications versus Java Applets - Applet Life cycle - Working with Applets - The HTML Applet Tag.

### **Unit-IV**

**Database Handling Using JDBC** : An Overview of DBMS - JDBC Architecture - Working with JDBC

**Servlets** : Introduction - How to run servlets - The Life - cycle of the servlet - servlet API - Multitier Applications using JDBC from a servlet.

**Networking and Remote Method Invocation** : Introduction to Networking - Understanding Ports - Networking classes in JDK - Introduction to RMI - RMI Architecture - Implementing Remote class and interface - security.

### **Prescribed Book:**

P. Radha Krishna, "Object Oriented Programming through Java", Universities Press (2008)

**Chapters:** 1, 2, 3, 4, 5, 6.1-6.5, 6.7, 6.8, 7, 8.1-8.5, 9.1-9.3, 12.1-12.5, 13

### **Reference Books:**

1. Cay S. Horstmann Gray Cornell, "Core Java - Volume 1 Fundamentals", Eighth Edition, Pearson Education

2. E.Balagurusamy, "Programming with Java", 3e, TMH (2007)
3. H.M.Deitel, P.J.Deitel, "Java How to Program", Sixth Edition, Pearson Education (2007)
4. Debasish Jana, "Java and Object Oriented Programming Paradigm", PHI (2005).
5. ISRD Group, "Introduction to Object Oriented Programming through Java", TMH (2007).

**Model Paper**

**MCA 301: Object Oriented Programming with JAVA**

**Time: 3Hrs.**

**Max. Marks : 80**

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**Answer ALL Questions : Each Question Carries Equal Marks**

1.

- a) Define Polymorphism.
- b) What is the difference between class variable and instance variable.
- c) Explain Use of 'this'.
- d) Define method overloading.
- e) What is thread ?
- f) What are the differences between application program and applet.
- g) Write any two advantages of Servlets.
- h) Mention different types of database drivers.

**UNIT - I**

2. a) What are the features of Object Oriented Programming Language?
- b) What is an array ? Write a program for sorting of array elements by using any sorting technique.  
(or)
- c) Explain different methods of String Class.
- d) What are different data types available in Java.

**UNIT - II**

3. a) What is exception ? How can you handle exceptions in Java.
- b) Define constructor. Write a program to overload constructors.  
(or)
- c) Explain Interface with example.
- d) What are the uses of final.

**UNIT - III**

4. a) Explain Thread Life cycle.
- b) Explain with suitable example, the creation of applets in Java.  
(or)
- c) Explain about the hierarchy of Input stream class and output stream class.
- d) Write a program for implementing Random Access File.
- e) Write short notes on Serialization.

**UNIT - IV**

5. a) Explain the architecture of JDBC.
- b) Write a program for establishing a Socket connection.  
(or)
- c) Write a note on RMI architecture.
- d) Explain about the Life cycle of the servlet.

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## **MCA 302: Computer Networks**

### **UNIT - I**

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

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

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

### **UNIT - II**

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

### **UNIT - III**

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

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

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

#### **UNIT - IV:**

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

#### **Prescribed Book:**

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

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

#### **Reference Books:**

1. James F.Kurose, Keith W.Ross, "Computer Networking", Third Edition, Pearson Education
2. Behrouz A Forouzan, "Data Communications and Networking", Fourth Edition, TMH (2007)
3. Michael A. Gallo, William M. Hancock, "Computer Communications and Networking Technologies", Cengage Learning (2008)

MODEL PAPER

MCA 302 : Computer Networks

Time : 3 hrs

Max Marks : 80

Answer ALL the following Questions. Each Question carries Equal marks.  
( 8 \* 2 = 16 )

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. (8M)
- b) Describe Go Back N protocol. (8M)

(or)

- c) Explain the architecture of the Internet (8M)
- d) Write about design issues of a Data Link layer. (8M)

UNIT - II

3. a) Explain Spanning tree Bridges. (8M)
- b) Give and explain 802.11 frame structure, services (8M)

(or)

- c) Describe architecture, applications, protocol stack of Bluetooth (10M)
- d) Explain Switched Ethernet (6 M)

UNIT - III

4. a) Explain IP Header Format and IP addresses (8M)
  - b) Discuss about Tunneling and Fragmentation (8M)
- (or)
- c) Explain Distance Vector Routing Algorithm (8M)
  - d) write about TCP Congestion Control (8M)

UNIT - IV

5. a) Explain about DNS (8M)
  - b) Write about URL's (8M)
- (or)
- c) Explain Electronic Mail concept (8M)
  - d) Discuss JPEG Compression mechanism (8M)

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## **MCA 303 : Operations Research**

### **UNIT I:**

**Linear Programming:** Introduction, formulation of Linear Programming Models, Graphic solution of Linear programming Models, Maximization with Less-than-or-equal to constraints, equalities and Greater than or equal to constraints, Minimization of the objective function, the simplex Method, properties of simplex Method, transportation problem, Assignment Problem.

### **UNIT II:**

**Deterministic inventory Models:** Introduction, Infinite Delivery Rate with No Backordering, Finite delivery Rate with no Backordering, Infinite Delivery Rate with Backordering, finite Delivery rate with Backordering.

### **UNIT III:**

**Game Theory:** Introduction, Minimax -Maxmini pure strategies, Mixed Strategies and Expected Payoff, solution of 2x2 games, dominance, solution of 2xn games, solution of mx2 games, Brown's algorithm

### **UNIT IV:**

**PERT:** Introduction, PERT Network, Time Estimates for Activities(ET), Earliest Expected completion of events(TE), Latest Allowable Event Completion time(TL), Event Slack Times(SE),Critical path

### **Prescribed book:**

Belly E. Gillett, "Introduction to Operations Research - A computer-oriented algorithmic approach", TMH (2008).

**Chapters:** 3.2 to 3.7, 3.10 to 3.12, 6.1 to 6.5, 11.1 to 11.4, 11.6 to 11.9, 12.1 to 12.7

### **Reference Book:**

J K Sharma, "Operation Research theory and applications", Third edition, MACMILLAN

Model Paper

MCA 303 : Operations Research

Time: 3 Hrs

Max. Marks: 80

Answer all the questions. Each question carries 16 Marks.

1. a. Standard form of L.P.P.  
b. Degeneracy in Simplex Method.  
c. North-West Corner Rule.  
d. Unbalanced transportation problem.  
e. Dominance Property.  
f. Pay-Off matrix.  
g. Three time estimates of PERT.  
h. Total float and Free float.

Unit-I

2. a. Solve the following L.P.P by using Graphical Method.

$$\text{Minimize } Z = 3x_1 + 5x_2$$

Subject to constraints

$$-3x_1 + 4x_2 \leq 12;$$

$$2x_1 - x_2 \geq -2;$$

$$2x_1 + 3x_2 \geq 12 \quad \text{and} \quad x_1 \geq 0; \quad x_2 \geq 0;$$

- b. Solve the following L.P.P by using simplex method.

$$\text{Max } Z = 3x_1 + 2x_2$$

Subject to the constraints

$$4x_1 + 2x_2 \leq 12;$$

$$4x_1 + x_2 \leq 8;$$

$$4x_1 - x_2 \leq 8; \quad \text{and} \quad x_1, x_2 \geq 0$$

(or)

- c. Explain the procedure for Hungarian Method.
- d. Given below is a table taken from the solution process for a transportation problem.

		Distribution centre				Availability
		Cost per unit (in rupees)				
		1	2	3	4	
Factory	A	10	8	7	12	5000
	B	12	13	6	10	6000
	C	8	10	12	14	9000
Demand (in Units)		7000	5500	4500	3000	

Answer the following Questions :

- (i) Is this solution feasible.
- (ii) Is this solution degenerate.
- (iii) Is this solution optimum ? If not find the Optimum Solution.

Unit-II

- 3.a. Explain the Finite delivery rate with No BACKORDERING.

- b. Suppose a retailer has the following information

Available :

$$D = 350 \text{ Units/Year}$$

$$C_0 = \$50 \text{ per order}$$

$$C_1 = \$13.75 \text{ per unit}$$

$$C_2 = \$25 \text{ per unit}$$

$$LT = 5 \text{ days.}$$

To minimize the total annual inventory cost when back ordering is allowed, how many units should be ordered each time an order is placed, and how many backorders should be allowed ?

(or)

- c. Explain infinite delivery rate with NOBACKORDERING.
- d. Explain with Finite delivery rate with BACKORDERING.

Unit-III

- 4. a. Explain briefly how can you solve the 2x2 game.
- b. Solve the following game by using graphical method.

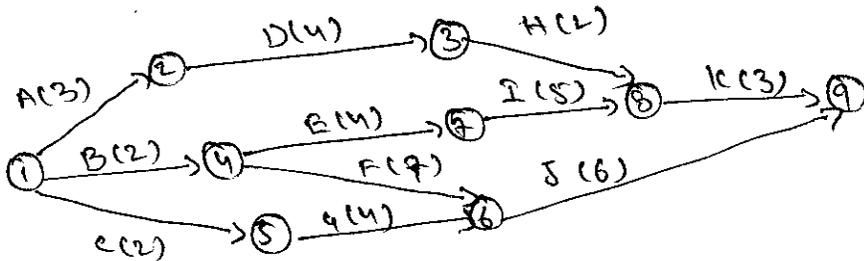
		Player - B				
		I	II	III	IV	V
Player-A	1	3	0	6	-1	7
	2	-1	5	-2	-2	1

(or)

- c. Explain the procedure for mx2 game in the case of graphical method.
- d. Explain the Brown's algorithm.

Unit-IV

- 5. a. Explain the Time calculations in Critical path method.
- b. For the following Network diagram, Identify the Critical path and find the total project duration.



(or)

- c. The three time estimates of PERT Network are as follows :

Activity		Estimated duration (weeks)		
i	j	Optimistic time	Most likely time	Pessimistic time
1	2	1	1	7
1	3	1	4	7
1	4	2	2	8
2	5	1	1	1
3	5	2	5	14
4	6	2	5	8
5	6	3	6	15

- (i) Draw the Project network
- (ii) Find the expected duration and variance of each activity
- (iii) Find the expected project length
- (iv) Calculate the variance and standard deviation of the project length
- (v) What is the probability that the project will be completed at least 4 weeks earlier than expected.

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## **MCA 304: Computer Graphics**

### **Unit-I**

**Overview of Computer Graphics:** Video Display Devices, Raster Scan Displays, Random Scan Displays, Color CRT Monitors, Direct View Storage Tubes, Flat Panel Displays, Raster Scan Systems, Random Scan Systems, Input Devices.

**Graphical User Interfaces and Interactive Input Methods:** The User Dialogue, Windows and Icons, Input of Graphical Data, Input Functions

### **Unit-II**

**Output Primitives:** Points and Lines, Line-Drawing Algorithms: DDA Algorithm, Bresenham's Line Algorithm, Line Function, Circle Generation Algorithms, Ellipse Generation Algorithms

**Attributes of output Primitives:** Line Attributes, Color and GrayScale levels, Area Fill Attributes, Character Attributes, Bundled Attributes, Antialiasing.

### **Unit-III**

**Two Dimensional Geometric Transformations:** Basic Transformations, Matrix Representation and Homogenous Coordinates, Composite Transformations, Other Transformations.

**Two Dimensional Viewing:** The Viewing pipeline, Viewing Coordinates Reference Frame, Window to Viewport Coordinate Transformations, Two Dimensional Viewing Functions, Clipping Operations, Point Clipping, Line Clipping: Cohen-Sutherland Line Clipping, Polygon Clipping: Sutherland-Hodgeman Polygon Clipping, Curve Clipping, Text Clipping, Exterior Clipping.

### **Unit-IV**

**Three Dimensional Concepts:** Three Dimensional Display Methods.

**Three Dimensional Object Representations:** Polygon Surfaces, Quadric Surfaces, Superquadrics.

**Three Dimensional Geometric and Modeling Transformations:** Translation, Rotation, Scaling, Other Transformations, Composite Transformations, Three Dimensional Transformation Functions.

**Three Dimensional Viewing:** Viewing pipeline, Viewing Coordinates, Projections, Clipping

#### **Prescribed Book:**

Donald Hearn, M. Pauline Baker, "Computer Graphics", Second Edition, Pearson Education (2004)

**Chapters :** 2.1 to 2.5, 8.1 to 8.3, 3.1, 3.2, 3.4 to 3.6, 4, 5.1 to 5.4, 6, 9.1, 10.1, 10.3, 10.4, 11, 12.1, 12.2, 12.3, 12.5

#### **Reference Book:**

1. Shalini Govil-Pai, "Principles of Computer Graphics - Theory and Practice using open GL and Maya", Springer (2007)
2. ISRD group, "Computer Graphics", ace series, TMH (2006)
3. Amearendra N. Sinha, Arun D Udai, "Computer Graphics", TMH (2008)

Model Paper

MCA 304: Computer Graphics

Time: 3 Hrs

Max. Marks: 80

Answer the following questions. Each question carries 16 Marks.

- 1.a) What is the difference between Passive and Interactive Graphics?
- b) What is Frame Buffer?
- c) What are the drawbacks of DDA Algorithm?
- d) What is world coordinate system?
- e) Define typeface.
- f) What are the attributes of a Line?
- g) What is projection?
- h) What is quadric surface?

UNIT-I

- 2.a) Discuss about Color Monitor?
- b) What is Computer Graphics? What are the major considerations in the study of computer graphics?  
(Or)
- c) Discuss about various positioning devices.
- d) Describe the difference between Random Scan Display devices and Raster scan display devices.

UNIT-II

- 3.a) Describe the generation of ellipse.
- b) Illustrate the Bresenham's line algorithm with end points (10,10) and (10,20).  
(Or)
- c) What is an output primitive? Discuss about attributes of character.
- d) Discuss about area filling styles.

UNIT-III

- 4.a) What are two-dimensional transformations? Explain.
- b) Perform a  $45^\circ$  rotation of a triangle A(0,0), B(1,1) and c(5,2)
  - i. About the origin
  - ii. About the point(-1,2)  
(Or)
- c) Write about Window-to-view port coordinate transformation.
- d) Discuss about polygon clipping Algorithm

UNIT-IV

- 5.a) Discuss about 3D Projection.  
  
(Or)
- b) Derive the combined transformation matrix of the following:  
A 3D Translation with 3 units along X-axis, 4 units along Y-axis, 5 units along Z-axis followed by a #D rotation by  $30^\circ$  on XY Plane followed by 3D rotation of  $45^\circ$  around Y-axis.

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## **MCA-305: Artificial Intelligence**

### **Unit-I :**

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

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

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

### **Unit-II :**

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

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

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

### **Unit-III :**

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

**Weak slot & filler Structures:** Semantic Nets, Frames

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

### **Unit-IV :**

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

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

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

### **Prescribed Book :**

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

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

### **Reference Book :**

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

Model Paper

MCA 305: Artificial Intelligence

Time: 3 Hrs

Max. Marks: 80

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Answer all the questions. Each question carries 16 Marks.

1. a. What is Abduction in Reasoning ?
  - i. What is meant by Turing Test ?
  - j. Advantages of Depth-First Search.
  - k. Write about production system types and explain.
  - l. Define and explain Inheritable knowledge.
  - m. Define inferential Adequacy and Acquisitional efficiency.
  - n. What is meant by pragmatic Analysis ?
  - o. Discuss the importance of knowledge representation in A.I. system development.

Unit-I

- 2.a. When you call a technique is a A.I technique ? What is meant by A.I problem explain in detail.
- b. Discuss about problem Reduction Algorithm.  
( or )
- c. Explain Depth-First search and Breadth -First search in Reasoning.
- b. Explain Non linear planning using constraint posting.

Unit-II

- 3.a. Advantages and disadvantages of Forward chaining. When compared to backward chaining.
- b. Explain Issues in knowledge Representation.  
( or )
- c. Write principles of resolution with example.

Unit-III

- 4.a. Explain conversion of Clause from with the help of Example.  
(or)
- b Write Unification algorithm with the help of example.

Unit-IV

- 4.a. i) Define and explain below terms  
Morphological Analysis  
Syntactic Analysis  
Semantic Analysis  
Discourse Analysis  
Pragmatic Analysis
- ii) Explain Goal Stack planning.  
( or )
- b. Explain about Expert systems in detailed.

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## **MCA 306: Java Programming Lab**

### **Lab Cycle**

1. Program to Demonstrate labeled looping Statements.
2. Find Volume of a box using classes.
3. Program to guess a coin flip.
4. Count the number of heads and tails in a series of a coin flips.
5. Demonstrate type conversions.
6. Implement operations on complex numbers.
7. Implement the following bank operations  
i) withdraw      ii) deposit      iii) Transfer
8. Demonstrate date class.
9. Implement Method Overloading.
10. Implement Constructor Overloading.
11. Program to Demonstrate on Static variables and methods.
12. Product Company Modeling - Multilevel Inheritance.
13. Payroll System - Hierarchical Inheritance.
14. Implement Method Overloading.
15. Demonstrate Constructor chaining in Inheritance.
16. Program that demonstrates fields shadowing.
17. Demonstrate the use of final.
18. Implementation of base class reference (Implement Dynamic Binding).
19. Student database using Interfaces.
20. Implement string sorting using command line arguments.
21. Implement any sorting technique for sorting given 'n' elements.
22. Implement possible operations on matrix.
23. Sorting the characters of a given string.
24. Program that demonstrate Exception Handling.
25. Program that demonstrate wrapper classes.
26. Convert an ordinary text file to HTML file.
27. Copies the content of one file to another file.
28. Perform DML commands on a particular table.
29. Implement authentication technique using applets.
30. Implement event handling in Applets.
31. Program for Deadlock Handling.
32. Program for Producer - Consumer problem.
33. Implement Process Synchronization.
34. Program that demonstrate process state.
35. Construct servlet using httpServlet class
36. Illustration of Initializing, implementing and destroying the servlet
37. Program for establishing a socket connection.

