

Total No. of Questions : 5]

SEAT No :

P 2298

[Total No. of Pages :4

[5334]-11

M.C.A. (Under Science Faculty)

COMPUTER SCIENCE

CS - 101:C - Programming

(2008 Pattern) (Semester - I)

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *Figures to the right indicate full marks.*
- 2) *All questions carry equal marks.*
- 3) *All questions are compulsory.*
- 4) *Assume suitable data if necessary.*

**Q1) a)** Trace the output (Any two):

**(2 × 4 = 8)**

i) Void func ( )

```
{printf("Hi");
```

```
}
```

```
main ( )
```

```
{
```

```
int k = 0;
```

```
for (k = 0; k < 4; k ++)
```

```
{
```

```
func ( ):
```

```
}
```

```
}
```

**P.T.O.**

```

ii) void func (int *p, int x)
    {
        *p ++;
        x ++;
    }
main ()
{
    int a = 5, b = 5;
    printf ("a = %d b = %d/n", a,b);
    func (& a, b);
    printf ("a = % d b = % d/n", a, b);
}

```

```

iii) main ()
{
    int y, i = 0, j = -1, k = 2;
    y = (i == ++j)? (++j >= k)? j:k: (i < k)? i:j;
    Print f (y = % d", y);
}

```

b) Find error and explain (Any two)

**(2 × 4 = 8)**

```

i) main ()
{
    int a [ ] = (1, 2, 3, 4, 5)
    int i = 0;
    for (; i < 5; i ++ )
    {
        printf ( "%3d"i);
    }
}

```

```

ii) main ( )
    {
        char s = "Hi";
        int i = 0;
        while (s [i] != "\0")
        {
            printf ("%c", s [i]);
            i ++;
        }
    }

iii) define sum (x, y, z) x + y
      + z main ( )
      {
          int a = 5, b, c;
          b = sum ( 3, 4,
          5); c = + b;
          printf ("b=%d c= %d", b, c);
      }

```

**Q2) Attempt any four of the following: (4 × 4 = 16)**

- a) Give syntax of the following functions and explain with example.
  - gets ( )
  - getchar ( )
- b) Write a note on storage classes.
- c) What is recursion? Explain with example.
- d) Define the following terms:
  - i) Structure
  - ii) Function
  - iii) Array
  - iv) Identifier
- e) Write a note on pass by value.

**Q3)** Attempt any four of the following: **(4 × 4 = 16)**

- a) Write a C program using command line arguments to accept three numbers through command line and find maximum number out of them.
- b) Write a C program using recursive function to compute  $m^n$ .
- c) Write a C program to find sum of diagonal elements of two dimensional array.
- d) Write a C program to find maximum number from two numbers.
- e) Write a C program using user - defined function to check whether two strings are equal or not?

**Q4)** Attempt any four of the following. **(4 × 4 = 16)**

- a) Write a note on preprocessor directives.
- b) Give syntax of the following functions and explain with example.
  - i) line
  - ii) purpixel
  - iii) getpixel
  - iv) circle
- c) Write a note on command line arguments.
- d) Give syntax and explain with example any four built in library functions for operations on string.
- e) Differentiate between structure and union.

**Q5)** Attempt any four of the following: **(4 × 4 = 16)**

- a) Write a 'C' program for matrix subtraction.
- b) Write a C program print given number is prime or not.
- c) Write a C program to open a file in read mode and count total number of lines, words and characters in the file.
- d) Write a menu driven C program to perform following operations on string.
  - i) Concatenate two strings.
  - ii) Reverse the string.
- e) Write a C program to compute addition of two matrices.



Total No. of Questions : 5]

SEAT No :

P 2299

[5334]-12

[Total No. of Pages : 2

**M.C.A. - I (Under Science Faculty)**  
**CS - 102 : COMPUTER ARCHITECTURE**  
**(2008 Pattern) (Semester - I)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Draw neat diagrams wherever necessary.*
- 3) *Figures to the right indicate full marks.*

**Q1)** Attempt any four:

**[4 × 4 = 16]**

- a) Explain concept of parallel processing
- b) Explain with logical diagram of Half adder circuit.
- c) What is PCI and name its command.
- d) Briefly explain Block Diagram of I/O interface.
- e) Explain following addressing modes of pentium processor
  - i) Immediate
  - ii) Direct.

**Q2)** Attempt any two of the following:

**[2 × 8 = 16]**

- a) State and explain the working of any four components of microprocessor.
- b) Briefly explain Register.
- c) What is DMA, its function and block diagram?

**Q3)** Attempt any four of the following:

**[4 × 4 = 16]**

- a) What is interrupt? Explain it in details.
- b) Explain Digital logic gates.
- c) Explain decimal to BCD encoder.
- d) Compare RISC and CISC.
- e) Explain Flip- flop in details.

**P.T.O.**

**Q4)** Attempt any four of the following:

**[4 × 4 = 16]**

- a) What is RISC pipelining?
- b) Explain any four features of Pentium-pro microprocessor.
- c) Explain ISA in detail.
- d) Briefly explain about USB.
- e) Briefly explain shift Registers.

**Q5)** Attempt any two of the following:

**[2 × 8 = 16]**

- a) Explain 3 bit asynchronous Up-Down counter.
- b) Briefly explain counters (Ripple and synchronous counters)
- c) Draw neat block diagram of Intel-Math co-processor and explain its 'Numeric Execution unit'.

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Total No. of Questions :5]

SEAT No :

**P 2300**

[Total No. of Pages :3

[5334]-13

**M.C.A - I (Under Science Faculty)**

**MATHEMATICS**

**CS-103: Mathematical Foundation**

**(2008 Pattern) (Semester-I)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*

**Q1)** Attempt any **four** of the following :

**[16]**

- a) Let  $A = \{a, b, c\}$ . Find the power set of A. How many elements are there in power set of A.
- b) Prove that  $(A \cap B)^c = A^c \cup B^c$
- c) Give an example of function which is not one-one. Justify your answer.
- d) Find g.c.d of 42823 and 6409 by Euclidean Algorithm and hence express it as linear combination of 42823 and 6409.
- e) Let  $\mathbb{Z}$  be the set of all integers. Given  $a, b \in \mathbb{Z}$ , Define  $a \sim b$  if  $a - b$  is an even integer. Then Show that  $\sim$  is an equivalence relation.
- f) Let  $p$  be a prime number.  $a, b \in \mathbb{Z}$  be such that  $p|ab$  show that either  $p|a$  or  $p|b$ .