## MCA 307: Unix Shell Programming Lab

### Lab Cycle

- 1) Write a shell script to accept two numbers and perform all arithmetic operations on it
- 2) Write a shell script to find largest of three numbers using conditional execution operators
- 3) Write a shell script to check whether a particular user has logged in or not. If he has logged in, also check whether he has eligibility to receive a message or not
- 4) Write a shell script to accept the name of the file from standard input and perform the following tests on it
  - a) File executable
  - b) File readable
  - c) File writable
  - d) Both readable & writable
- 5) Write a shell script which will display the username and terminal name who login recently in to the unix system
- 6) Write a shell script to find no. of files in a directory
- 7) Write a shell script to print the following format
  - 1
  - 12
  - 123
  - 1234
- 8) Write a shell script to print prime numbers up to a given range using arguments
- 9) Write a shell script which will display the number of days in the given month and year
- 10) Write a shell script to check whether a given number is perfect or not
- 11) Write a menu driven shell script to copy, edit, rename and delete a file
- 12) Write a shell script for concatenation of two strings
- 13) Write a shell script which will display fibonacci series up to a given number of argument
- 14) Write a shell script to accept student number, name, marks in 5 subjects. Find total, average and grade. Display the result of student and store in a file called stu.dat
  - Rules: avg>=80 then grade A
  - Avg<80&&Avg>=70 then grade B
  - Avg<70&&Avg>=60 then grade C
  - Avg<60&&Avg>=50 then grade D
  - Avg<50&&Avg>=40 then grade E
  - Else grade F
- 15) Write a shell script to accept empno,empname,basic. Find DA,HRA,TA,PF using following rules. Display empno, empname, basic, DA,HRA,PF,TA,GROSS SAL and NETSAL. Also store all details in a file called emp.dat
  - Rules: HRA is 18% of basic if basic > 5000 otherwise 550
  - DA is 35% of basic
  - PF is 13% of basic
  - IT is 14% of basic
  - TA is 10% of basic
- 16) Write a shell script to demonstrate break and continue statements
- 17) Write a shell script to satisfy the following menu options
  - a. Display current directory path
  - b. Display todays date
  - c. Display users who are connected to the unix system
  - d. Quit
- 18) Write a shell script to delete all files whose size is zero bytes from current directory
- 19) Write a shell script to display string palindrome from given arguments
- 20) Write a shell script which will display Armstrong numbers from given given arguments

- 21) Write a shell script to display reverse numbers from given argument list
- 22) Write a shell script to display factorial value from given argument list
- 23) Write a shell script which will find maximum file size in the given argument list
- 24) Write a shell script which will greet you "Good Morning", "Good Afternoon", "Good Evening" and "Good Night" according to current time
- 25) Write a shell script which will display total size of directories
- 26) Write a shell script to sort the elements in a array using bubble sort technique
- 27) Write a shell script to find largest element in a array
- 28) Write an awk program for display the lines in any file centre alignment
- 29) Write an awk program to print sum, avg of students marks list
- 30) Write an awk program to display total number of users and their names in unix system
- 31) Write an awk program to display students pass/fail report
- 32) Write an awk program to count the no. of vowels in a given file
- 33) Write an awk program which will find maximum word and its length in the  
given input File
- 34) Write a shell script to generate the mathematical tables.
- 35) Write a shell script to check whether given number is strong or not
- 36) Write a shell script to sort elements of given array by using selection sort.
- 37) Write a shell script to search given number using binary search.
- 38) Write a shell script to find number of vowels, consonants, numbers, white spaces and special characters in a given string.
- 39) Write a shell script to lock the terminal.
- 40) Write a shell script which merge the contents of file1, file2, file3, sort them and display the sorted output on the screen page by page.

MCA 308: Seminar

## **MCA 401: Principles of Programming Languages**

### **UNIT - I**

**Introduction** : What is a programming language, Abstractions in programming languages, Computational paradigms, Language definition, Language translation, Language design.

**History** : Early History : The first programmer, The 1950s : The first programming languages, The 1960s : An explosion in programming languages, The 1970s : Simplicity, abstraction, study, The 1980s : New directions and the rise of object -orientation, The 1990s : Consolidation, The Internet, libraries and scripting, The future.

**Language Design Principles** : History and design criteria, Efficiency, regularity, Further language design principles, C++ : A Case study in language design.

**Syntax** : Lexical structure of programming languages, Context-free grammars and BNFs, Parse trees and Abstract syntax trees, Ambiguity, Associativity and precedence, EBNFs and syntax diagrams, Parsing techniques and tools, Lexical vs Syntax vs Semantics.

**Basic Semantics** : Attributes, binding and semantic functions, Declarations, blocks and scope, The symbol table, Name resolution and overloading, Allocation, Lifetimes and the environment, Variables and Constants, Aliases, Dangling references and garbage.

**Data Types** : Data types and type information, Simple types, Type constructors, Type equivalence, Type Checking, Type conversion, Polymorphic type checking, Explicit polymorphism.

### **UNIT - II**

**Control - I : Expressions and Statements** : Expressions, Conditional Statements and Guards, Loops and Variation on "while", The "goto" controversy, Exception handling.

**Control - II : Procedures and Environments** : Procedure definition and activation, Procedure semantics, Parameter passing mechanisms, Procedure environments, activations and allocation, Dynamic memory management, Exception handling and environments.

**Abstract data types and Modules** : The algebraic specification of abstract data types, Abstract data type mechanisms and modules, Separate compilation in C, C++ name spaces and Java packages, Ada packages, Modules in ML, Modules in earlier languages, Problems with abstract data type mechanisms, The mathematics of abstract data types.

### UNIT - III

**Object - Oriented Programming** : Software reuse and independence, Java : objects, Classes and methods, Inheritance, Dynamic binding, C++, Small Talk, Design issues in object - oriented languages, Implementation issues in object - oriented languages.

**Functional Programming** : Programs as functions, Functional programming in an imperative language, Scheme : A Dialect of LISP, ML : Functional programming with static typing, Delayed Evaluation, Haskell - A fully curried lazy language with overloading, The Mathematics of functional programming I : Recursive functions, The Mathematics of functional programming II : Lambda calculus.

**Logic Programming** : Logic and Logic programs, Horn clauses, Resolution and Unification, The language Prolog, Problems with logic programming, Extending logic programming : Constraint logic programming and Equational systems.

### UNIT - IV

**Formal Semantics** : A Sample small language, Operational semantics, Denotational semantics, Axiomatic semantics, Proofs of program corrections.

**Parallel programming** : Introduction to parallel processing, Parallel processing and programming languages, Threads, Semaphores, Monitors, Message passing, Parallelism in non-imperative languages.

#### **Prescribed Book :**

Kenneth C. Louden, "Programming Languages Principles and Practice", Second Edition, Cengage Learning (2008).

**Chapters** : 1 through 14

#### **Reference Books:**

1. Terrence W. Pratt & Mervin V. Zelkowitz, "Programming Languages Design and Implementation", Fourth Edition, Pearson Education (2008)
2. Robert W. Sebesta, "Concepts of Programming Languages", Seventh Edition, Pearson Education (2007)

**Model Paper**

**MCA 401: Principles of Programming Languages**

**Time: 3Hrs.**

**Max. Marks : 80M**

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**Answer ALL Questions : Each question carries 16 Marks**

**Section - A**

**1.**

- a) What are Dangling references ?
- b) Justify the need of symbol table.
- c) Define Obsolescence.
- d) Define Binding.
- e) Classes vs Data types.
- f) What are activation records ?
- g) Define an exception.'
- h) Orthogonality.

**Section - B**

**Unit - I**

- 2. a) Discuss the issues regarding language translation. (8M)
- b) Present some reasons supporting type checking. (8M)
- (or)
- c) Discuss garbage collection procedure in a programming language. (8M)
- d) Define binding times. Explain various types of binding times. (8M)

**Unit - II**

- 3. a) What is an exception and excepting handling? How exceptions are handled in C++. (8M)
- b) Describe the way of creating packages in Ada. (8M)
- (or)
- c) Explain various parameter passing mechanisms. (8M)
- d) Illustrate how can we maintain free space using neat diagrams. (8M)

**Unit - III**

- 4. a) Distinguish between inheritance and polymorphism. (8M)
- b) Explain the problems associated with logic programming. (8M)
- (or)
- c) Discuss delayed evaluation. (8M)
- d) Explain whether a function having no side effects are really transparent. (8M)

Unit - IV

5. a) Discuss reduction rules for integer arithmetic expressions. (8M)
- b) Explain threading in Java. (8M)
- (or)
- c) Write a prolog program that sorts a list of integers according to the merge sort algorithm. (8M)
- d) Write a short notes on Monitors. (8M)

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## **MCA 402: Object Oriented Modeling and Design Using UML**

### **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.

### **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.

### **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.

## 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.

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

Model Paper

MCA 402: Object Oriented Modeling and Design with UML

Time: 3 Hrs

Max. Marks: 80

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Answer the following questions. Each question carries 16 Marks.

- 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)
- c) Explain the following terms:
  - i. Association.
  - ii. Aggregation.
  - iii. Generalization.
  - iv. Composition.

Unit-II

- 3.a) What is State modeling? How does dynamic behavior of a system Represented ?
- b) What is an Event? Discuss about types of Events with example?  
(or)
- c) What is Use Case? How was Use Case diagrams were helpful in Analysis of a System.
- d) What is Concurrency? Discuss the concurrency with the help of an example.

Unit-III

- 4.a) Discuss about the steps involved in Analysis of a System.  
(or)
- b) Define state diagram for ATM Model.
- c) Discuss about nested state diagram.

Unit-IV

- 5.a) What is the task of a design? How would you differentiate a good design from bad design?
- b) Discuss about System Testing?  
(or)
- c) Discuss the programming style in the large complex systems.
- d) Discuss about good programming style.

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## **MCA 403: Web technologies**

### **Unit-I:**

**Introduction:** What is Internet, History of Internet, Internet services and accessibility, uses of the Internet, protocols, web concepts - the client/server model of the web, retrieving data from the web, How the web works?, web browsers, searching information on the web, Internet standards

**Internet protocols:** Introduction, Internet protocols - Internet protocol (IP), Transmission control protocol (TCP), User datagram protocol (UDP), host names, Internet applications and application protocols - Datagram Vs. Stream, Trivial file transfer protocol (TFTP), FTP - File Transfer Protocol, Telnet, HTTP (Hyper Text Transfer Protocol), e - mail protocols SMTP (Simple Mail Transfer Protocol), POP (Post Office Protocol, version 3), IMAP

**Java network programming:** Introduction, UDP/IP and TCP/IP communications, I/O streams - types of streams, character and byte streams, input stream, output stream, filter streams, readers and writers, data streams, object streams, sockets - creating client sockets, server socket, datagram socket, a simple example, Multicast sockets - multicast groups and addresses, a simple example, remote method invocation, protocol handler - developing a protocol handler, a simple protocol handler, content handlers - developing a content handler, a simple content handler, the "Grid Content Handler" class, the "Get Grid Application" program

### **Unit -II**

**HTML:** Introduction, SGML - DTD, DTD elements, attributes, outline of an HTML document, head section - prologue, link, base, meta, script, style, body section - headers, paragraphs, text formatting, linking, internal linking, embedded images, lists, tables, frames, other special tags and characters, HTML forms

**Java Script:** Introduction - need of a scripting language, language elements - identifiers, expressions, java script keywords, operators, statements, functions, objects of a java script - the "window" object, the "Document" object, forms object, text boxes and text areas, buttons, radio buttons, check boxes, the "Select" object, other objects - the "date" object, the "math" object, the "string" object, regular expressions, arrays, worked examples

**VB Script:** Introduction, embedding VB script code in an HTML document, comments, variables - array variables, operators - assignment operator, numerical operators, string concatenation, procedures - sub procedure, function procedure, conditional statements, looping statements, object and VB script, cookies: cookie variables, creating a cookie, a cookie with multiple values, reading cookie value

### Unit - III

**Dynamic HTML (DHTML):** Introduction, cascading style sheets (CSS) : coding css, properties of tags, property values, other style properties, in - line style sheets, Embedded style sheets, External Style Sheets, grouping, inheritance, class as selector, ID as selector, contextual selectors, pseudo classes and pseudo elements, positioning, backgrounds, element dimensions, DHTML document object model and collections - using the collections "all", moving objects around the document, event handling - assigning event handlers, event bubbling, filters and transitions - filters, transitions, data binding - using tabular data control, sorting data, dynamic sorting, filtering

**XML:** Introduction, HTML vs. XML, syntax of XML document, XML attributes: use of elements vs. use of attributes, XML validation: "well formed" XML documents, "valid" XML documents, XML DTD: internal DTD, external DTD, the building blocks of XML documents, DTD elements: declaring an element, empty elements, elements with data, elements with children, wrapping, declaring only one occurrence of the same elements, declaring minimum one occurrence of the same element, defining zero or one occurrence of the same element, declaring mixed content, DTD attributes: declaring attributes, default attribute value, implied attribute, required attribute, fixed attribute value, enumerated attribute values, DTD entities, DTD validation, XSL, XSL transformation, XML namespaces, XML schema

**Common Gateway Interface (CGI):** Introduction, server - browser interaction, CGI script structure - the CGI .pm module, perl variables, CGI environment variables - processing forms - sending mail - validating the form data - handling check boxes - SSI - CGI server side and client side applets, CGI security issues

### Unit - IV

**Servlets:** Introduction, advantages of servlets over CGI, installing servlets, the servlets life cycle, servlets API, a simple servlet, handling HTTP "Get" requests, handling HTTP "Post" requests, cookies, session tracking, multi tier applications using database connectivity, servlets chaining

**Java Server Pages (JSP):** Introduction, advantages of JSP, developing first JSP, components of JSP, reading request information, Retrieving the data posted from a HTML file to a JSP file, JSP sessions, cookies, disabling sessions

**Active Server Pages (ASP):** Introduction, advantages of ASP, first Asp script, processing ASP scripts with forms, variables and constructs, subroutines, Include/Virtual, ASP cookies, Asp objects, connecting to data with ASP

**Prescribed book:**

N.P Gopalan, J.Akilandeswari, "Web Technology - A Developer's Perspective", PHI (2008)

**Chapters** : 1 through 12

**Reference Books:**

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. Chris Bates, "Web Programming-Building Internet Applications", Second Edition, Wiley (2007).
4. Jeffrey C. Jackson, "Web Technologies - A Computer Science Perspective", Pearson Education (2008).

**Model Paper**

**MCA 403: Web technologies**

**Time: 3 Hrs**

**Max. Marks: 80**

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**Answer ALL the following Questions. Each question carries Equal Marks.**

**Section - A**

**(2\*8=16M)**

- 1) a) What are Meta search engines?
- b) In which situation, IMAP best suits?
- c) How can we specify colors for visited and active hyperlinks?
- d) Define DOM.
- e) What is the purpose of cookies?
- f) Write about X-ray filter?
- g) How can we validate the data stored in checkboxes?
- h) What is a resolver?

**Section - B**

**Answer ONE Question from each unit. Each question carries sixteen marks.**

**Unit-I**

- 2)
  - a) What are the different ways to access E-mails stored in the recipient's mail server? **(8M)**
  - b) Write the series of steps that takes place when a client wants to access a webpage? **(8M)**

**(OR)**

  - c) Discuss about the internet applications: telnet, FTP and remote login? **(8M)**
  - d) List out all the attributes in <head> tag with examples? **(8M)**

**Unit-II**

- 3)
  - a) Define css, what are the different types of style sheets available? **(8M)**
  - b) Write the available functions available in java script to work on strings? **(8M)**

**(OR)**

  - c) Write the various types of filters available? Explain them with examples? **(8M)**
  - d) Explain different control structures available in VB script? **(8M)**

**Unit-III**

4)

- a) List out different DTD attributes and explain the process to declare them? **(8M)**
  - b) Write the procedure to define arrays in perl? **(8M)**
- (OR)**
- c) Write the XML syntax and structure rules? **(8M)**
  - d) What are environment variables? List out different CGI environment variables. **(8M)**

**Unit-V**

5)

- a) Compare CGI and servlets. **(8M)**
  - b) Briefly explain the components of JSP **(8M)**
- (OR)**
- c) Write a servlet that calculates the factorial of a given no that has been submitted through a form. **(8M)**
  - d) Explain the concept of ADO. **(8M)**

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## **MCA 404 : Software Engineering**

### **Unit-I:**

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

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

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

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

### **Unit-II**

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

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

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

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

### Unit-III

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

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

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

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

### Unit-IV

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

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

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

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

#### **Prescribed Book:**

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

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

#### **Reference Books:**

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

Model Paper

MCA 404: Software Engineering

Time: 3 Hr

Max. Marks: 80

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Answer the following Questions. Each Question carries 16 Marks.