**Q2)** Attempt any **four** of the following :

**[16]**

- a) Give an example of a relation with the property that it is reflexive and symmetric but not transitive. Justify your answer.
- b) Find the solution for the following system of congruences  
$$x \equiv 1 \pmod{3}, x \equiv 2 \pmod{4}, x \equiv 3 \pmod{5}$$
- c) Find an inverse of 2 modulo 17.

**P.T.O.**

- d) Find the remainder when  $7^{486}$  is divided by 13.
- e) Let  $a, b, m \in \mathbb{Z}$ ,  $M \neq 0$ . If  $a \equiv b \pmod{m}$  then prove that  $a^k \equiv b^k \pmod{m}$  for any  $k \in \mathbb{N}$ .
- f) Find the quotient and remainder when polynomial  $q(x) = x^6 + x^3 + x + 1$  is divided by the polynomial  $p(x) = x^2 + 1$ .

**Q3)** Attempt any **four** of the following: **[16]**

- a) Find order of the following permutation

$$\begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 2 & 3 & 4 & 5 & 1 & 6 & 7 & 9 & 8 \end{pmatrix}$$

- b) Write the composition table of  $\mathbb{Z}_7$  under the operation  $\times_7$  and  $+_7$  (multiplication modulo 7 and addition modulo 7 respectively).
- c) Prove that  $U(10) = \{\bar{1}, \bar{3}, \bar{7}, \bar{9}\}$  is a group with respect to the operation multiplication modulo 10 ( $\times_{10}$ ).
- d) Define odd permutation. Determine whether the permutation  $\sigma$  given below is odd or not

$$\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 3 & 4 & 1 & 6 & 5 \end{pmatrix}$$

- e) Find all roots of the polynomial  
 $f(x) = 2x^4 + 3x^3 - 12x^2 - 7x + 6 = 0$
- f) Define the composition of two functions. Also prove that  
 $(g \circ f)^{-1} = f^{-1} \circ g^{-1}$

**Q4)** Attempt any **four** of the following : **[16]**

- a) Find the inverse of matrix by adjoint method:

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 1 \end{bmatrix}$$

- b) Solve the system of equations by using Cramer's rule  
 $x + y + z = 6$ ,  $2x + 4y + 3z = 19$ ,  $x + 3y + 2z = 13$

- c) Let  $G$  be a group show that inverse of an element  $a$  in  $G$  is Unique.
- d) What is coefficient of  $x^5y^8$  in  $(x+y)^{13}$ .
- e) Determine whether the function  $f: \mathbb{Z} \times \mathbb{Z}$  defined by  $f(m,n) = m^2+n^2$  is onto or not.

**Q5)** Attempt any **four** of the following : **[16]**

- a) Draw the truth table of  $(p \vee \neg q) \rightarrow (p \wedge q)$ . Is it a contradiction?
- b) Show that  $\neg(p \vee (\neg p \wedge q))$  and  $\neg p \wedge \neg q$  are logically equivalent by developing a series of logical equivalences.
- c) Show that  $(p \rightarrow q) \wedge (p \rightarrow r)$  and  $p \rightarrow (q \wedge r)$  are logically equivalent by constructing the truth table.
- d) Show that following equation has no solution in integers by method of exhaustive proof.  $x^2+3y^2 = 8$ .
- e) Prove the following statement by method of contradiction. "If  $3n + 2$  is odd then  $n$  is odd".
- f) Let  $Q(x,y)$  denote the statement " $x = y + 3$ ". What is truth value of proposition  $Q(1,3)$ ,  $Q(3,0)$ ,  $Q(0,3)$  and  $Q(2,1)$ .

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**M.C.A. - I (Science Faculty)**  
**MATHEMATICS**  
**CS - 105 : Graph Theory**  
**(2008 Pattern) (Semester - I)**

*Time : 3 Hours]*

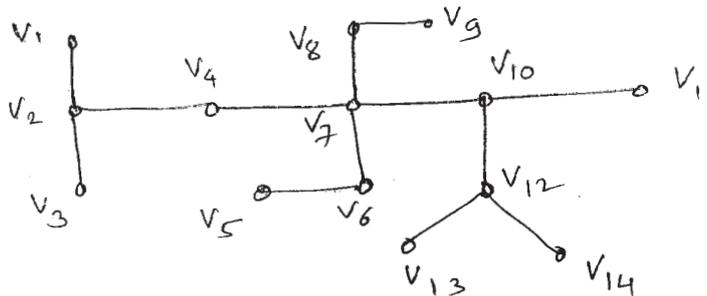
*[Max. Marks : 80*

*Instructions to the candidates:*

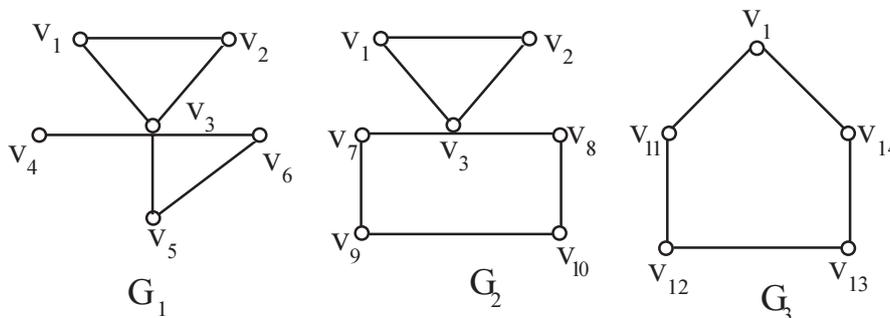
- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*

**Q1) Attempt any four of the following: [16]**

- a) Explain Handshaking Lemma.
- b) Draw the following graphs.
  - i) Complete bipartite graph on 6 vertices.
  - ii) Regular graph on 8 vertices.
- c) Find the eccentricity of each vertex in the tree given below. Find the centre, radius and diameter of the following trees.



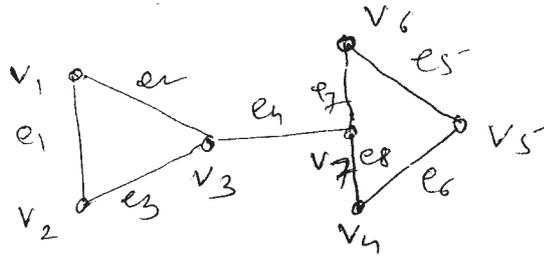
- d) For the graph  $G_1$ ,  $G_2$  and  $G_3$  given below, find  $G_1 \oplus (G_2 \oplus G_3)$ .