- 1.a) Define is Software Crisis?
- b) List the advantages of Formal Methods?
- c) What is meant by "Product is Right"?
- d) Give the characteristics of a good design?
- e) Explain top-down integration?
- f) Goals of Software Engineering?
- g) Difference between Error and Bug?
- h) What is the importance of Certification?

Unit-I

- 2.a) Describe Software Characteristics.
- b) Explain agile software process.  
(or)
- c) Explain Spiral Model and its suitability
- d) Why Software Myths becomes constraints to software process.

Unit-II

- 3.a) What is Use Case? Discuss about the importance of Use Cases in Software Engineering.
- b) What is Class? Explain Class Responsibility Collaborator Modeling.  
(or)
- c) Discuss different Levels of Data Flow Diagrams with the help of an example.

Unit-III

- 4.a) What is the role of Basis Path Testing in software testing?
- b) What is Test Case? Prepare a Test Case for Factorial of a number.  
(or)
- c) Discuss about Function Oriented Metrics.
- d) What is Debugging? Explain about Debugging Strategies.

Unit-IV

- 5.a) What are the attributes of the Quality?
- b) Explain Cleanroom software engineering approach.  
(or)
- c) Describe the COCOMO Model?
- d) Why software Quality Assurance is important?

## **MCA 405.1 : Grid and Cluster Computing**

### **Unit-I**

**Introduction** : The Data Centre, the Grid and the Distributed / High Performance Computing, Cluster Computing and Grid Computing, Metacomputing - the Precursor of Grid Computing, Scientific, Business and e-Governance Grids, Web Services and Grid Computing, Business Computing and the Grid - a Potential Win - win Situation, e-Governance and the Grid.

**Technologies and Architectures for Grid Computing** : Clustering and Grid Computing, Issues in Data Grids, Key Functional Requirements in Grid Computing, Standards for Grid Computing, Recent Technological Trends in Large Data Grids

**World Wide Grid Computing Activities, Organizations and Projects** : Standard Organizations, Organizations Developing Grid Computing Tool Kits, Framework, and Middleware, Grid Projects and Organizations Building and Using Grid Based Solutions, Commercial Organizations Building and Using Grid Based Solutions.

### **Unit-II**

**Web Services and the Service Oriented Architecture (SOA)** :History and Background, Service Oriented Architecture, How a Web Service Works, SOAP and WSDL, Description, Creating Web Services, Server Side.

**OGSA and WSRF**: OGSA for Resource Distribution, Stateful Web Services in OGSA, WSRF (Web Services Resource Framework), Resource Approach to Stateful Services, WSRF Specification.

**Globus Toolkit** : History of Globus Toolkit, Versions of Globus Toolkit, Applications of GT4-Cases, GT4-Approaches and Benefits, Infrastructure Management, Monitoring and Discovery, Security, Data, Choreography and Coordination, Main Features of GT4 Functionality - a Summary, GT4 Architecture, GT4 Command Line Programs, GT4 Containers

**The Grid and the Databases** : Issues in Database Integration with the Grid, The Requirements of a Grid-enabled Database, Storage Request Broker (SRB), How to Integrate the Databases with the Grid?, The Architecture of OGSA-DAI for Offering Grid Database Services

### Unit-III

**What is Cluster Computing?** : Approaches to Parallel Computing, How to Achieve Low Cost Parallel Computing through Clusters, Definition and Architecture of a Cluster, What is the Functionality a Cluster can Offer? Categories of Clusters

**Cluster Middleware : An Introduction** : Levels and Layers of Single System Image (SSI), Cluster Middleware Design Objectives, Resource Management and Scheduling, Cluster Programming Environment and Tools

**Early Cluster Architectures and High Throughput Computing Clusters** : Early Cluster Architectures, High Throughput Computing Clusters, Condor

**Networking, Protocols & I/O for Clusters** : Networks and Inter-connection/Switching Devices, Design Issues in Interconnection Networking/Switching, Design Architecture-General Principles and Trade-offs, HiPPI, ATM (Asynchronous Transmission Mode), Myrinet, Memory Channel (MC), Gigabit Ethernet

### Unit-IV

**Setting Up and Administering a Cluster** : How to Set Up a Simple Cluster?, Design Considerations for the Front End of a Cluster, Setting Up Nodes, Clusters of Clusters or Metaclusters, System Monitoring, Directory Services Inside the Clusters & DCE, Global Clocks Sync, Administering Heterogeneous Clusters

**Cluster Technology for High Availability** : Highly Available Clusters, High Availability Parallel Computing, Mission Critical (or Business Critical or Business Continuity) Applications, Types of Failures and Errors, Cluster Architectures and Configurations for High Availability, Faults and Error Detection, Failure Recovery, Failover/Recovery Clusters

**Load Sharing and Load Balancing** : Load Sharing and Load Balancing, Strategies for Load Balancing, Modelling Parameters

**Distributed Shared Memory** : Issues in DSM, Write Synchronization for Data Consistency, Double Faulting, Application/Type Specific Consistency, Issues in Network Performance in DSM

### Prescribed Book:

C.S.R.Prabhu - "Grid and Cluster Computing"-PHI(2008)

**Chapters:** 1 to 13, 16, 17.

### Reference Book:

Jankiram, "Grid Computing Models : A Research Monograph", TMH (2005)

**Model Paper**

**MCA 405.1 : Grid and Cluster Computing**

**Time: 3Hrs.**

**Max. Marks: 80**

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**Answer ALL Questions: Each Question Carries Equal Marks**

**1.**

- a) What is e-science?
- b) Compare Globus and Legion.
- c) What is a Web Service?
- d) Write different categories of Clusters.
- e) Define Cluster middleware.
- f) Compare Gigabit Ethernet with ATM.
- g) What is a Watchdog timer?
- h) What is double faulting?

**UNIT - I**

- 2. a) What is metacomputing? What is its relationship with the grid?
  - b) What is datagram architecture? Explain its main features.
- (or)
- c) Compare and contrast Condor, CondorG, Nimrod, NimrodG and NMI.
  - d) What are the objectives, functions and achievements of Global Grid Forum (GGF)?

**UNIT - II**

- 3. a) Explain what is SOA and how it functions?
  - b) What is WSRF? What are its benefits? Where is it available?
- (or)
- c) Explain the architecture and functionality modules of Globus Toolkit (GT4).
  - d) How does grid enable a DBMS?

**UNIT - III**

- 4. a) What is Cluster computing ? Why is it needed?
  - b) Explain Cluster middleware design objectives.
- (or)
- c) Explain Condor architecture.
  - d) What are the different design issues in interconnection Networking/Switching?

UNIT - IV

5. a) How to setup a simple cluster? What are the design considerations for the front end of a cluster?
- b) Explain the various cluster architectures and configuration for high availability.
- (or)
- c) Explain static and dynamic load sharing approach.
- d) What is DSM? Why is it required in cluster and what are the various issues in DSM?

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## **MCA 405.2: Cryptography and Network Security**

### **Unit-I**

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

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

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

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

### **UNIT-II**

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

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

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

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

### **UNIT-III**

**Authentication Applications:** Kerberos, X.509 authentication service

**Email Security:** Pretty good privacy, S/MIME

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

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

## UNIT-IV

**Intruders:** Intruders, Intrusion detection, password management

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

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

### **Prescribed Book:**

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

**Chapters :** 1,2,3,7,9,10,11,13,14,15,16,17,18,19,20

### **Reference Books:**

1. William Stallings, "Network Security Essentials - Applications and Standards", Third Edition, Pearson Education (2007).
2. Chris McNab, "Network Security Assessment", 2<sup>nd</sup> Edition, OReilly (2007).
3. Jon Erickson, "Hacking - The Art of Exploitation", SPD, NOSTARCH Press (2006).
4. Neal Krawety, "Introduction to Network Security", Thomson (2007).
5. Ankit Fadia, "Network Security - A Hackers Perspective", Macmillan (2008)

**Model Paper**

**MCA 405.2: Cryptography and Network Security**

**Time: 3 Hrs**

**Max. Marks:80**

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**Answer all the following questions. Each question carries 16 marks.**

**Section-A**

- 1.a) Abbreviate VIRUS.
- b) What is meant by interception?
- c) What are the various places where the data can get hacked?
- d) What is the difference between authentication and authorization?
- e) Explain the role played by the certificate management authority in providing security for the data.
- f) SEPP architecture.
- g) What are the different elements involved in cryptography?
- h) Digital signatures.

**Section-B**

**Unit- I**

- 2.a) Discuss various ways of hacking the data.
  - b) Discuss the way to encrypt data using substitution techniques. Explain it with suitable example.
- (or)
- c) Write the structure of stream cipher.
  - d) Discuss the process of encryption using triple DES method.

**Unit- II**

- 3.a) Explain Diffie-Hellman key exchange algorithm.
  - b) What is hashing? Write the procedure to calculate the hash value in brief.
- (or)
- c) Discuss different authentication protocols.

**Unit-III**

- 4.a) Discuss S-MIME functionality. Explain how it differs from MIME?
  - b) What is dual signature? Explain the process of calculating it.
- (or)
- c) Discuss in detail about the IP security.

**Unit-IV**

5. a) Write the rules for selecting passwords. Also explain how a password can be managed?
  - b) Discuss various virus prevention measures.
- (or)
- c) Describe firewall design principles.

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## **MCA 405.3: Simulation Modeling And Analysis**

### **UNIT I:**

Basic simulation Modeling: Systems , models and simulation , Discrete-Event simulation , Simulation of an inventory system , Problem statements, program organization and Logic, C program, simulation output and discussion, Steps in a Sound Simulation Study  
Other types of simulation: Continuous simulation, Combined Discrete continuous simulations, Monte Carlo Simulation, Spreadsheet simulation, Advantages , disadvantages and Pitfalls of Simulation

### **UNIT II:**

Modeling Complex Systems: Introduction, List Processing in Simulation, A simple Simulation Language: simlib, Single Server Queueing Simulation with simlib, Time-Shared Computer Model, Multiteller Bank with Jockeying, Job-Shop Model, Efficient Event List Manipulation.

### **UNIT III:**

Simulation Software: Introduction, Comparison of simulation packages with Programming languages , Classification of Simulation Software. General purpose versus Application Oriented Simulation Packages, Modeling Approaches, Common Modeling Elements, Desirable Software features, General Capabilities, Statistical capabilities, Customer support and documentation, Object-Oriented Simulation.

### **UNIT IV:**

Random-Number Generators: Introduction, Linear Congruential generators , Mixed generators, Multiplicative generators, Composite generators, Empirical Tests, Theoretical tests,  
Generating random variates: General approaches to generating random variates, Inverse Transform, Acceptance -Rejection , Generating continuous Random variates, Uniform , Exponential, weibull and normal.

### **Prescribed Book:**

1. Averill M Law, "Simulation Modeling and Analysis",  
Fourth Edition, TMH (2008)

**Chapters:** 1, 2, 3, 7, 8

### **Reference Book :**

Jerry Banks, John S.Carson And Berry L. Nelson & David M. Nicol,  
"Discrete Event System Simulation", 3<sup>rd</sup> Edition, Pearson Education

Model Paper

MCA 405.3: Simulation Modeling And Analysis

Time: 3 Hrs

Max. Marks:80

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Answer the following questions. Each question carries 16 Marks.

- 1.a) Give any four applications of Simulation?
- b) Define System State.
- c) Compare the Simulation Packages with Programming Languages.
- d) What is the difference between verification and validation?
- e) What is Random Variable?
- f) Describe the candidate generation in queuing system?
- g) Define Bernouli Principle for Random Variate.
- h) What is Hypothesis?

Unit-I

- 2.a) Discuss about steps involved in simulation study?
- b) Explain the simulation of Inventory System?  
(or)
- c) What is Discrete Event Simulation? Discuss about simulation process of any real world system.
- d) What are the advantages and disadvantages of simulation.

Unit-II

- 3.a) Discuss about the simulation of single server queueing process.  
(or)
- b) Ships arrive at a harbor with interarrival times that are IID exponential random variables with a mean of 1.25days. The harbor has a dock with two berths and two cranes for unloading the ships; ships arriving when both berths are occupied join a FIFO queue. The time for one crane to unload a ship is distributed uniformly between 0.5 and 1.5 days. If only one ship is in the harbor, both cranes unload the ship and the (remaining) unloading time is cut in half. When two ships are in the harbor, one crane works on each ship. If both cranes are unloading one ship when a second ship arrives, one of the cranes immediately begins serving the second ship and the remaining service time of the first ship is doubled. Assuming that no ships are in the harbor at time 0, run the simulation for 90 days and compute the minimum, maximum, and average time that ships are in the harbor (which includes their time in berth). Also estimate the expected utilization of each berth and of the cranes. Use stream 1 for the interarrival times and stream 2 for the unloading times.

UNIT III

- 4.a) Describe about different classifications of Simulation Software.  
(or)
- b) Give the features of System Simulation Software?

Unit-IV

- 5.a) Discuss about different kinds of testing methods to check the Random Number Generators.  
(or)
- b) Explain the following distributions
  - i. Normal Distribution.
  - ii. Poisson Distribution.

## **MCA 406 : Web Technologies Lab**

1. Write HTML code to provide intra document linking.
2. Insert the "Calendar" object in a web page.
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. Simulate the "notepad" help file in HTML.
5. Write a Java script to differentiate between write() and writeln() methods. Also, depict how <H1> tag in a Java script influence the output, while a <pre> tag is also attached to the script.
6. Find the difference in hours between local time and Greenwich Mean Time using the 'Date' object in Java Script.
7. Create a bank entry form using appropriate form elements. The account number must not be visible on the screen. The name and address must be stored in one place. There must be a text box showing the opening balance of the customer. The user should be able to make a choice of either a deposit (or) withdrawal transaction. Accordingly, when the user deposits (or) withdraws money, the opening balance must be updated using CREDIT/DEBIT button. The user should not be able to make any entries in the opening balance text box.
8. Write a Java Script to update the information into the array, in the "onClick" event of the button "Update".
9. Create forms for the objects "stu\_info", "College" and "Experience". Place textboxes for all the fields in the form "stu\_info". Create two tables for storing data for the "college" and "experience" forms and place textboxes for all the fields in a three row format. Place two buttons "update" and "retrieve" in the form "execute".
10. Create a web page for a shopping mall that allows the user to tick off his purchases and obtain the bill with the total being added up simultaneously.
11. Use the suitable date functions to prompt the user for an integer between 1-31 and return the day of the week it represents.
12. Write a script to find the duplicate elements of an array.
13. Write validation functions for checking the alphabetic and number fields.
14. Using the concept of "Nested Frames", obtain the output as follows:

Enter file name: Films.html	The films released are as follows: 1. Twister 2. Titanic 3. Terminator 4. Independence Day			
Enter background color: Green				

The right hand frame must display the output of the file, that is entered in the top-left frame. The bottom left-hand frame displays the selected background color.

15. Create a home page for "Cyber book stores" that will display the various books available, the authors and prices of the books. Include a list box that contains various subjects and a "submit" button, that displays information about the books on the subject required by the user.
16. Create a HTML form that interacts with the user. Collect first name, last name and date of birth and display that information back to the user.
17. Write a script which generates a different greeting each time the script is executed.
18. Write a script that takes input from user and displays the same in upper case.
19. Illustrate different types of filters on a sample text.
20. Create an inline style sheet.
21. Illustrate the use of an embedded style sheet.
22. Create an external style sheet to illustrate the "Font" elements.
23. Create a file with HTML code and insert two anchors to point to a specific area in the code.
24. Illustrate the creation of clickable images in HTML.
25. With a suitable example, depict how we can align text and images using "table" tag.
26. Simulate the "Clip Art" gallery of M.S. Word in HTML, using suitable tags.
27. Using functions, write a Java Script code that accepts user name and password from user. Check their correctness and display appropriate alert messages. Restrict the user to try only for a maximum of three times.

28. Modify the above program that suits the following requirements:

a) After a lapse of 15 seconds, the password should be generated automatically.

b) For impatient users, place a button that displays the passwords immediately without waiting for 15 seconds.

29. Write a script to open a new window, after clicking a button named "New". After displaying the new window, the original window should be closed automatically.

Write an application to create a "customer interaction form", that accepts the name, age and salary of a customer who approaches the bank to obtain education loan for their children. He should furnish details about his marital status and children. Accept this information in textboxes and two check boxes. Display whether the customer is eligible for the loan (or) not, based on the furnished information.