- e) Solve the following recurrence relation.

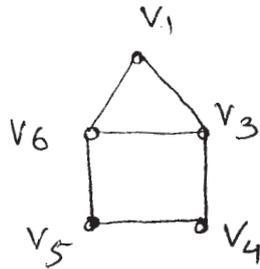
$$a_n - 8a_{n+1} + 16a_{n+2} = 0, \quad a_0 = 0, a_1 = 1$$

f) Write Incidence and Adjacency matrix of the following graph



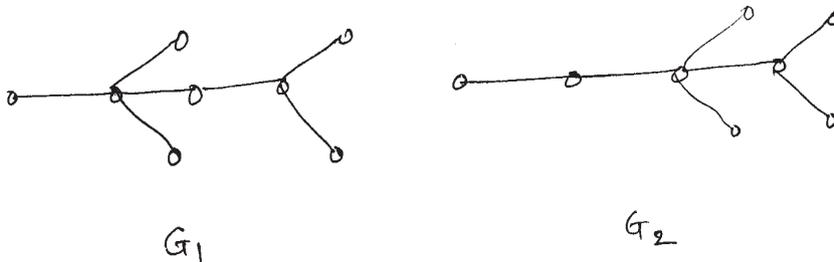
**Q2)** Attempt any four of the following: **[16]**

- Prove that, a simple graph and its complement both cannot have connected.
- Determine the minimum number of vertices in the simple graph with 15 edges. Also draw such graph.
- Find the exponential generating function for the number  $a_r$  of  $r$ -letter words with no consonants used more than once (vowels may be repeated)
- Define complement of a graph and self complementary graph.
- Show that any connected graph with  $n$  vertices and  $n-1$  edges is a tree.
- Find the fusion of vertices  $V_1$  and  $V_3$  at  $V_3$  of the following graph.

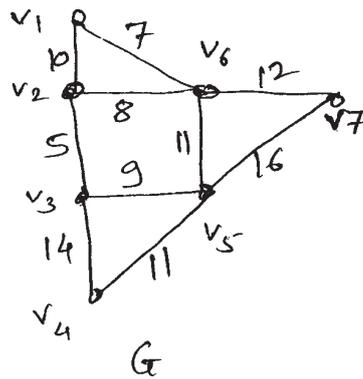


**Q3)** Attempt any four of the following: **[16]**

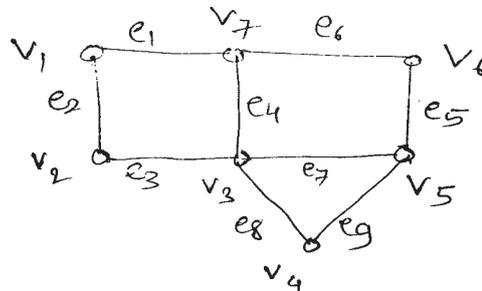
- Show that if  $G$  is self complementary graph then vertices of  $G$  of the type  $4K$  or  $4K + 1$ , where  $K$  is integer.
- Determine whether the following graphs Isomorphic



- c) Find the minimal spanning tree for following connected weighted graph using kruskal's Algorithm.



- d) Let G be the graph given below. Find  $G[U]$  and  $G[F]$ , where  $U = \{v_4, v_5, v_6\}$ ,  $F = \{e_1, e_2, e_6\}$  and  $G(x)$  means G induced by set X.

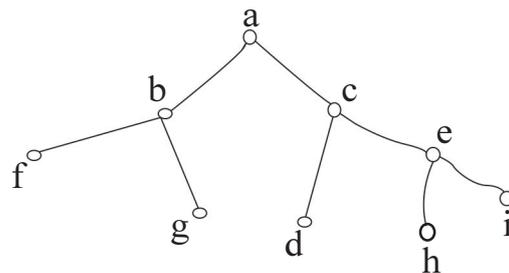


- e) Find the Hamiltonian circuit in  $K_5$  graph. Draw it.  
 f) Draw the arborescence and express in polish notation, the expression is

$$f + \frac{abc}{\frac{d}{g} + e}.$$

**Q4)** Attempt any four of the following: [16]

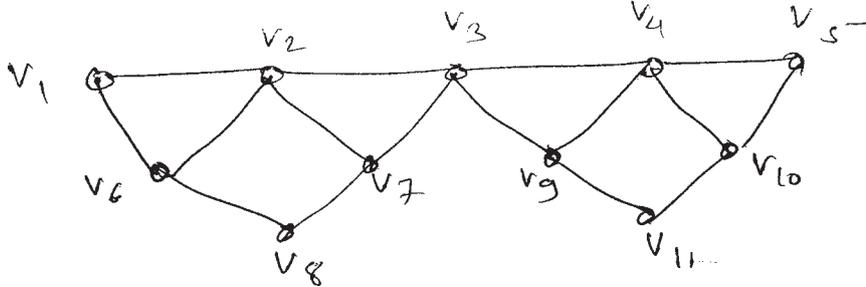
- Prove that, a tree with n-vertices has n-1 edges.
- Find the maximum vertex connectivity of a graph with 6 vertices and 14 edges. Draw the graph showing that they are achieved.
- Obtain preorder and postorder traversals for the following binary tree.



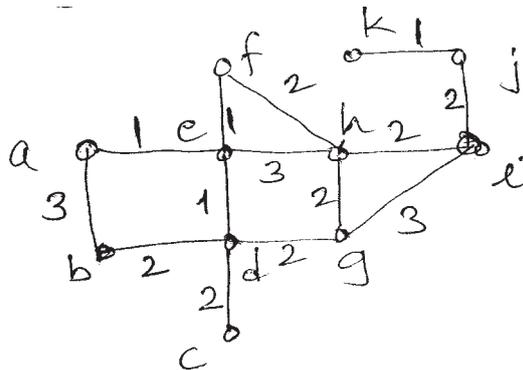
- d) Write an algorithm of depth first search.
- e) Solve the recurrence relation  $a_n - a_{n-1} - 30a_{n-2} = 3 + 2n$ .
- f) Write a note on travelling salesman problem.