**MCA 407 : Visual Programming Lab**

1. Develop an Visual Basic Application to display the Profile of a Valid User.

Conditions:

- i. Check the User with his User Name and Pass Word.
  - ii. Display the Profile of the User. (Note: Profile of the user will be any of "READ", "WRITE" and "READ AND WRITE"
2. Develop an Visual Basic Application to search an item from list of items using Binary Search.
3. Develop an Visual Basic Application to demonstrate the Stack Operations.
4. Develop an Visual Basic Application to demonstrate the Queue Operations.
5. Develop an Visual Basic Application to check the given string is palindrome or not.
6. Develop an Visual Basic Application to find out the factorial of the given number by using functions
7. Develop an Visual Basic Application to Check the given number in one of categories like
  - i. Strong Number.
  - ii. Perfect Number.
  - iii. Palindrome.(Note: Use Sub Program Concept)
8. Develop an Visual Basic Application for copying the elements from one list to the other list and Vice-versa. (Note: Implement Single Element, Multiple Element Transfer between the lists)
9. Develop an Visual Basic Application to implement the Calculator operations by using Control Array.
10. Develop an Visual Basic Application to Implement the Traffic Signal Operations by using the following conditions
  - i. Three Traffic Signal named "RED", "GREEN" and "YELLOW"
  - ii. Signal Flow should be RED->YELLOW->GREEN.
  - iii. Time Out for Red signal is 10, Green signal is 10 and Yellow signal is 5.
  - iv. Always Yellow Signal follows either Red or Green.
  - v. Red and Green Signals will not appear one by one.
11. Develop an Visual Basic Application to sort the given list of numbers. (D't use the Sort option of the List Control)

12. Develop an Visual Basic Application to read and Print the user data by using Input Box and Message Box.

13. Develop an Visual Basic Application to Read the Details of the Candidate using following Conditions

- i. Read the Name, Father Name, Address, Qualifications and respective percentages and Experience if any.
- ii. Candidate may choose any TWO OS Types (MAX)
- iii. Candidate may Choose any THREE Database (MAX)
- iv. Candidate may choose any FIVE Programming Languages (MAX)

(Note: No Control in the Form will be NULL)

14. Develop an Visual Basic Application to generate the Telephone Bill.

15. Develop a Visual Basic Application to make survey on different age groups.

Example:

Age groups may be (25-34), (35-44), (45-54) and  $\geq 55$  and display the no of people on a particular age group.

16. Develop an Visual Basic Application to implement the Arithmetic operations.

- i. Project Consists of Four Forms
- ii. Form1 is used to Read the numbers and read the operation.
- iii. Operations are partitioned into two categories like Integer Arithmetic and Real Arithmetic should follow the normalization principles.
- iv. Choose the appropriate arithmetic operation under Integer and Real arithmetic under Addition, Subtraction, Multiplication and Division.
- v. Form2 is for doing Integer Arithmetic and Form3 is for doing Real Arithmetic.
- vi. Form 4 is for Display the result.

17. Develop an Visual Basic Application to make the following database operations by using ADO,

- i. Insert an New Employee into the database.
- ii. Delete an Existing Employee from the database.
- iii. Update the employee information on the basis of Employee number.
- iv. Search an employee details on the basis of department number.

18. Develop an Visual Basic Application to make the following operations on Employee database.
  - i. Search an Employee on the basis of Employee number.
  - ii. Navigate and display the records on MOVE FIRST, MOVE NEXT, MOVE PREVIOUS, MOVE LAST.
  
19. Develop an Visual Database application by using Data Environment and PL/SQL procedures.
  - i. Insert the employee details into the database by using PL/SQL Procedure.
  - ii. Update the employee information in basis of employee number by using PL/SQL procedure.
  - iii. Delete a employee information in basis of employee number by using PL/SQL procedure.
  - iv. Generate a report for
    - a. Recently joined employees
    - b. Department wise and in the order of experience.
    - c. Complete Employee Details.
  
20. Develop an Database application for Telephone Billing System.

**MCA 408 : Soft Skills**

**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)

## **MCA 501 : Data Warehousing And Data Mining**

### **Unit - I**

Warehouse: What is it, Who Need It, and Why?, Things to Consider, Managing the Data Warehouse, Data Warehouse Design Methodology, Data Marts and Start Schema Design, Fundamentals of ETL Architecture, Partitioning Data, Indexing Data.

### **Unit - II**

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

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

### **Unit - III**

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

### **Unit - IV**

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

### **Prescribed Books :**

1. Michael Corey, Michael Abbey, Ian Abramson, Ben Taub, "Oracle 8i Data Warehousing", TMH (For Unit-I)
2. Jiawei Han Micheline Kamber, "Data mining & Techniques", Morgan Kaufmann Publishers (Unit-II to IV)

### **Reference Books :**

- 1 S.N.Sivanandam, S.Sumathi, "Data Mining - Concepts, Tasks and Techniques", Thomson (2006).
- 2 Ralph Kimball, "The Data Warehousing Toolkit", Wiley.
- 3 Margaret H. Dunham, "Data mining - Introductory and advanced topics", Pearson Education.
- 4 D.Hand, H. Mannila and P.Smyth, "Principles of Data mining", PHI (2001).

Model Paper

MCA 501 : Data Warehousing and Data Mining

Time: 3 Hrs

Max. Marks: 80

Answer the following questions. Each Question Carries 16 Marks.

1. (a) What is OLAP? Discuss about OLAP operations.
- (b) What is Multidimensional Model?
- (c) What is Generalized Rule?
- (d) Explain about different cluster categories.
- (e) How can the root of the decision tree was initialised?
- (f) What kinds of data used in Data Mining?
- (g) What is Meta data? Describe the types of Metadata.
- (h) What is Episode Discovery?

Unit-I

2. (a) What is Data Warehouse? Discuss the difference between Warehouse and Database.
- (b) What is Warehouse Schema? Discuss about Star Schema.
- (or)
- (c) Discuss about the phases of Warehouse Architecture.
- (d) Discuss about Indexing Techniques used to organize the data in the Data Warehouse.

Unit-II

3. (a) Discuss and Compare
  - i. Priori Algorithm.
  - ii. PAM Algorithm
- (b) What is Association Rule? Is every subset of any itemset must contain either a frequent set or a border set. Justify.
- (or)
- (b) Discuss about FP-Tree Growth Algorithm.
- (c) Discuss about various categories of Association Rules

Unit-III

4. (a) What is Decision Tree? Discuss about Decision Tree Construction Algorithms.
- (b) Discuss about Bayesian Classification.
- (or)
- (c) What is the purpose of Neural Network? Discuss about types of Neural Networks?
- (d) Discuss about salient features of the generic algorithm? How can a data mining problem can be an optimization problem? How can do you use generic algorithms for such a cases?

Unit-IV

5. (a) What is clustering? Discuss about various categories of clustering.
- (b) Discuss about DBSCAN Algorithm.
- (or)
- (c) Discuss about BIRCH clustering
- (d) Discuss about STING Algorithm with example.

## **MCA 502 : .NET Programming**

### **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 Object Oriented 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

### **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

### **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, Picture box 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

**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

**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**

**MCA 502: .Net Programming**

**Time: 3 Hrs**

**Max. Marks: 80**

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**Answer all the following questions. Each Question Carries 16 Marks.**

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

**Unit-II**

3. a) Explain all the validation controls.
- b) Write the procedure to design the application which allows the valid user to enter into it.  
(or)
- c) Briefly explain about master pager and themes
- d) With suitable example explain the navigation controls.

**Unit-III**

- 4.a) What are the concepts of object oriented programming.
- b) Explain the following controls
  - i. ComboBox
  - ii. ListBox
  - iii. Panel
  - iv. Builtin dialogBox  
(or)
- c) Explain the steps involved in windows form design and interface
- d) Write the procedure for coffee shop billing application (use checkbox)

#### Unit-IV

- 5.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)
- c) 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

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## **MCA 503: Design and Analysis of Algorithms**

### **Unit-I**

**Introduction** : What is Algorithm - Algorithm Specification : Pseudocode Conventions - Recursive Algorithms ; Performance Analysis: Space Complexity - Time Complexity - Asymptotic notation - Performance Measurement; Randomized Algorithms : Basics of probability theory - Randomized algorithms - Identifying the repeated element, Primality Testing - Advantages and Disadvantages.

**Elementary Data Structures:** Stacks and Queues ; Trees : Terminology - Binary Trees ; Dictionaries : Binary Search Trees ; Priority Queues : Heaps - Heapsort ; Sets and disjoint set Union : Introduction - union and find operations. ; Graphs: Introduction - Definitions - Graph Representations.

**Divide - and - conquer:** General Method - Defective Chess Board - Binary Search - Finding Maximum and Minimum - Merge Sort - Quick sort - Selection Problem ; Strassen's Matrix Multiplication, Convex Hull: some geometric Primitives - The Quick Hull Algorithm - Graham's scan - An  $O(n \log n)$  divide - and - conquer algorithm.

### **Unit-II**

**The Greedy Method** : The general Method - Container loading - Knapsack Problem - Tree Vertex Splitting - Job sequencing with deadlines ; Minimum cost spanning trees : Prim's Algorithm - Kruskal's Algorithm - Optimal Storage on tapes - Optimal Merge patterns - Single Source shortest paths.

**Dynamic Programming** : The general method - Multi-stage graphs - All pairs shortest paths - Single source shortest paths - Optimal Binary Search Trees - String editing - 0/1 Knapsack - Reliability design - The traveling sales person problem - Flow shop Scheduling

### **Unit-III**

**Basic Traversal and Search Techniques:** Techniques for Binary Trees - Techniques for graphs : Breadth First Search and Traversal - Depth First Search ; Connected Components and Spanning Trees - Bi-connected components and DFS

**Back Tracking** : The general method - The 8-queens problem - sum of subsets - Graph coloring - Hamiltonian Cycles - Knapsack Problem .

## Unit-IV

**Branch and Bound** : The Method: Least Cost search - The 15 puzzle - control abstractions for LC search - Bounding - FIFO Branch - and - Bound - LC Branch and Bound; 0/1 knapsack problem: LC Branch and Bound solution - FIFO Branch and Bound solution; Traveling Sales person.

**NP-Hard and NP - complex problems** : Basic concepts : Non deterministic algorithms -The classes NP hard and NP complex ; Cook's theorem - NP hard graph problems : Clique Decision Problem - Node cover decision problem - chromatic number decision problem - Directed Hamiltonian cycle - Traveling sales person decision problem - and/or graph decision problem; NP-hard scheduling Problems: scheduling identical processors - flow shop scheduling - job shop scheduling; NP-hard code generation problems:code generation with common subexpressions - Implementing parallel assignment instructions; Some simplified NP-hard problems.

### **Prescribed Book:**

Sartaj Sahni, "Fundamentals of Computer Algorithms", Second Edition, Universities Press (2008)

**Chapters** : 1 to 8 and 11

### **Reference Books :**

1. Anany Levitin, "Introduction to the Design & Analysis of Algorithms", Second Edition, Pearson Education (2007).
2. I.Chandra Mohan, "Design and Analysis of Algorithms", PHI.
3. Prabhakar Gupta, Vineet Agrawarl, "Design and Analysis of Algorithms", PHI.
4. Parag Himanshu Dave, "Design and Analysis of Algorithms", Pearson Education (2008)

Model Paper

MCA 503: Design And Analysis Of Algorithms

Time : 3 hrs

Max Marks : 80

Answer ALL the following Questions. Each Question carries Equal Marks.

UNIT - I

(8 \* 2 = 16 )

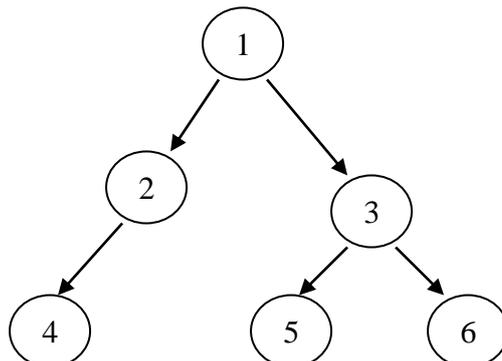
1. a) What are Huffman codes ?
- b) Explain dominance rule.
- c) State the general method for dynamic programming.
- d) Write the difference between divide-and-conquer and the greedy method.
- e) State the principle of optimality ?
- f) Write the formulae developed by Strassen to multiply matrices ?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

UNIT - II

2. a) Explain control abstraction for divide - and - conquer strategy. (8M)
- b) Explain the process of constructing convex hull. Also write its algorithm and complexity . (8M)
- (or)
- c) Derive the average time complexity for quick sort. (8M)
- d) Write a randomized algorithm to perform primality testing. (8M)

UNIT - III

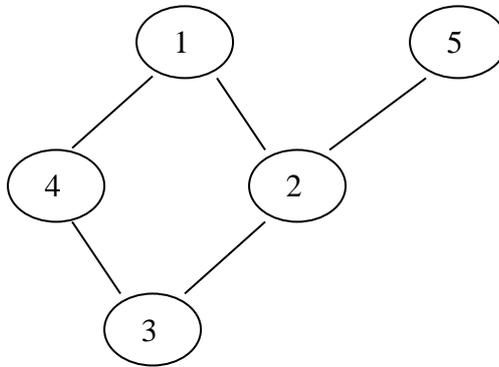
3. a) State the problem of "optimal storage on tapes". If three programs of length (11,12,13 ) = (5,10,3). Find the optimal way to store those programs on tapes using greedy method. (8M)
- b) Find optimal binary search tree for the identifiers (do, if, while). Let  $p(1:3) = (3,3,1)$  and  $q(0:3)=(2,3,1,1)$ . Solve it using dynamic programming (8M)
- (or)
- c) Write the problem of tree vertex splitting. Find the places where boosters are needed for the following tree, for  $\delta=5$  (8M)



- d) Solve 0/1 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  $m=6$ . (8M)

**UNIT - IV**

4. a) Solve sum of subsets problem for  $n=6, m=30$ ,  
 $w[1:6] = \{5, 10, 12, 13, 15, 18\}$ . (8M)  
 b) Find connected components & spanning tree for : (8M)



(or)

- c) Solve 8-queues problem. (8M)  
 d) Write different traversal techniques for graphs. (8M)

**UNIT - V**

5. a) Write a complete LC branch and bound algorithm for Knapsack  
 problem (8M)  
 b) Write an non-deterministic algorithm to sort array  
 elements. (8M)  
 (or)  
 c) Explain the principles of (8M)  
 i) control abstraction for LC search  
 ii) Bounding  
 iii) FIFO branch & bound  
 iv) LC branch and bound  
 d) Write the relationship between P, NP and NP-complete,  
 NP-hard problems. (8M)

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## MCA 504.1 Embedded Systems

### Unit I

**Introduction.:** Embedded system overview, Design challenges, Processor technology., IC technology, Design technology, Trade offs.

**Custom single purpose processors: Hardware:** Introduction, Combinational logic, Sequential logic, Custom single purpose processor design, RT-level custom single purpose processor design, Optimizing custom single purpose processor design.

### Unit II

**General purpose processors : Software :** Introduction, Basic architecture, Operation, Programmer's view, Development environment, Application specific instruction set processors, Selecting a microprocessor, General purpose processor design

**Standard single purpose processors: Peripherals:** Introduction, Timers, Counters, Watchdog timers, UART, Pulse width modulators, LCD controllers, Keypad controllers, Stepper motor controller, Analog to digital converters, Real time clocks.

### Unit III

**Memory:** Introduction, Memory write ability and storage permanence, Common memory types, Composing memory, Advanced RAM

**Interfacing:** Introduction, Communication basics, Microprocessor interfacing -I/O addressing, Microprocessor interfacing - Interrupts, Microprocessor interfacing - DMA, Arbitration, Multi level bus architectures, Advanced communication principles, Serial protocols, Parallel protocols, Wire less protocols

### Unit IV

**Digital camera example:** Introduction, Introduction to simple digital camera, Requirements specifications, Design

**State machine and concurrent process models:** Introduction, Models Vs languages, text Vs graphics, An introductory example, A basic state machine model-FSM, Finite state machine with data path model-FSMD, Using state machine, HCFSM and stack charts languages, Program state machine model -PSM, The role an appropriate model and language, Concurrent process model, Concurrent processes, Communication among the processes, Synchronization among the processes, Implementation, Data flow model, Real time systems

#### **Prescribed Book:**

Frank Vahid / Tony Givargis, "Embedded System Design",  
Third edition, Wiley (2008).

**Chapters :** 1 to 8.

#### **Reference book:**

Raj Kamal, "Embedded Systems", Second Edition , TMH (2008).

Model Paper

MCA 504.1: Embedded Systems

Time: 3 Hrs

Max. Marks: 80

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Answer the following questions. Each Question Carries 16 Marks.

1. (a) Define three main characteristics of Embedded Systems.
- (b) What is a design metric?
- (c) Describe why a general purpose processor could cost less than a single - purpose processor.
- (d) Compose 1K X 8 ROMS into 1K X 32 ROM.
- (e) Define Real-Time clock.
- (f) Explain the difference between port based I/O and bus-based I/O.
- (g) Define Real-Time systems and real time operating system.
- (h) Difference between FSM and FSMD.

Unit-I

2. a) Describe common Design metrics of an embedded system.
- b) Explain the importance of processor technology, IC technology and Design technology in designing a Embedded System.  
(or)
- c) What are the steps involved in designing custom single - purpose processor.
- d) Explain RT-level custom single purpose processor design.

Unit-II

3. a) Describe steps involved in designing a general-purpose processor.
- b) Explain different software design tools that are used by embedded system designers.  
(or)
- c) Explain pulse width modulators.
- d) Explain stepper Motor controllers.

Unit-III

4. a) Discuss different types of ROM's and RAM's.
- b) What is Cache ? Explain Cache mapping techniques.  
(or)
- c) Describe different types of serial, parallel and wireless protocols.
- d) Discuss different arbitration methods.

Unit-IV

5. a) Illustrate the Design of a Digital Camera.  
(or)
- b) Explain communication and synchronization among processes.
- c) Describe FSM with example.