**Q5)** Attempt any two of the following: **[16]**

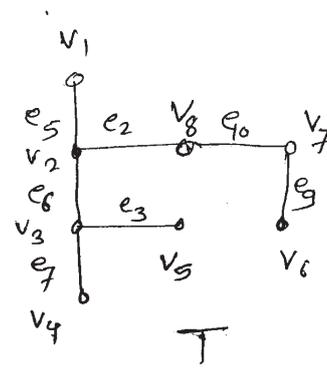
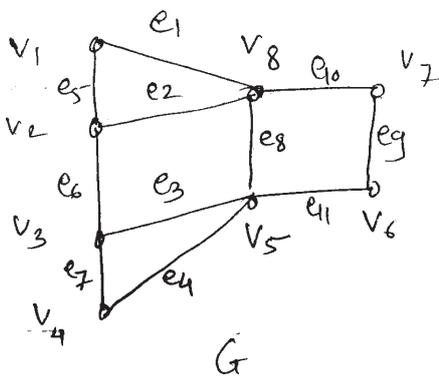
- a) Using Fleury's algorithm find the Euler tour in the following graph G.



- b) Using Dijkstra's algorithm. Find the shortest path from vertex 'a' to all vertices in the weighted graph below.



- c) Find all fundamental circuits (cycles) and cutsets of following graph G with respect to T.



Total No. of Questions : 5]

SEAT No. :

**P2302**

[Total No. of Pages : 3

[5334] - 21

**M.C.A. -I (Science Faculty)**

**CS-201: DATA AND FILE STRUCTURES USING 'C'**

**(2008 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *All questions carry equal marks.*
- 4) *Assume suitable data, if necessary.*

**Q1)** Attempt any four of the following:

**[4×4=16]**

- a)
  - i) What is abstract data type?
  - ii) Consider an array A [2][3]. How do you represent it using row major and column major representation?
- b) What is recursion? Explain with example.
- c) Write a 'C' functions to create and display linked list using array representation.
- d) What are the different types of linked list? Explain in brief.
- e) Differentiate between static and dynamic memory allocation.

**Q2)** Attempt any four of the following:

**[4×4=16]**

- a) Explain two types of graphs. Discuss various applications of graph.
- b) Write a recursive C function to create a mirror image of binary tree.

**P.T.O.**

- c) Write following 'C' functions for static queue representation.
  - i) DeleteQ ( )
  - ii) Isempty Queue ( )
- d) Apply merge sort for following data set:  
98, 22, 79, 36, 47, 26, 82, 32
- e) Explain the following rotations which are performed to balance a tree.
  - i) RR rotation
  - ii) RL rotation

**Q3) Attempt any four of the following: [4×4=16]**

- a) Convert following infix expression to postfix expression. Show operand stack and operator stack contents at each step. (A+B)-(C+D).
- b) Define circular queue. What are different solutions to cheque if queue full?
- c) Write short note on doubly linked list.
- d) Define the terms: preorder, postorder and inorder tree traversal.
- e) Sort following data using Heap sort. Show all iterations.  
26, 5, 77, 1, 61, 11, 59, 15.

**Q4) Attempt any four of the following: [4×4=16]**

- a) Write short note on Priority Queue.
- b) Write a 'C' function for bubble sort.
- c) Construct BST for following elements. Show all iterations.  
10, 20, 15, 5, 1, 6, 13.
- d) Write short note on ISAM.
- e) Write algorithm to multiply two polynomials.

Q5) Attempt any four of the following:

[4×4=16]

- a) Write a C function to search an element in BST.
- b) Write different applications of graphs.
- c) Write the steps of BFS algorithm.
- d) What is B+ tree structure? Give characteristics of B+ tree.
- e) Sort the following numbers using merge sort.

9, 5, 6, 10, 15, 17, 13, 2, 25, 3.

*EEE*

Total No. of Questions : 5]

SEAT No. :

**P2303**

[5334]-22

[Total No. of Pages : 4

**M.C.A. - I (Science Faculty)**

**CS - 202 : THEORETICAL COMPUTER SCIENCE**

**(2008 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*

**Q1)** Attempt all of the following.

**[8×2=16]**

- a) What is Language?
- b) Explain the term DFA.
- c) What is ambiguous grammar. Give one example.
- d) Define Turing machine.
- e) Define pumping Lemma.
- f) What is term NFA.
- g) Explain regular grammer.
- h) What is PDA.

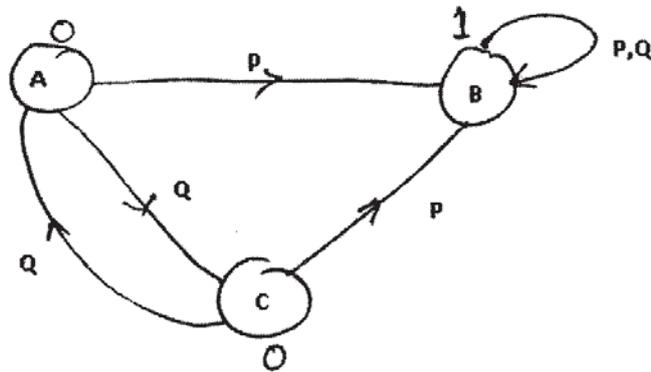
**Q2)** Attempt any four of the following.

**[4×4=16]**

- a) Construct DFA accepting the strings over alphabet  $\{0,1\}$  beginning with 0 ending with 11.
- b) Consider following CFG  
 $e \rightarrow AB|CA$   
 $B \rightarrow BC |$   
 $AB A \rightarrow a$   
 $C \rightarrow aB | b$   
 $D \rightarrow SS | d$   
Eliminate useless symbols from grammer.

**P.T.O.**

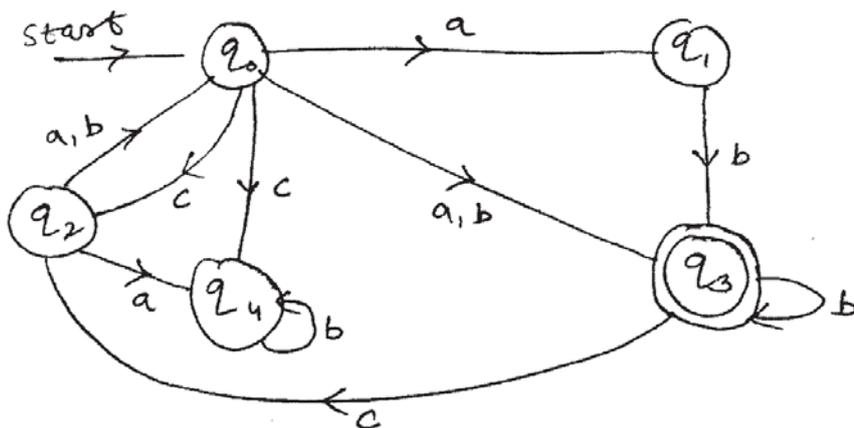
- c) Prove that Regular sets are closed under Intersection.
- d) Construct PDA for  $L = \{0_m 1_n 2_n 0_m \mid m \geq 0, n \geq 1\}$ .
- e) Construct Moore machine equivalent to the Melay machine (given below).



Q3) Attempt any four of the following.

[4×4=16]

- a) Construct CFG for language  $L = L_1 * L_1 = \{a^m bc^m \mid m \geq 1\}$ .
- b) Construct DFA equivalent to following NFA.

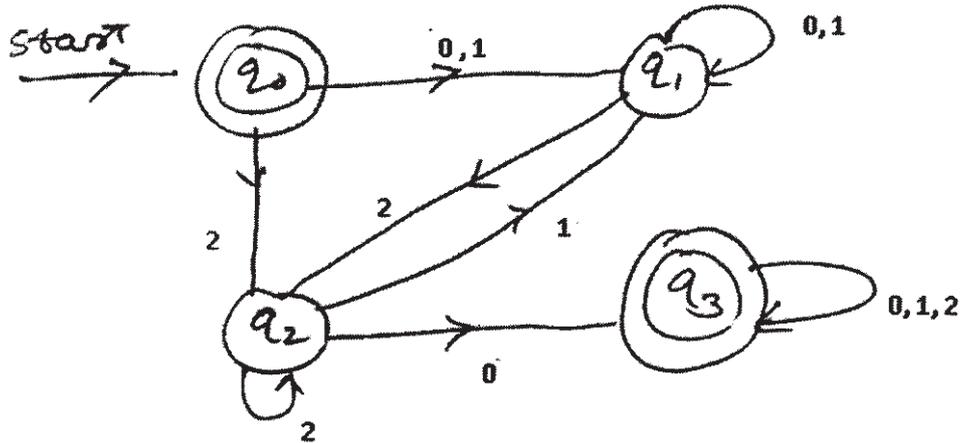


- c) Construct PDA equivalent to following.  
CFG.  $S \rightarrow aPb \mid aS$   
 $P \rightarrow Qb \mid a$   
 $Q \rightarrow Sa \mid b$
- d) Construct DFA for accepting string "abca"
- e) Construct grammer by eliminating  $\epsilon$  - productions.  $S \rightarrow AB$   
 $A \rightarrow SA \mid BB \mid bB$   
 $B \rightarrow b \mid aA \mid \epsilon$

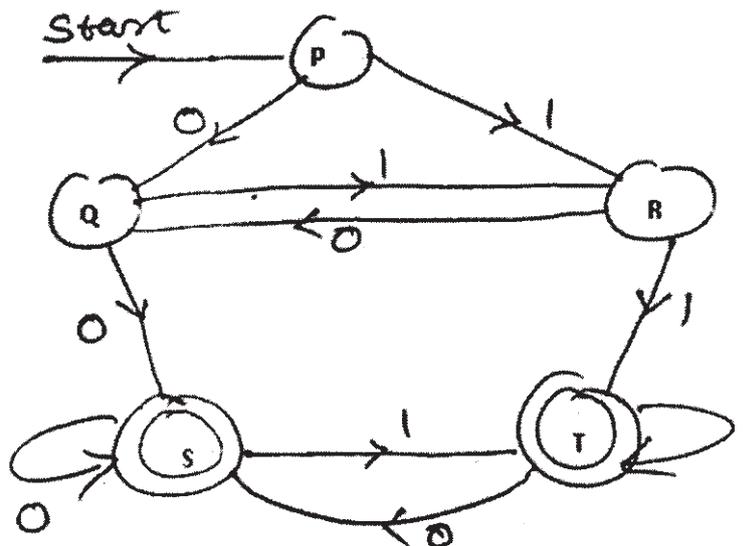
Q4) Attempt any four of the following.

[4×4=16]

- Construct CFG for  $L = L_1 \cup L_2$  where  
 $L_1 = \{a_n b a_{2n} \mid n \geq 0\}$   
 $L_2 = \{a_n b_m \mid n, m \geq 1\}$
- Construct NFA for regular expression  $a + b^* a$ .
- Show that  $L = \{ww \mid w \in \{a, b^*\}\}$  is not regular (using pumping lemma).
- Construct regular grammar for following DFA.



- Minimize the following DFA.



**Q5)** Attempt any four of the following.

**[4×4=16]**

a) Construct T.M for  $L = \{a_n b c_{n+2} \mid n \geq 1\}$

b) Convert following grammar into GNF.

$S \rightarrow AB \mid$

$BA \rightarrow BS$

$B \rightarrow A1 \mid 1$

c) Construct NFA for Regular Expression.

$((0 + 1) + (0 + 1))^* + ((0 + 1) (0 + 1))^*$

d) Construct DFA for  $L = L_1 L_2$  over  $\{0, 1\}$  where  $L_1 =$  starting with 0 and ending with 11  $L_2 =$  having substring 010 in it.

e) Construct mealy machine to output residue mod 3 for each binary string treated as a binary integer.



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :4

**P2304**

**[5334] - 23**

**M.C.A. - I**

**(Under Science Faculty)**

**CS - 203 : Object Oriented Programming (C++ Programming)**

**(2008 Pattern) (New) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks :80*

*Instructions to the candidates:*

- 1) *All Questions are compulsory.*
- 2) *Figures to the right indicate full marks.*

**Q1)** Attempt all of the following :

**[8 × 2 = 16]**

- a) Give any two characteristics of object oriented programming.
- b) Define the term :
  - 1) Data hiding
  - 2) setw
- c) What do you mean by late binding?
- d) Give syntax to create an object of template class.
- e) List any two file mode parameter. Also writes its meaning.
- f) Give the meaning of following statements.
  - i) `int * p = new int (30)`
  - ii) `int * p = new int;`
- g) Give general form of member function. Give example.
- h) What is static class?

**Q2)** Attempt any four of the following:

**[4 × 4 = 16]**

- a) Explain use of `get ()` and `put ()` functions for handling files with example.
- b) What is the use of constructor? 'Default values can be assigned to arguments in a parameterized constructor.' Comment.

**P.T.O.**

- c) What is this pointer? When it is necessary to use this pointer? Explain with suitable example.
- d) Explain memory management operator in C++.
- e) What are access specifiers in C++? Explain with example.