## **MCA 504.2: Mobile Computing**

### **Unit - I**

**Introduction:** Mobility of bits and bytes, Wireless - the beginning, mobile computing, dialogue control, networks, middleware and gateways, applications and services, developing mobile computing applications, security in mobile computing, standards - why is it necessary, standard bodies, players in the wireless space

**Mobile computing architecture:** History of computers, history of Internet, Internet - ubiquitous network, Architecture of mobile computing, three tier architecture, design considerations for mobile computing, mobile computing through Internet, making existing applications mobile - enabled

**Mobile computing through telephony:** Evolution of telephony, multiple access procedure, mobile computing through telephone, developing an IVR application, voice XML, telephony application programming interface (TAPI)

### **Unit - II**

**Emerging technologies:** Introduction, Bluetooth, radio frequency identification {RFid}, wireless broadband {WiMAX}, mobile IP, Internet protocol version 6 {IPv6}, java card

**Global system for mobile communications (GSM):** Global system for mobile communications, GSM Architecture, GSM Entities, Call routing in GSM, PLMN Interfaces, GSM Addresses and identifiers, network aspects in GSM, GSM frequency allocation, Authentication and security

**Short message service (SMS):** Mobile computing over SMS, short message services (SMS), value added services through SMS, accessing SMS bearer

### **Unit - III**

**General packet radio service (GPRS):** Introduction, GPRS and packet data network, GPRS network architecture, GPRS network operations, data services in GPRS, applications for GPRS, limitations of GPRS, billing and charging in GPRS

**Wireless application protocol (WAP):** Introduction, WAP, MMS, GPRS applications

**CDMA and 3G:** Introduction, spread - spectrum technology, Is - 95, CDMA Vs GSM, wireless data, third generation networks, applications on 3G

## Unit -IV

**Wireless LAN:** Introduction, wireless LAN advantages, IEEE 802.11 standards, wireless LAN Architecture, mobility in wireless LAN, deploying wireless LAN, mobile Ad Hoc networks and sensor networks, wireless LAN security, Wi- Fi vs. 3G

**Voice over Internet protocol and convergence:** Voice over IP, H.323 frame work for voice over IP, Session initiation protocol (SIP), comparison between H.323 and SIP, real time protocols, convergence technologies, call routing, voice over IP applications, IP Multi media subsystem (IMS), mobile VoIP

**Security issues in mobile computing:** Introduction, information security, security techniques and algorithms, security protocols, public key infrastructure, trust, security models, security frameworks for mobile environment

### **Prescribed Book:**

Asoke K Talukder and Roopa R Yavagal, "**Mobile Computing**" TMH (2008)

**Chapters:** 1 to 10, 17,18.

### **Reference Book :**

Rajkamal, "Mobile Computing", Oxford (2008).

**Model Paper**

**MCA 504.2 Mobile computing**

**Time : 3 Hrs**

**Max. Marks: 80**

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**Section - A**

**Answer ALL of the following questions. Each question carries two marks**

**1.**

- (a) Wireless PAN.
- (b) How can we produce different tones?
- (c) Define inter leaving.
- (d) SMS vs. MMS.
- (e) What is transport layer protocol that supports Internet Telephony?
- (f) What are Ad Hoc networks?
- (g) Write some of the applications of GPRS.
- (h) Justify the need of providing security for mobile data.

**Section - B**

**Unit - I**

**2.**

- (a) Write the architecture of mobile computing. **8M**
  - (b) Write the middle ware software and gateways needed in mobile computing. **8M**
- (or)**
- (c) Develop a theatre booking application. **8M**
  - (d) Compare wireless networks with wired networks. **8M**

**Unit -II**

**3.**

- (a) Explain the Bluetooth protocol stack. **8M**
  - (b) How can we perform value added services through SMS? **8M**
- (or)**
- (c) Explain tunneling operations in mobile IP and also the relationship between mobile IP and cellular IP. **16M**

**Unit - III**

**4.**

- (a) Explain MMS environment. **8M**
  - (b) List out 3G applications. **8M**
- (or)**
- (c) Explain WAE logical model. **8M**
  - (d) Explain the applications for GPRS. **8M**

**Unit -IV**

**5.**

- (a) Compare between H.323 and SIP. **8M**
  - (b) Discuss the features of Wi - Fi. **8M**
- (or)**
- (c) Discuss the various security models in mobile computing. **16M**

## MCA 504.3 Software Testing Techniques

### UNIT : I

**The Testing Challenge and Those Who Take It On** : Software Engineering Evolution, A Tester's True Goal, What is a User, Testers, What Makes Them Special

**Industrial -strength Software, It's Not a Science Project** : Industrial-strength Software, Production Environments, Mission-critical Software, Case Study :A Pension Plan Management Vendor

**The Development Process** : Test Process Definitions

**The Test and Development Divide** : Should Developers Test Their Own Software, Diplomacy : The Tester's Relationship with Development

### UNIT : II

**Where to Start ? Snooping for Information** : The Importance of Knowing What You Test, Viewing All Software as a Solution to a Problem, Customer Reconnaissance, A Simple Test Preparation Tool, Don't Just Take, Give a Little

**Coping with Complexity through Teaming** : Complex Software Products : You Can't Know It All, Reducing Complexity through Component Spies, Sharing Expertise Across the Team.

**Test Plan Focus Areas** : The Test Plan Document, Unit Test Focus Areas, Function Verification Test Focus Areas, System Verification Test Focus Areas, Integration Test Focus Areas, Single-system versus Multisystem Testing, Test Plan Reviews

**Testing for Recoverability** : Function Verification Test, System Verification Test, Integration Test, Case Study : Clustered System Recovery

### UNIT : III

**Planning for Trouble** : Scheduling, Entry and Exit Criteria, Injecting Testability into Development Plans, Case Study : The Testability of Errors

**The Magic of Reuse** : Who Writes More Code : Development or Test, Reuse Opportunities and Techniques, Case Study : Testing Real Memory Management

**Developing Good Test Programs** : Function Verification Test Programs, System Verification Test Programs, Case Study : Termination Processing

**Data Corruption** : Data Integrity : What is it, Protecting against Data Corruption, The Need for Special Testing, Data Integrity Monitors, Case Study : Memory and File Thrashers

## UNIT : IV

**Tools-You Can't Build a House without Them** : The Magic Tool Myth, Tool Categories, Buy versus Build, Avoid the Tool Merry-Go-Round

**Test Execution** : Test Execution Sequence, Artistic Testing, An Iterative Approach : Algorithm Verification Testing, Catching Problems, Problem Diagnosis, Testing the Documentation

**Testing with a Virtual Computer** : Partitioning, Virtualization, Partitioning and Virtualization Combinations, Why Go Virtual

**The Customer's Role in Testing** : Controlled Early Introduction Programs, Preproduction Testing

### **Prescribed Book :**

Loveland, Miller, Prewitt, Shannon, "Software Testing Techniques - Finding the Defects that Matter", SPD, Charles River Media (2007)

**Chapters** : 1 to 13, 15, 16, 19

### **Reference Book :**

- 1 Rajini & Oak, "Software Testing : Methodologies, Tools and Processes", TMH (2004)
- 2 Dorothy Graham, "Foundations of Software Testing : ISTQB Certification", Thomson (2007)

Model Paper

**MCA 504.3: Software Testing Techniques**

**Time: 3 Hrs**

**Max. Marks: 80**

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**Answer ALL the following questions. Each Question carries Two Marks.**

**1.**

- (a) Software Test.
- (b) Mission critical software.
- (c) Test process definitions.
- (d) Complex software products.
- (e) Artistic Testing.
- (f) Integration Test.
- (g) Data Integrity Monitors.
- (h) Virtualization.

**Answer ONE question from each unit. Each Question carries sixteen Marks.**

Unit - I

**2.**

- (a) What makes Testers Special ? Why do we need Testers ? **8M**
- (b) Distinguish between White Box Testing & Black Box Testing. **8M**  
(or)
- (c) Explain the importance of Debugging and product / function skills. **8M**
- (d) What are the benefits of a strong Relationship. **8M**

Unit -II

**3.**

- (a) Give the detail explanation of the importance of knowing what you test. **8M**
- (b) Explain unit test focus areas. **8M**  
(or)
- (c) What are Function verification Test Focus Areas. **8M**
- (d) Distinguish between Single - System and Multi system Testing. **8M**

Unit -III

**4.**

- (a) Explain about Reuse Opportunities & Techniques. **8M**
- (b) Explain about Injecting Testability into Development Plans. **8M**  
(or)
- (c) Explain about Protecting against Data Corruption. **8M**
- (d) Explain about System verification Test Programs. **8M**

Unit - IV

5.

(a) Give detail explanation about Test Execution Sequence. **8M**

(b) Explain about Problem Diagnosis. **8M**

(or)

(c) Explain about Partitioning & Virtualization combination. **8M**

(d) Explain about Preproduction Testing. **8M**

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## **MCA 505.1 Image Processing**

### **UNIT I:**

Introduction, Image Shape, Human Vision System, Image Acquisition - Intensity Images, Real Time Capture, Colour Images, Video Camera, Capture, Analogue To Digital Conversion, Scanners, Character Recognitions Devices, Satellite Imaginary, Ranging Devices, Calibration, Image Presentation-Raster Screen, Printers (Matrix, Laser, Ink-Jet, Wax Thermal), Patterns, Dithering, Three-Dimensional Image.

### **UNIT II:**

Statistical Operations-Introduction, Gray-Level Transformations, Histogram Equalization, Multi-Image Operations, Spatial Operations And Transformations-Introduction, Spatial Dependent Transformations, Templates And Convolution, Edge Detection, Other Window Operations, Two-Dimensional Geometric Transformations, Segmentation And Edge Detection-Introduction, Region Operations, Basic Edge Detection, Second-Order Edge Detection, Pyramid Edge Detection, Crack Edge Relaxation.

### **UNIT III:**

Morphological And Other Area Operations-Introduction, Basic Morphological Operations, Opening And Closing Operations, Finding Basic Shapes-Combining Edges, Hough Transforms, Bresenham's Algorithms; Labeling Lines And Regions-Flat Surface And Straight Line Labeling, Dealing With Curves, Labeling Regions.

### **UNIT IV:**

Frequency Domain-Introduction, Hartley Transform, Fourier Transform, Optical Transformation, Power And Autocorrelation Functions; Image Compression-Introduction, Types And Requirements, Statistical Compression, Spatial Compression, Contour Coding, Quantizing Compression, Real-Time Image Transmission, Quadrees; Texture-Introduction, Identifying Textures, Texture Gradient, Texture Segmentation.

### **Prescribed Book**

Introductory Computer Vision And Image Processing - Adrian Low:, MC Graw Hill International Editions

### **Reference Book**

1. Digital Image Processing - Gojelez - Addison Wesley.
2. B.Chanda, D.Dutta Majunder, "Digital Image Processing", PHI (2008).

## **MCA 505.2: Microprocessors And Interfacing**

### **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.

### **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.

### **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.

## 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.

### **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**

**MCA 505.2: Microprocessors and Interfacing**

**Time: 3 Hrs**

**Max. Marks: 80**

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**Answer all the following questions. Each question carries 16 marks.**

- 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)**
- c) With suitable example explain data transfer and logical group instructions of 8086.
  - d) Explain different assembler directives of 8086 assembler.

**UNIT - II**

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

**UNIT - III**

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

**UNIT - IV**

- 5.a) Described Architectural details of Pentium processor.
- (or)**
- b) Described the architectural details of 80486.

## **MCA 505.3 : Web Engineering**

### **Unit-I**

**Web-Based Systems:** The Web, Web Applications

**Web Engineering:** What is Web Engineering, The Components of Web Engineering, Web Engineering Best Practices

**A Web Engineering Process:** Defining the Framework, Incremental Process Flow, Generic Actions and Tasks for the WebE Framework

**Communication:** The Communication Activity, Formulation Elicitation, Identifying WebApp Increments, Negotiation

### **Unit-II**

**Planning :** Understanding Scope, Refining Framework Activities, Building a WebE Team, Managing Risk, Developing a Schedule, Managing Quality, Managing Change, Tracking the Project, Outsourcing WebE Work.

**Analysis Modeling for WebApps:** Understanding Analysis in the Context of WebE, Analysis Modeling for WebApps, Understanding the Users, The Content Model, The Interaction Model, The Functional Model, The Configuration Model, Relationship-Navigation Analysis.

**WebApp Design :** Design for WebApps, Design Goals, Design and WebApp Quality, The Design Process, Initial Design of the Conceptual Architecture, Initial Design of the Technical Architecture

### **Unit-III**

**Interaction Design :** Interface Design Principles and Guidelines, Interface Design Workflow, Interface Design Preliminaries, Interface Design Steps, Aesthetic Design, Usability, Design Issues.

**Information Design :** Information Architecture, Organizing Content, Structuring the information Space, Blueprints : Adding Detail to a structure, Accessing Information, Wireframe Models, Navigation Design : Creating the Detailed structure, Summarizing the Design Process.

**Functional Design :** WebApp Functionality, The Nature of WebApp Functionality, Functional Design in the Design Process, Functional Architecture, Detailed Functional Design

#### **Unit-IV**

**Construction and Deployment** : Construction and Deployment within the WebE Process, Construction, Construction Principles and Concepts, Deployment, Construction and the Use of Components, Component-Level Design Guidelines, Component Design Steps

**Technologies and Tools** : General Issues, Implementation Tools and Technologies, Development Tools and Technologies

**Testing WebApps** : Testing Concepts, The Testing Process-An Overview, Content Testing, User Interface Testing, Usability Testing, Compatibility Testing, Component-Level Testing, Navigation Testing, Configuration Testing, Security and Performance Testing

#### **Prescribed Book:**

Roger S Pressman, David Lowe, "Web Engineering A Practitioner's Approach", TMH (2008)

**Chapters:** 1 to 5, 7 to 12, 14, 15.

**Model Paper**

**MCA 505.3: Web Engineering**

**Time: 3 Hrs**

**Max. Marks: 80**

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**Answer ALL the following questions. Each Question carries Two Marks.**

1. Write short notes on
  - a) Agile
  - b) Modelling
  - c) Elicitation
  - d) Managing risks
  - e) Usability
  - f) Construction
  - g) Content Testing
  - h) Organizing content

**Answer ONE question from each unit. Each carries sixteen Marks.**

**Unit - I**

2.
  - (a) Explain different components of Web Engineering. **8M**
  - (b) Describe Incremental Process Flow. **8M**

(or)

  - (c) What is the importance communication Activity ? Why ? **8M**
  - (d) Explain mechanism for Identifying WebApp Increments. **8M**

**Unit - II**

3.
  - (a) How to Redefine Framework Activities. **8M**
  - (b) Discuss steps involved in Building a WebE Team. **8M**

(or)

  - (c) Briefly explain analysis Modelling for WebApps. **8M**
  - (d) Explain Content Model. **8M**

**Unit - III**

4.
  - (a) Explain about Interface Design Steps. **8M**
  - (b) Describe the importance of functional design in design process. **8M**

(or)

  - (c) Describe the Information Architecture. **8M**
  - (d) Describe the Accessing Information. **8M**

**Unit - IV**

5.
  - (a) Explain about Component Design Steps. **8M**
  - (b) Explain about Implementation Tools & Technologies. **8M**

(or)

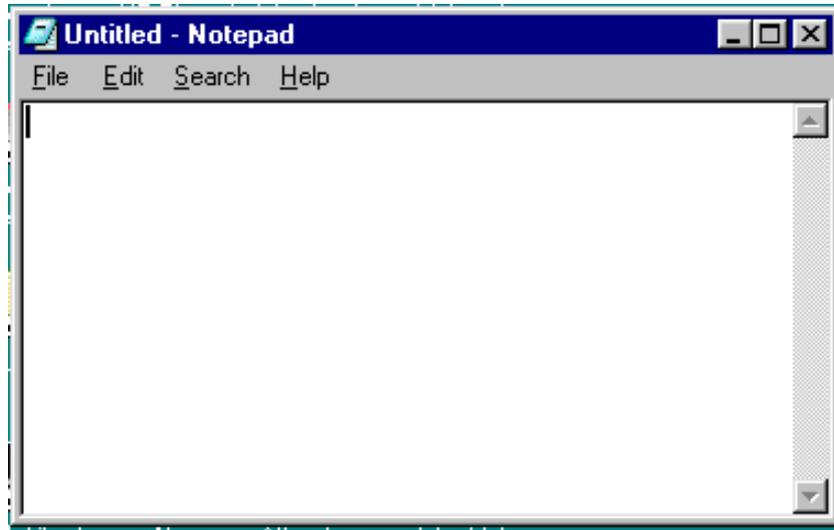
  - (c) Explain about Usability Testing. **8M**
  - (d) Explain about Component - Level Testing. **8M**

\* \* \* \* \*

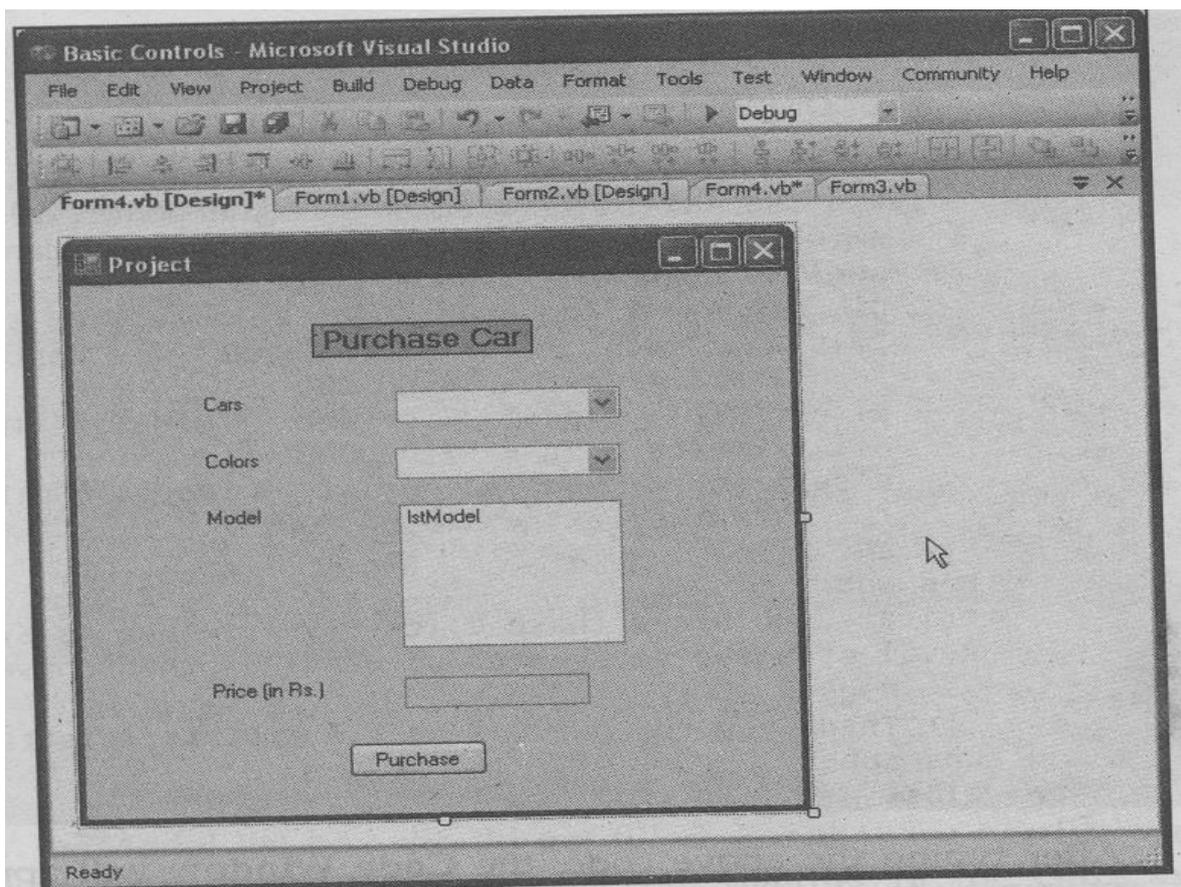
Lab Cycle

VB .NET:

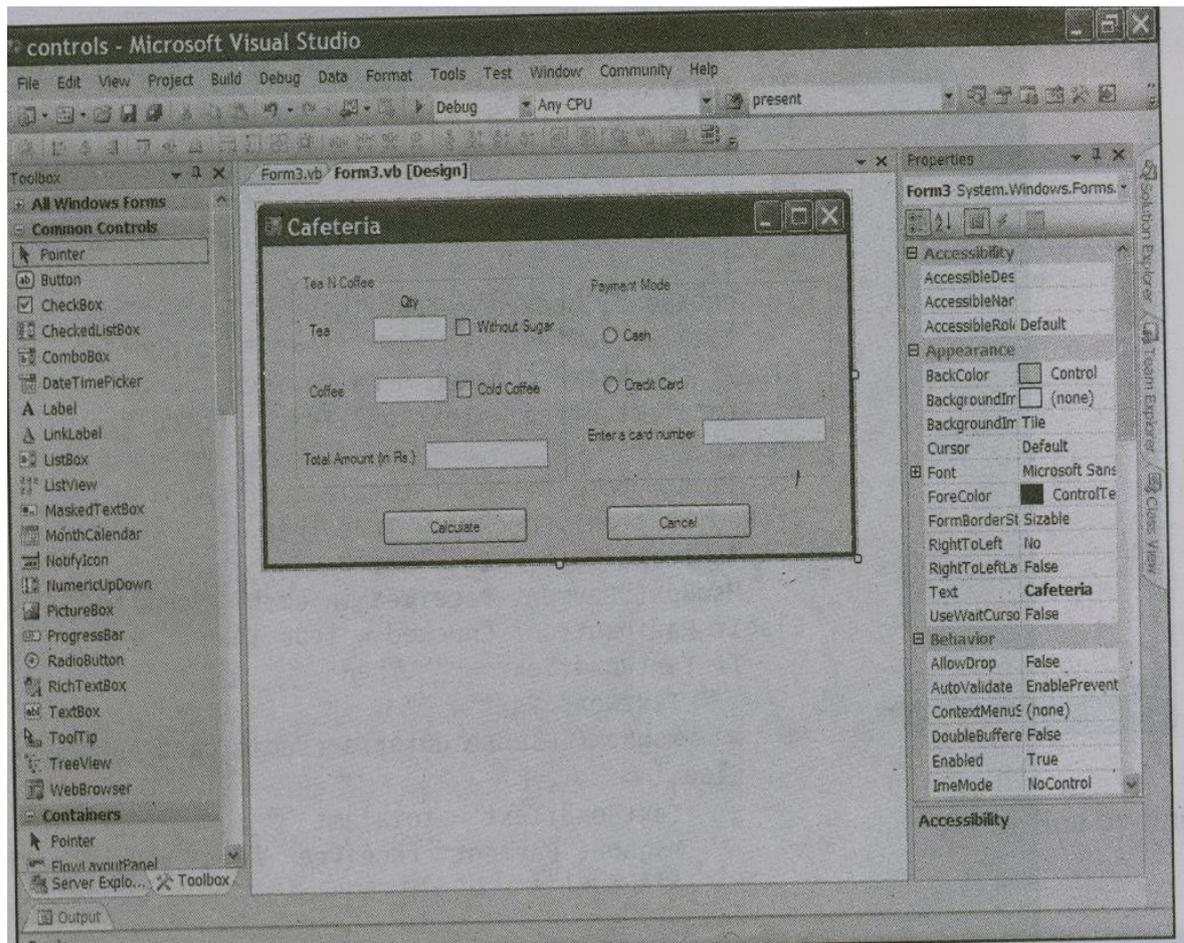
- 1) Develop an application which is similar to "Notepad" using menus.



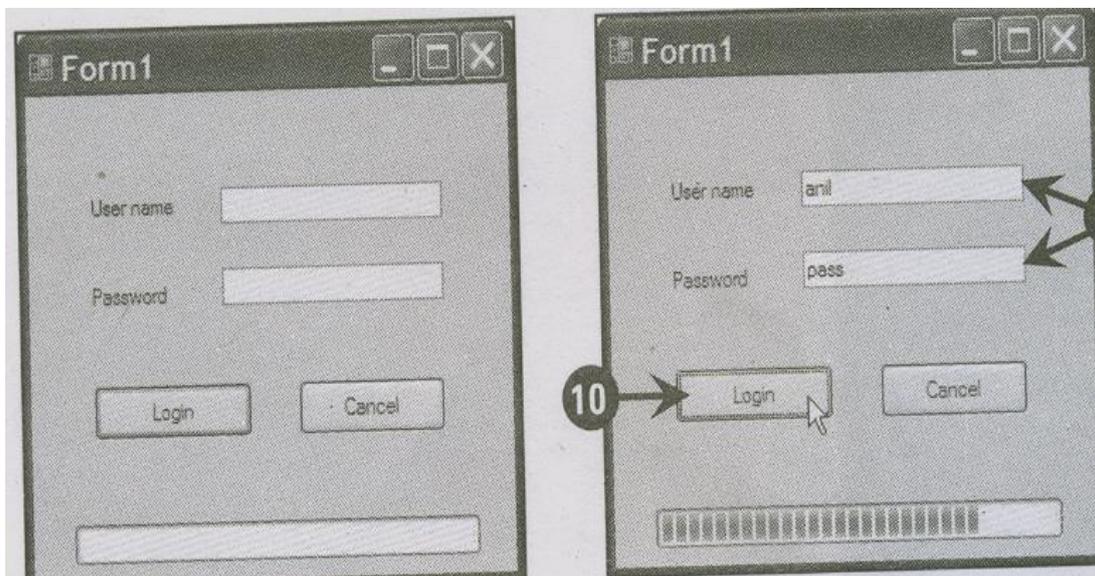
- 2) (a) Develop an application for facilitating purchasing order which will look like as shown below :



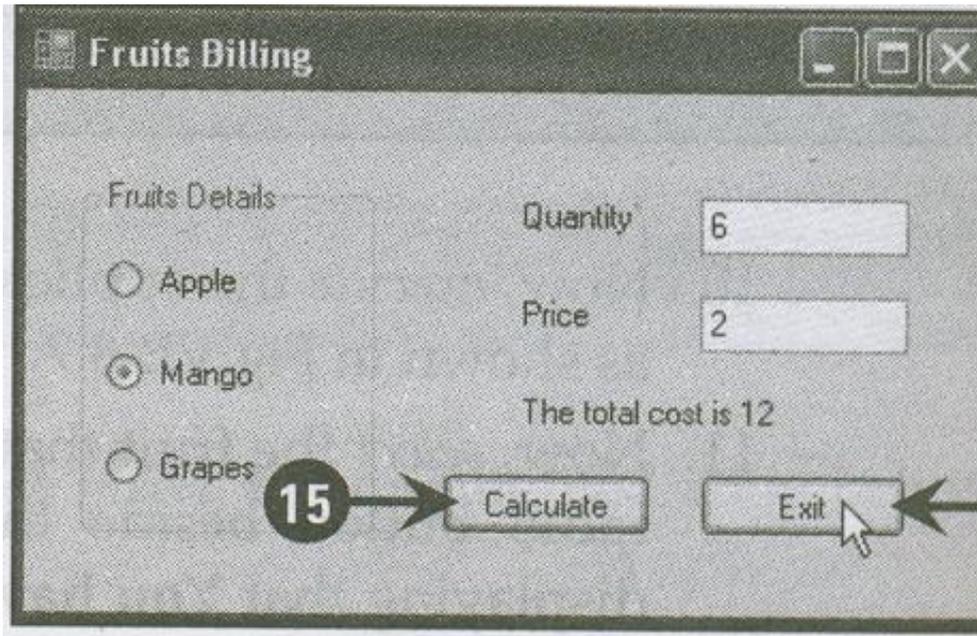
(b) Develop an application for billing system in coffee shops which will look like as shown below :



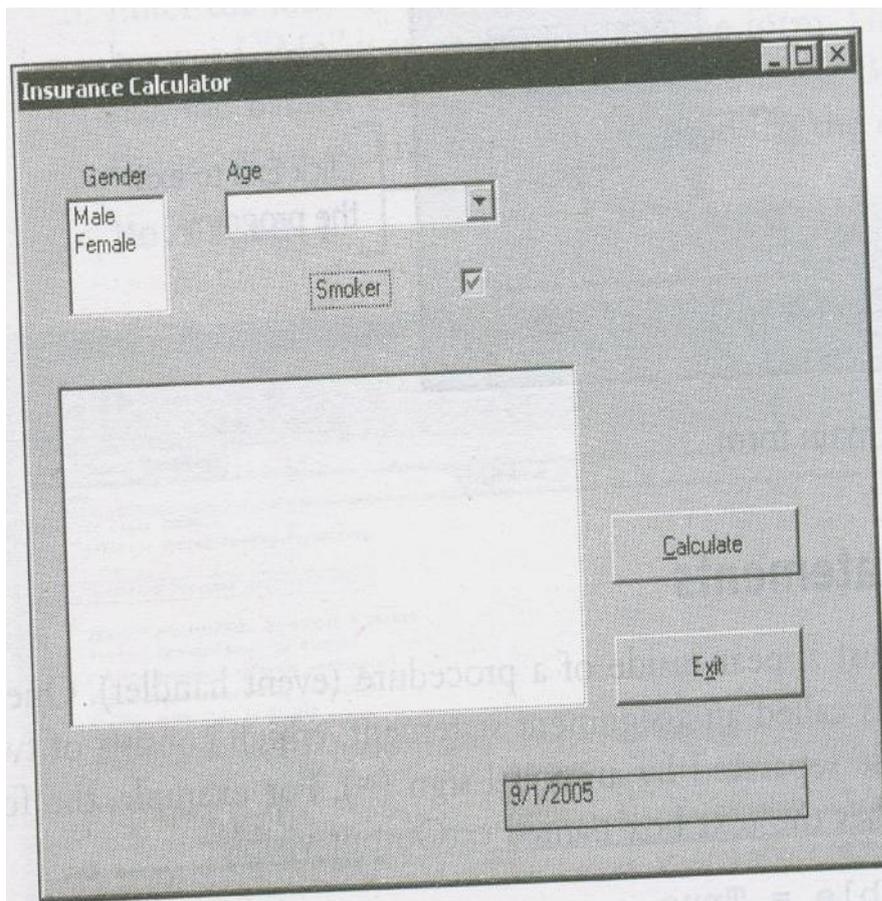
3) (a) Develop an application which is similar to login form including the progress bar controls.



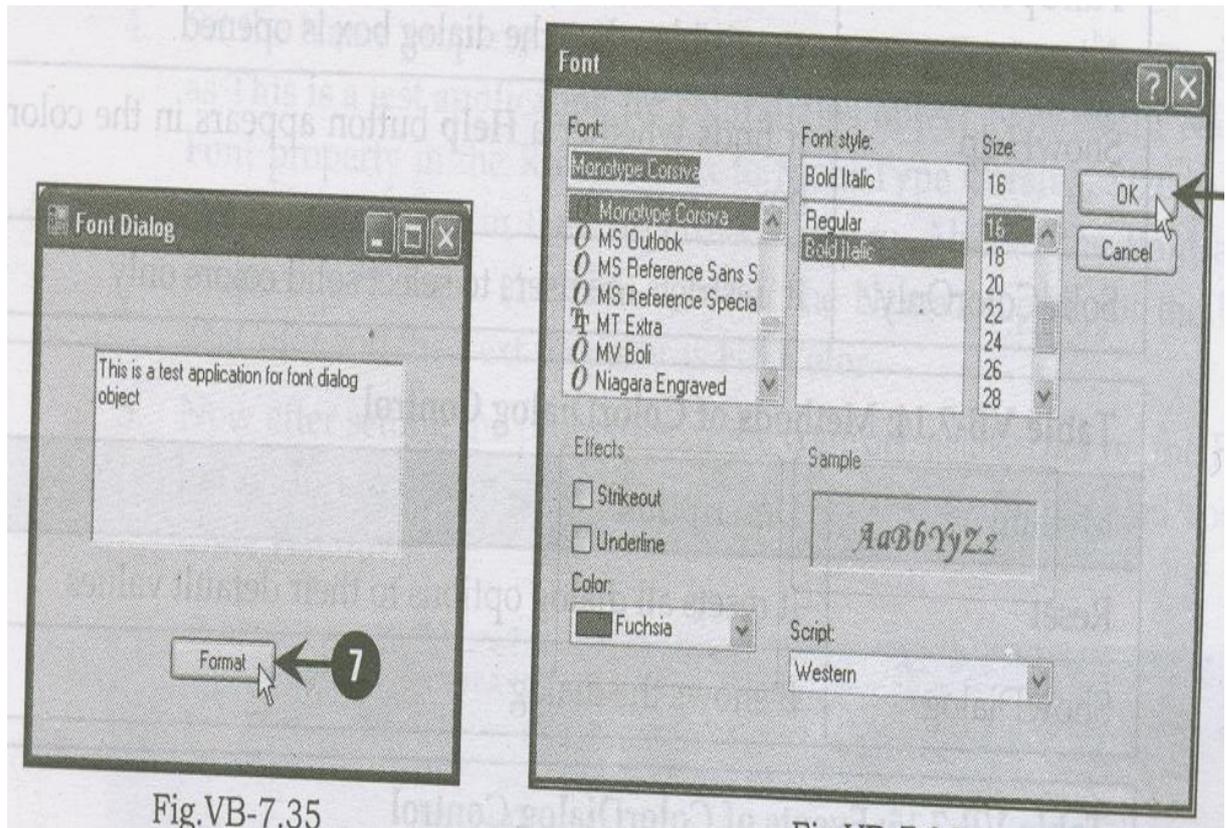
- (b) Develop an application for fruits billing system which will look like as shown below :



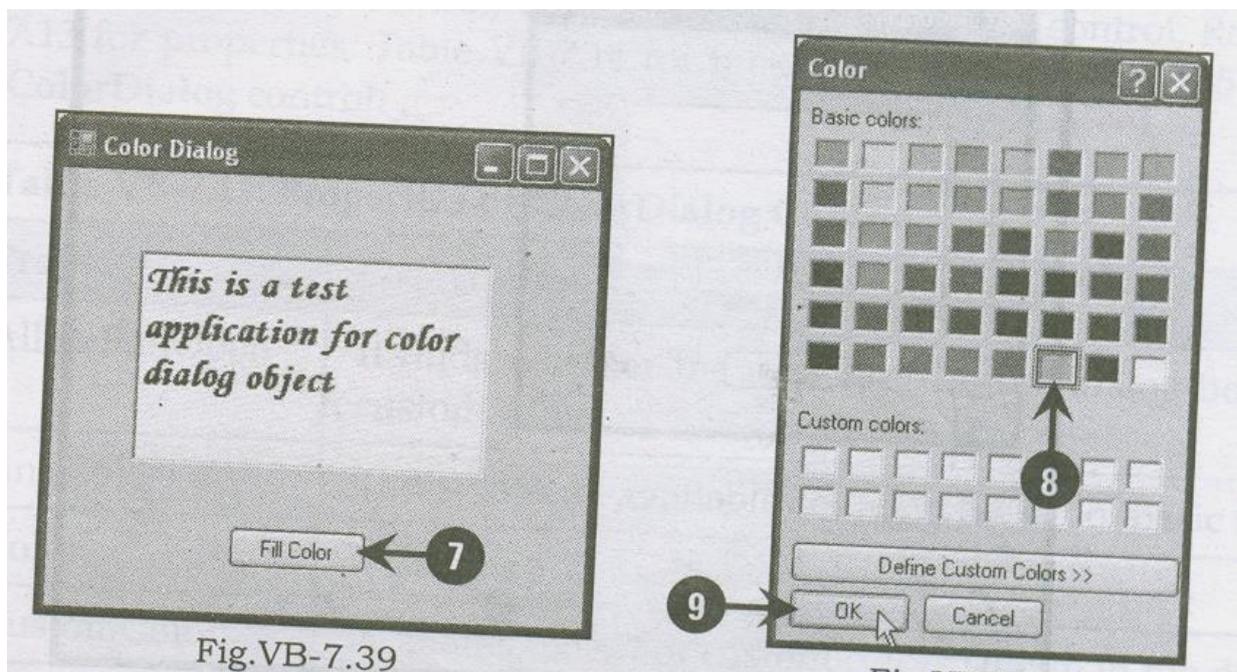
- 4) Develop an application which is helpful for calculating the insurance.