**Q3)** Attempt any Four of the following:

**[4 × 4 = 16]**

- a) Write a C++ program to store the following details.  
Base Class Members : Empcode, Name, Designation, Age  
Derived Class Members : Basic, Earnings, deductions, netsal

Carry out the following methods:

- i) Create master table.
  - ii) List all records.
  - iii) Search according to Empcode.
- b) Write a C++ program to illustrate the overloading of << and >> operators.
  - c) Write a C++ program to accept record of n students and store it in array of objects. The class student contain following data members.

```
introllno;  
char name [20];  
float percentage;
```

overload the search function for following :

- i) Search by roll no
- ii) Search by name
- iii) Search by percentage

d) Identify the error in the following program.

```
Class Human
```

```
{  
    Public: Human()  
    { }  
    Virtual ~ Human ()  
    {  
        cout << "Human : : ~ Human";  
    }  
};
```

```
Class Student : public Human
```

```
{  
    public: Student ()  
    { }  
    ~ Student ()  
    {  
        cout << "Student : : ~ Student ()";  
    }  
};
```

```
void main ()
```

```
{  
    Human *H = New Student ();  
    delete H;  
}
```

e) Write a C++ program to sort n elements in descending order. Use any sorting technique. (Function overloading is expected.

**Q4)** Attempt any Four of the following.

**[4 × 4 = 16]**

- Explain runtime polymorphism in detail.
- How to define pure virtual function? What is the purpose of it?
- Differentiate between friend function and normal function.

- d) Explain the following function:
  - i) `seekp ( )`      ii) `seekg ( )`
  - iii) `tellg ( )`      iv) `teelp ( )`
- e) Write a short note on iterator.

**Q5) Attempt any Four of the following. [4 × 4 = 16]**

- a) Write a C++ program for concatenating two strings using constructor.
- b) Write a C++ program that prompts the user for a positive number if negative number is entered then throw an exception as number not positive.
- c) How to overload binary operator using friend function. Explain in detail.
- d) Explain multiple and multilevel inheritance with example.
- e) What are benefits of object oriented programming?



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :5

**P2305**

**[5334] - 24**

**M.C.A. - I (Science Faculty)**

**COMPUTER SCIENCE**

**CS - 205 : Database Management System**

**(2008 Pattern) (Semester - II)**

*Time : 3 Hours]*

*[Max. Marks :80*

*Instructions to the candidates:*

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Assume appropriate data, if necessary.*

**Q1)** Attempt all of the following:

**[8 × 2 = 16]**

- a) Explain the difference between Primary Key and Foreign Key.
- b) What is mean by attribute? Give example.
- c) What is data independence?
- d) What is shared lock?
- e) State properties of transaction.
- f) State any two fuctions of DBA
- g) What are the languages provided by DBMS.
- h) Define Candidate key, null value.

**Q2)** Attempt any four of the following:

**[4 × 4 = 16]**

- a) Explain 2 phase Locking protocol.
- b) Explain DBMS architecture with diagram.
- c) List types of serializability.
- d) Define normalization. Explain 1 NF with proper example.

***P.T.O.***

- e) The following is the list representing the sequence of events in an interleaved execution of set transaction T1, T2, T3 assuming two phase locking protocol (X is exclusive, S is shared).

Time Transaction Code

t <sub>1</sub>	T <sub>1</sub>	Lock (A, S)
t <sub>2</sub>	T <sub>2</sub>	Lock (B, S)
t <sub>3</sub>	T <sub>3</sub>	Lock (A, X)
t <sub>4</sub>	T <sub>1</sub>	Lock (C, S)
t <sub>5</sub>	T <sub>2</sub>	Lock (A, X)
t <sub>6</sub>	T <sub>3</sub>	Lock (D, X)
t <sub>7</sub>	T <sub>1</sub>	DISP (A-C)
t <sub>8</sub>	T <sub>2</sub>	Lock(D, S)
t <sub>9</sub>	T <sub>3</sub>	Lock(C, X)
t <sub>10</sub>	T <sub>1</sub>	COMMIT
t <sub>11</sub>	T <sub>2</sub>	Lock(C, S)

Construct a wait-for a graph according to above request. Is there a deadlock? Justify.

**Q3) Attempt any four from the following: [4 × 4 = 16]**

- What are the different aggregate function supported by SQL.
- Differentiate between generalization & specialization.
- What do you mean by pattern matching? Discuss pattern matching operators in SQL.
- Explain the following operators from relational algebra.
  - Select
  - Project
  - Union
  - Cartesion product
- Let R be a relation schema  $R = \{A, B, C, D, E\}$  and set of FDs define on R as  $F = \{A \rightarrow B, CD \rightarrow E, A \rightarrow C, B \rightarrow D, E \rightarrow A\}$  compute the closure of F i.e.  $F^+$ .

**Q4)** Attempt any four from the following:

**[4 × 4 = 16]**

- a) Explain Time-Stamp based protocol.
- b) Consider the following RDB.

Movie (mno, mname, releaseyear), Actor (ano, name). There exists many-to-many relationship between Movie & Actor. Solve the following queries into SQL.

- i) Count no. of movies in which 'Amir' has acted.
  - ii) List the movies released in 1999.
  - iii) Display the actors of movie 'Doom3'.
  - iv) List the names of actors starting with character 'A'.
- c) Consider the following non-serial schedule.

T1	T2
Read (A)	Read(A)
A := A - 100	T := A*0.1
Write (A)	A := A - T
Read(B)	Write(A)
B := B +100	Read(B)
Write(B)	B := B + -T
	Write (B)

Give at least 2 non – serial schedules that are serializable to serial schedule <T1, T2>.

- d) Explain group by & order by clause with example.
- e) Every cascades schedule is also recoverable. comment.

**Q5)** Attempt any four of the following:

**[4 × 4 = 16]**

- a) Explain different set operations in SQL.
- b) The log corresponding to a particular schedule for three transactions  $T_1$ ,  $T_2$ ,  $T_3$  is as follows.

[Start,  $T_1$ ]

[Read,  $T_1$ , P]

[Write,  $T_1$ , P, 7]

[Commit,  $T_1$ ]

[Start,  $T_2$ ]

[Read,  $T_2$ , Q]

[Write,  $T_2$ , Q, 10]

[Start,  $T_3$ ]

[Write,  $T_3$ , C, 40]

[Commit,  $T_2$ ]

[Read,  $T_3$ , P]

[Write,  $T_3$ , P, 10] → System crash

If immediate update with checkpoint is used, what will be the recovery procedure?

- c) Consider the following relational database  
Doctor (dno, dname, daddr, dcity), Hospital (hno, hname, hcity), D\_H (dno, hno, date). Solve the following queries.
- i) Find the hospital names to which Dr.Mehta has visited.
- ii) Count all the hospital in Pune city.
- iii) List the names of doctor starting with character 'M'.
- iv) List the name of hospital to which Dr. Amit has visited on 10-12-17.
- d) The following is, list of events in an interleaved execution of set of transactions  $T_0$ ,  $T_1$ ,  $T_2$ ,  $T_3$  with two phase locking protocol.

Time	Transaction	Code
t <sub>1</sub>	T <sub>1</sub>	Lock (A, X)
t <sub>2</sub>	T <sub>2</sub>	Lock (B, S)
t <sub>3</sub>	T <sub>3</sub>	Lock (A, S)
t <sub>4</sub>	T <sub>4</sub>	Lock (B, S)
t <sub>5</sub>	T <sub>1</sub>	Lock (B, X)
t <sub>6</sub>	T <sub>2</sub>	Lock (C, X)
t <sub>7</sub>	T <sub>3</sub>	Lock (D,S)
t <sub>8</sub>	T <sub>4</sub>	Lock (D, X)

Construct a wait-for graph according to above request is there deadlock at any instance? Justify.

- e) In a nursery, the plants are sold to the customers. These plants are flowering & non flowering only. Nutrients are given to the plants with some quantity. Nutrients includes pesticides, watering & manure

Draw E-R Diagram



Total No. of Questions :4]

SEAT No. :

P2306

[5334]-31

[Total No. of Pages : 3

M.C.A-II (Under Science Faculty)

CA-301 : DESIGN AND ANALYSIS OF ALGORITHM (New)

(2008 Pattern) (Semester-III)

Time : 3 Hours]

[Max. Marks : 80

Instructions to the candidates:

- 1) Neat diagrams must be drawn wherever necessary.
- 2) Figures to the right indicate full marks.
- 3) All questions are compulsory.

Q1) Attempt all of the following :

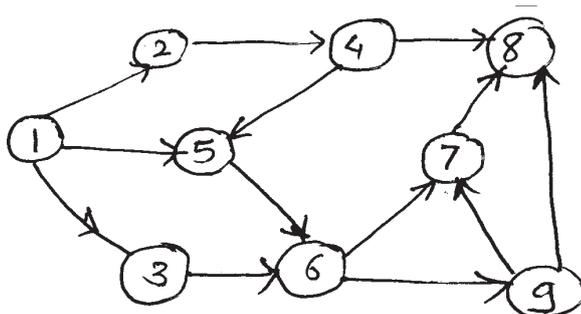
[8×2=16]

- a) What is Backtracking? Who introduced it?
- b) Define NP-complete and NP-Hard?
- c) What is principle of optimality?
- d) What do you mean by best-case time complexity of merge sort?
- e) Define Biparite graph
- f) Explain time and space complexity?
- g) Explain FIFO in Branch-and-Bound?
- h) What do you mean by greedy method?

Q2) Attempt any four :

[4×5=20]

- a) Apply BFS on following graph.



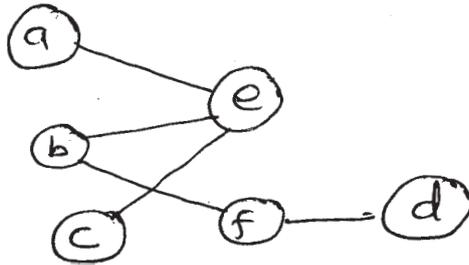
- b) Explain principle of optimality with application.
- c) Apply Backtracking to solve instance of sum of subsets problem :  
 $W = (5, 7, 5, 3)$  and  $m=10$
- d) Solve following example of practical knapsack using greedy method  
 $P = (12, 6, 15, 7, 6, 20, 3)$   
 $W = (2, 3, 5, 7, 2, 5, 1)$   
 $M = 15$
- e) Write and explain Dijkstra's Algorithm

P.T.O.

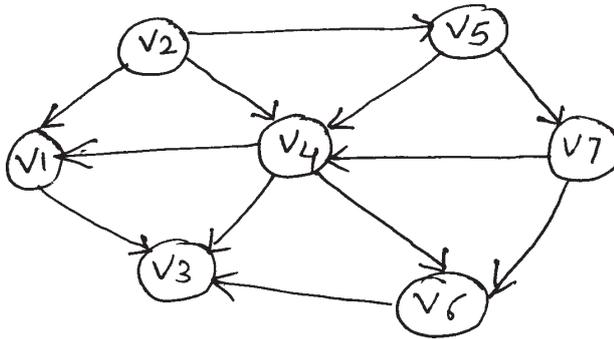
Q3) Attempt any four :

[4×8=32]

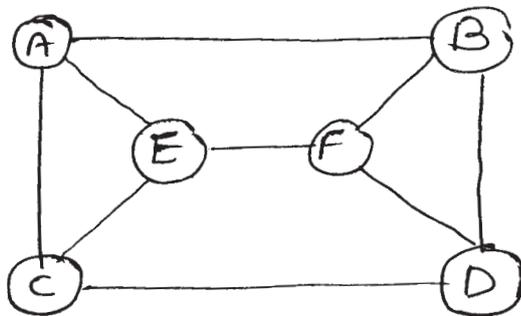
a) Obtain maximum Bi-parite matching of the following :



b) Obtain topological sort for the following graph



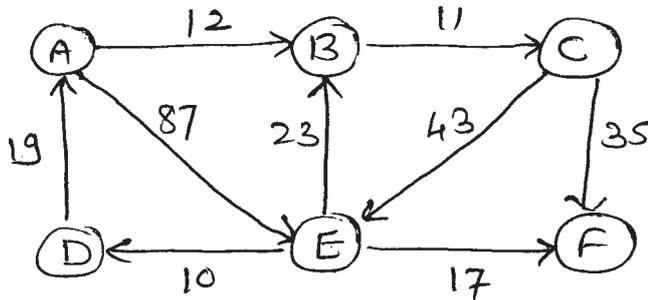
c) What do you mean by minimum spanning tree? Obtain same using Kruskal's and Prim's algorithm for following graph.