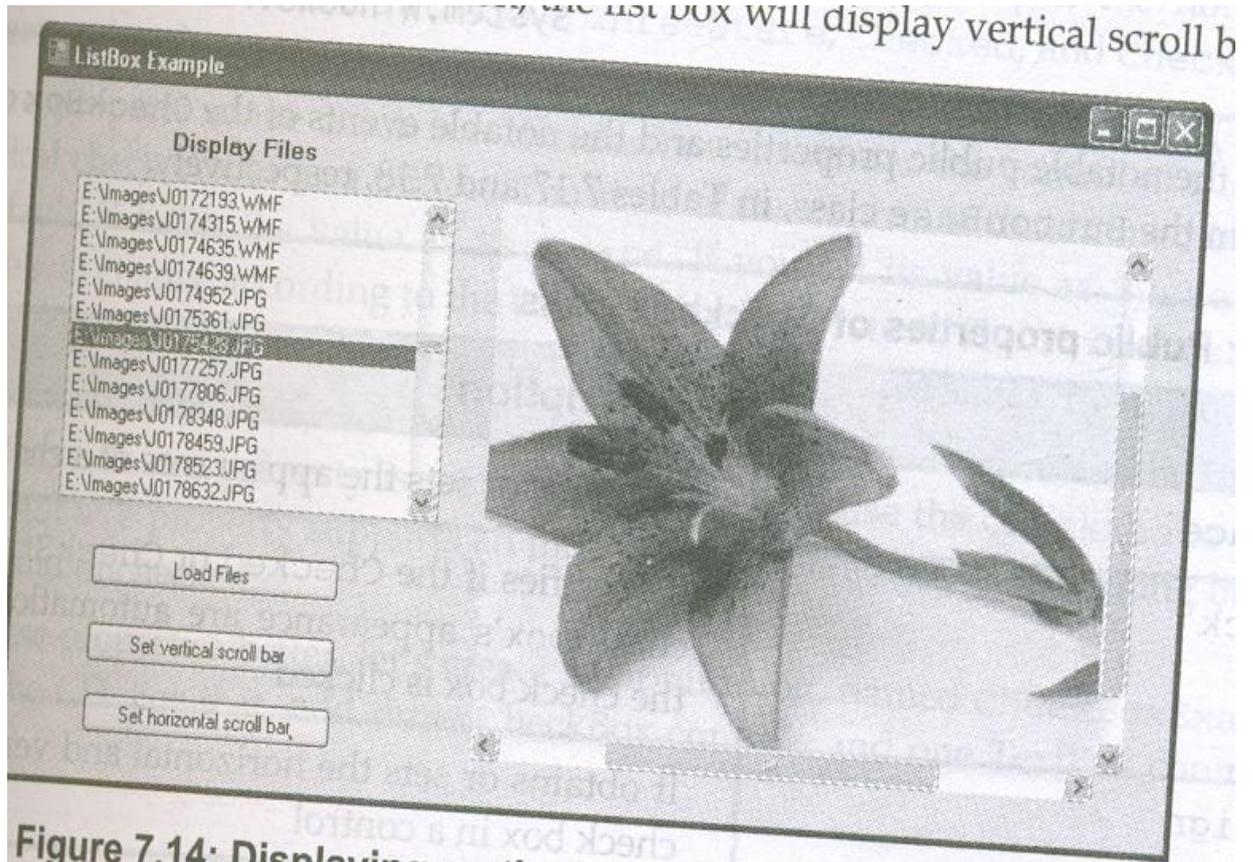
5) (a) Develop an application using font dialog control



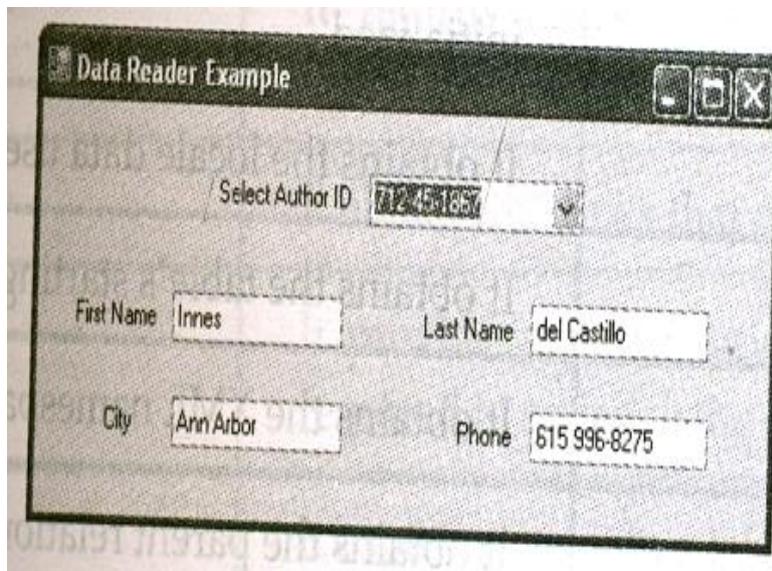
(b) Develop an application using color dialog control



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

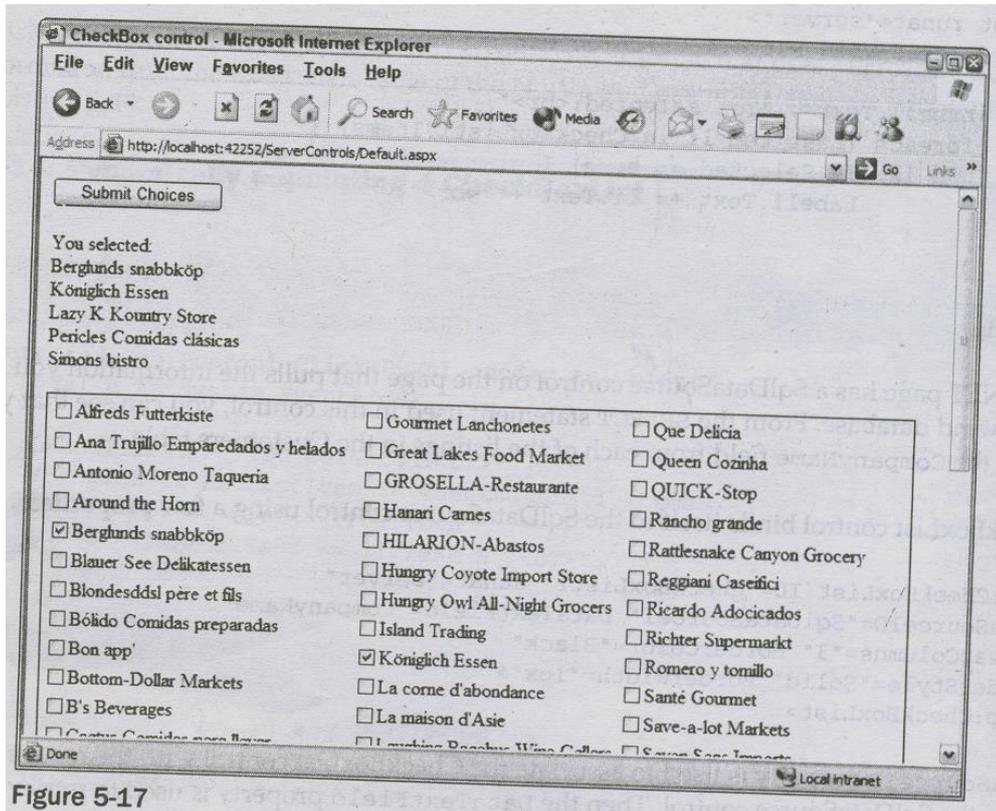


- 7) Develop an application using the data reader to read from a database.

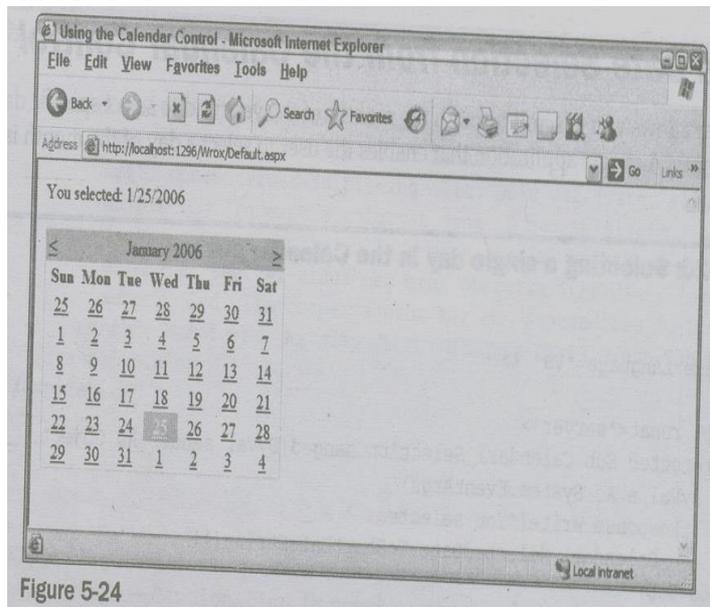


**ASP.NET:**

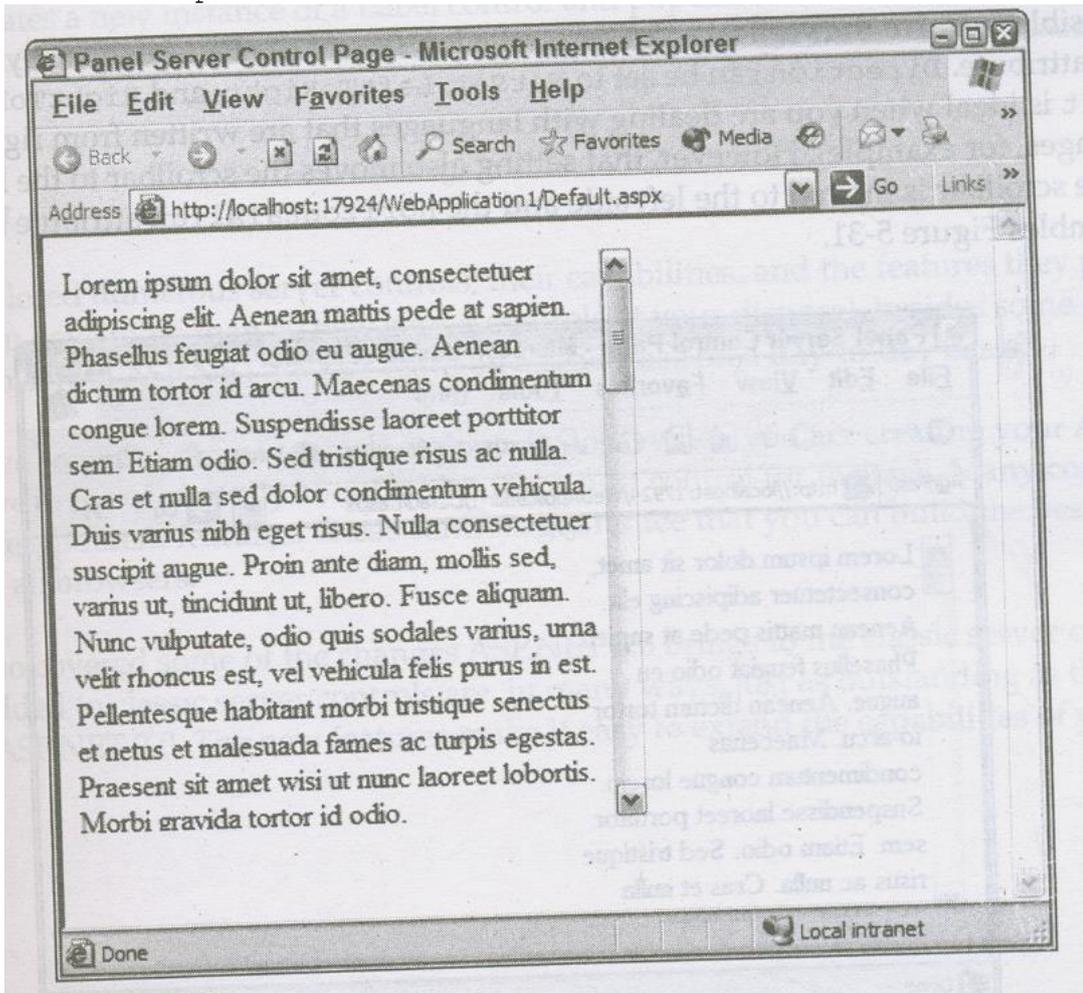
- 8) Design an application for dynamically populating a checkbox list.



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



- 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.

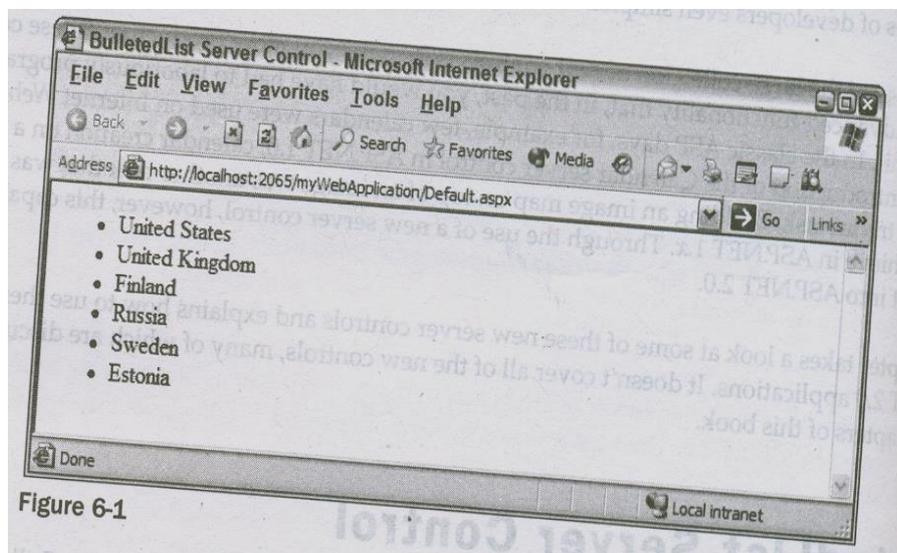
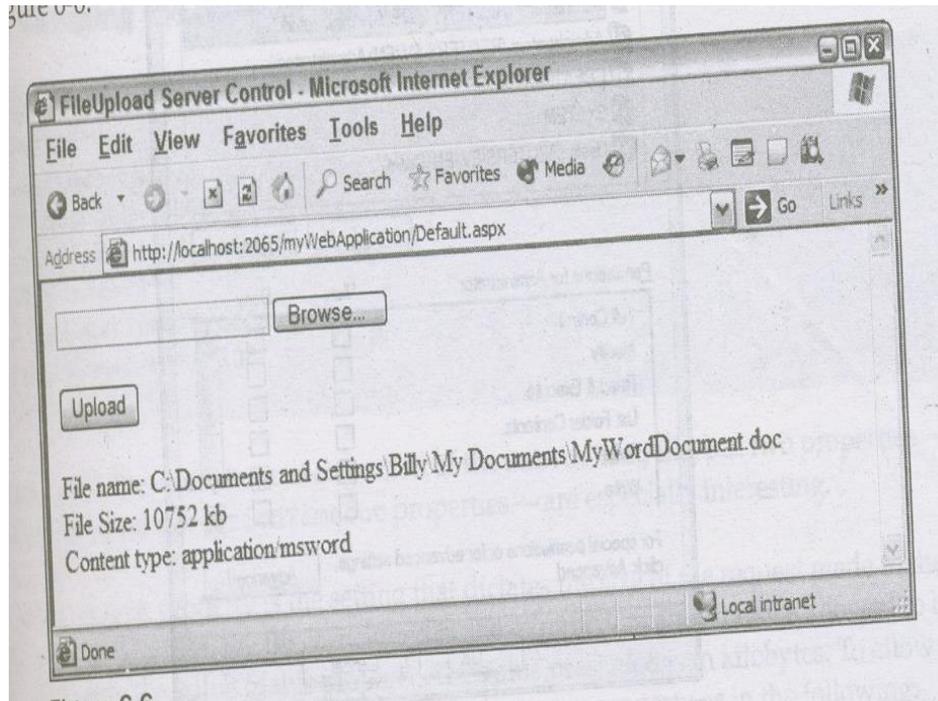
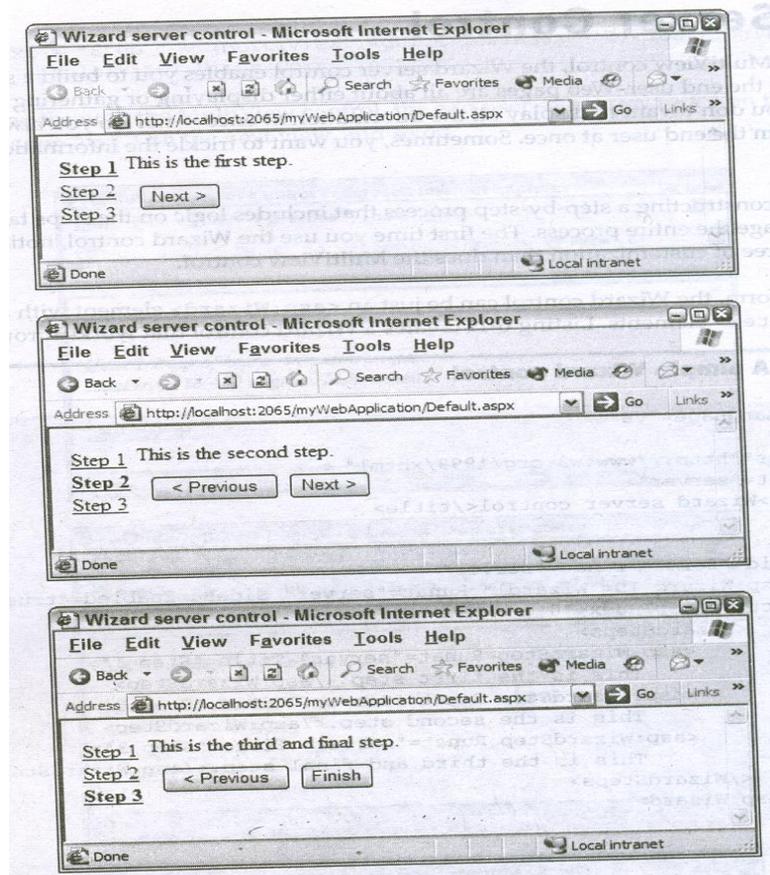


Figure 6-1

- 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.

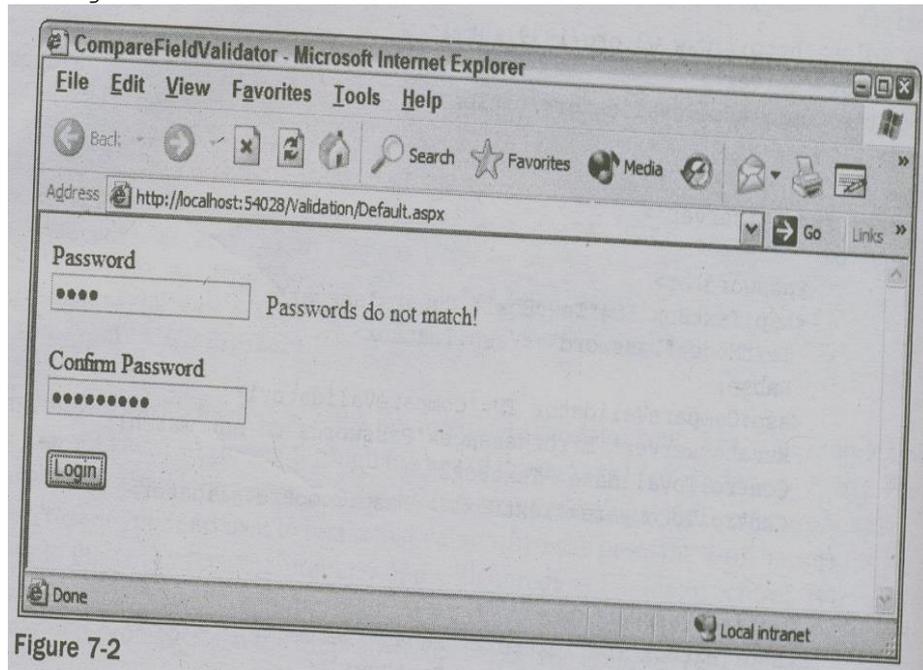


Figure 7-2

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

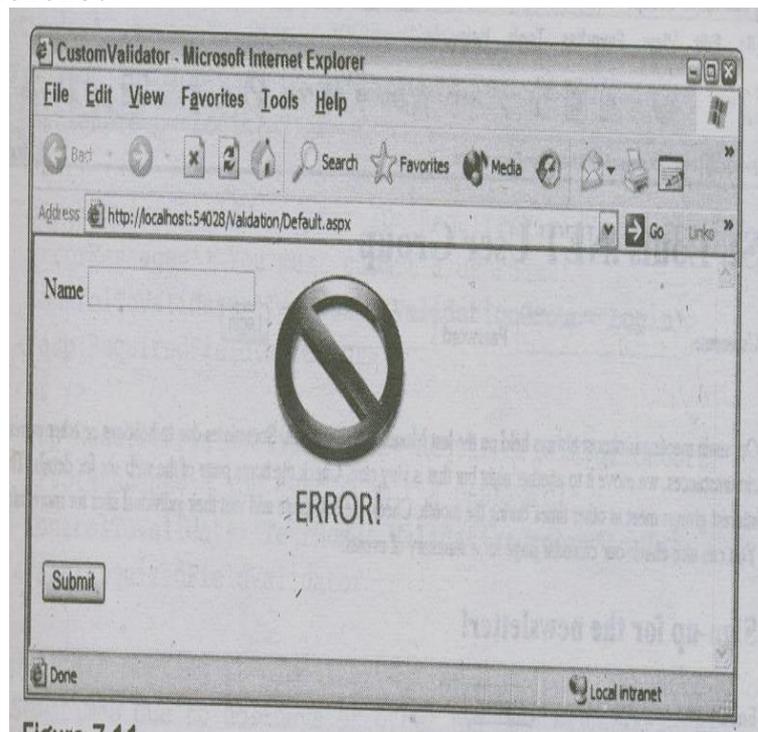


Figure 7.11

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

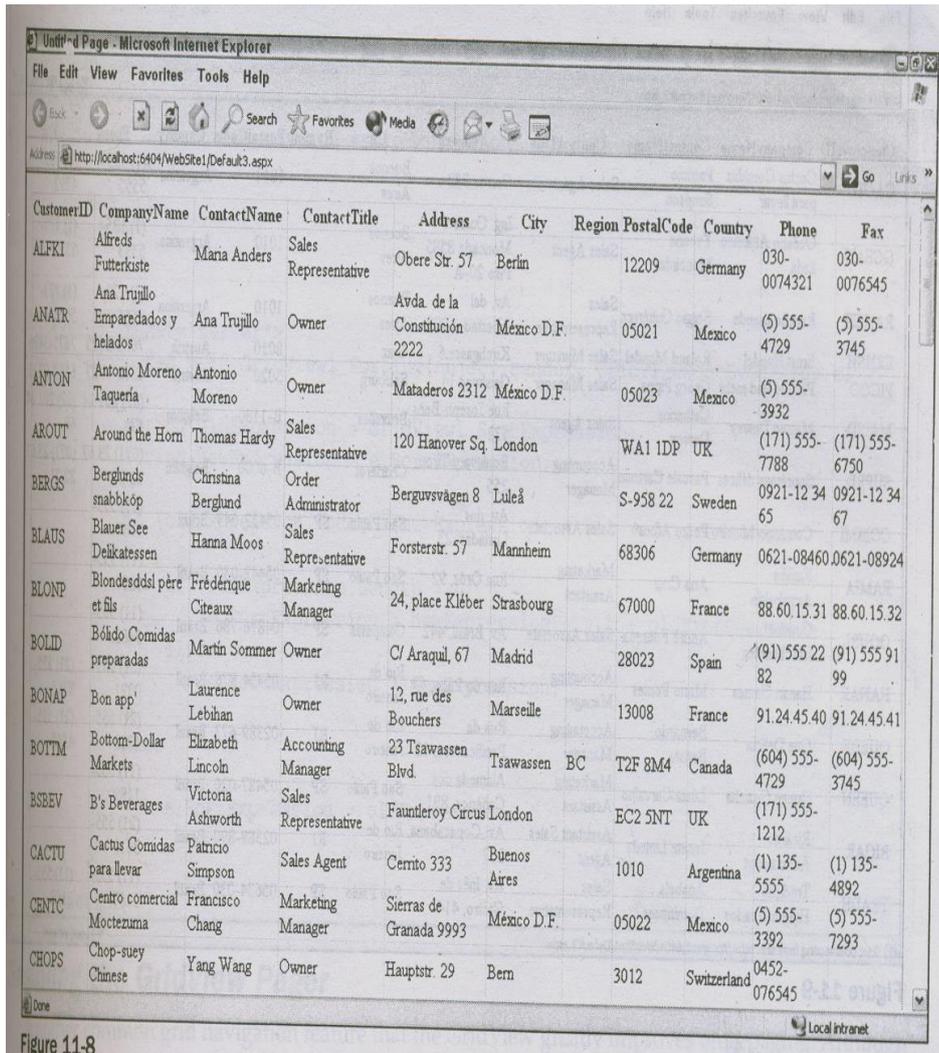


Figure 11-8

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

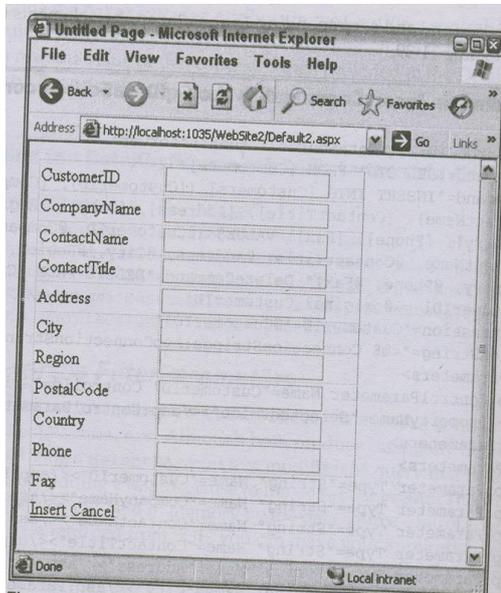


Figure 11-19

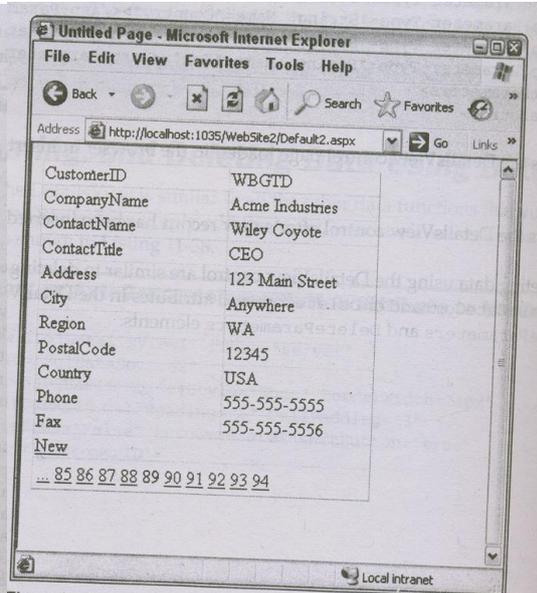
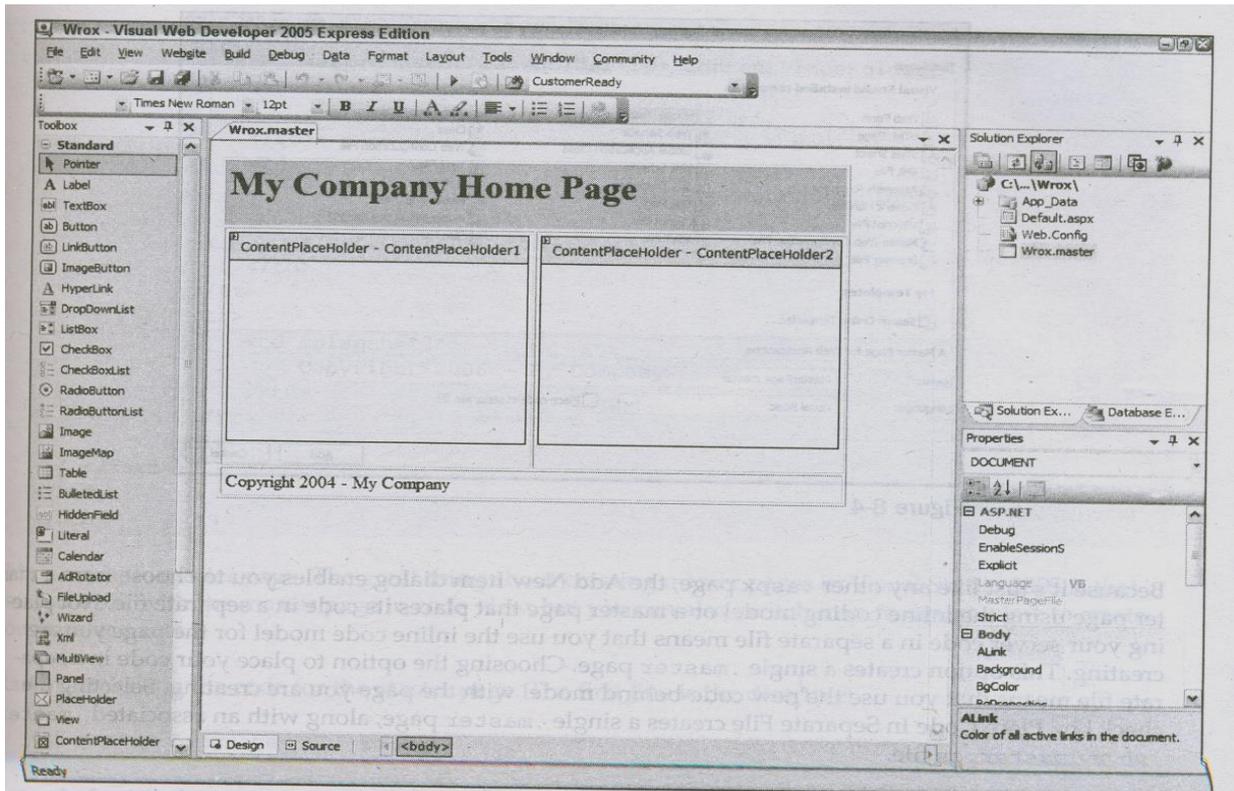


Figure 11-20

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.

## **MCA 507 : Advanced Java Lab**

### **Lab Cycle**

1. (a) Write a program to download a web page.  
(b) Write a program to download a web page using a URL Connection.
2. (a) Write a program to print the socket information.  
(b) Write a program to print the information in the Datagram
3. Develop a Client, Server Application to satisfy the requests from multiple clients.
4. Write a program to implement a server that will simply echo back whatever is typed by the client
  - a) TCP
  - b) UDP
5. Write a program to have chat application
  - a) TCP
  - b) UDP
6. Write a program to add Cookie and get Cookie.
7. Write a program to print the Fibonacci numbers using **RMI**.
8. Develop Multithreaded Message Application Using **Java Sockets**
9. Develop Multicast Communication using **Java Multicast class**
10. Develop Distributed Programming using **Java RMI**
11. Develop Database Programming using **JDBC** and **Java swings**
12. Develop Web Programming using **JSP** and **EJB**.
13. Create a JavaBean class called **Prompter** that displays a prompting message and provides an entry field where users can enter their response to the prompt. This bean should also include an OK button so users can indicate that they are finished entering their response.
14. Write a program to retrieve values from database and print them in a text file.
15. Write a program to create a frame with a label, text field and a submit button. The Text field should not an empty value.
16. Write a program to create a frame with menu bar. The menu bar contains two menus. The first menu contains menu items like square, cube, square root and absolute value. The second menu contains two menu items namely clear and exit.
17. Write a simple program to get the result of stored procedure in the servlet by JDBC through the Oracle Database.
18. Write a program using RMI to access the database using the primary key value and return the data to the client.

## **MCA 508 : Seminar**

## **MCA 601 : Project Work**