Cost Adjacency matrix is

	A	B	C	D	E	F
A	0	8	9	$\infty$	11	$\infty$
B	8	0	$\infty$	10	$\infty$	13
C	9	$\infty$	0	8	7	$\infty$
D	$\infty$	$\infty$	8	0	9	6
E	11	$\infty$	7	$\infty$	0	6
F	$\infty$	13	$\infty$	9	6	0

- d) Solve the following instance of the single source shortest paths problem with vertex 'A' as the source for the given graph using Dynamic programming. Also write the algorithm for the above problem.



- e) What is strassen's matrix multiplication obtain and solve it's recurrence relation?

**Q4)** Attempt any three :

**[3×4=12]**

- Explain 8-queens problem
- Prove that counting sort is stable sort method.
- Solve all pairs shortest-path problem for the following graph.

A	B	C
A	$\begin{bmatrix} 0 & 1 & 2 \end{bmatrix}$	
B	$\begin{bmatrix} 3 & 0 & \infty \end{bmatrix}$	
C	$\begin{bmatrix} 1 & 2 & 0 \end{bmatrix}$	

- Write merge sort algorithm. Explain Average-Case behaviour of merge sort.
- Let X=abaabbaaaba and Y = abaaba. Find minimum cost edit sequence that transforms X into Y.



Total No. of Questions : 5]

SEAT No :

**P 2307**

**[5334]-32**

[Total No. of Pages : 2

**M.C.A. - II (Science Faculty)**  
**COMPUTER SCIENCE**  
**CS 302 : Computer Networks**  
**(2008 Pattern) (Semester - III)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Figures to the right indicate full marks.*
- 4) *Draw diagrams wherever necessary.*

**Q1)** Attempt ALL of the following **[16]**

- a) Consider a noiseless channel with a bandwidth of 3000 Hz transmitting a signal with two signal levels. What is the maximum bit rate?
- b) An ASCII code 1101011 is transmitted using hamming code method. What is the transmitted code?
- c) An IP packet has arrived with the first 8 bits as 01000010. The receiver discards the packet. Why?
- d) Define: De facto and De jure standards.
- e) What is the relationship between services and protocols?
- f) What is pipelining? In what situation pipelining protocols are useful?
- g) Draw addressing structure of IPV6.
- h) Define: Congestion, Network Architecture

**Q2)** Attempt any FOUR of the following: **[16]**

- a) What are the design issues of the layers?
- b) Compare circuit switching and packet switching.
- c) What is the subnetwork address, if the destination address is 200.45.34.56 and the subnet mask is 255.255.240.0?
- d) If the sender has a frame 1101011011 and generator polynomial 10011. What will be the transmitted frame sequence?
- e) What is the purpose of length and padding fields in Ethernet? Why minimum length of traditional Ethernet frame is 64 bytes?

**P.T.O.**

**Q3)** Attempt any FOUR of the following: **[16]**

- a) What are the different transmission modes? Explain each one in short.
- b) Compare virtual circuits subnet and datagram subnet.
- c) What are the desirable properties of routing algorithms?
- d) Explain CSMA/CD. Why CSMA/CD is better than CSMA?
- e) Explain 1-bit sliding window protocol with its advantages and disadvantages?

**Q4)** Attempt any FOUR of the following: **[16]**

- a) Why framing is needed at data link layer? Explain all framing techniques.
- b) What are the functions of presentation layer and session layer?
- c) What are the characteristics of line coding?
- d) What are the propagation time and the transmission time for a 5 Mbyte image. If the bandwidth of the network is 1 Mbps. Assume that the distance between the sender and the receiver is 12,000km and the light travels at  $2.4 \times 10^8$  m/s.
- e) How Go Back N protocol works? What are its disadvantages?

**Q5)** Attempt any FOUR of the following: **[16]**

- a) What are the different ways of achieving transition from IPV4 to IPV6?
- b) What are the congestion prevention policies data link layer and network layer implements?
- c) A packet of size 4000 bytes has to pass through a network having maximum packet size as 1400 bytes. How many fragments will pass through the network? What will be the value of identification, flags and fragment offset field for each fragment? (Diagram is essential. Assume any identification value.)
- d) Explain polling and token passing methods.
- e) What are the factors affect performance of the network?

**x      x      x**

Total No. of Questions : 5]

SEAT No :

**P 2308**

[Total No. of Pages :3

**[5334]-33**

**M.C.A.-II (Science Faculty)**

**COMPUTER SCIENCE**

**CS - 303: Introduction to system programming and  
Operating System Concepts  
(2008 Pattern) (Semester-III)**

*Time : 3.00 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Figures to the right indicate full marks.*

**Q1)** Attempt all of the following :

**[8×2=16]**

- a) What is assembler?
- b) Define context switch time.
- c) What is starvation in CPU scheduling?
- d) What is Pthread?
- e) State two differences between internal and external fragmentation.
- f) What is fork() system call?
- g) What is semaphore?
- h) State the difference between non-preemptive and preemptive scheduling.

**Q2)** Attempt any four :

**[4×4=16]**

- a) Explain the structure of Process Control Block (PCB).
- b) Write a note on thread libraries.
- c) Explain free space management techniques.
- d) Explain cyclic graph directory structure.
- e) State any four functions of operating system.

**P.T.O.**

Q3) Attempt any four:

[4×4=16]

- a) Consider the following set of processes, with the length of CPU-burst time given in milli sec, and arrival time is 0 milli second.

Process	Burst time
P1	10
P2	29
P3	3
P4	7
P5	12

Calculate average turn around time & average waiting time using (i) FCFS  
(ii) SJF

- b) Consider a system with 4 processes P1, P2, P3, P4 and four resources A, B, C, D with one instance of each type. Resource ownership is as follow:

P1 holds A & wants C

P2 holds B

P3 holds D wants B

P4 holds c wants D

Is system dead locked? Draw resource-allocation graph & wait for graph.

- c) Consider the following page reference string 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3

How many page faults would occurs for the following page replacement algorithms (frames = 3)

(i) LRV (ii) Optimal

- d) Suppose the head of a cylinder with 300 tracks numbered 0 to 299 is currently at 10. If a request in queue are :

12, 14, 58, 65, 75, 100, 250

What is the total head movements to satisfy there request with following disk scheduling algorithm.

i) SSTF ii) FCFS

- e) Explain system calls with an example.

**Q4)** Attempt any four :

**[4×4=16]**

- a) What is critical section.
- b) Explain file allocation methods in detail.
- c) Explain concept of device driver.
- d) Explain demand paging in brief.
- e) What are the necessary conditions for deadlock to occur?

**Q5)** Attempt any four:

**[4×4=16]**

- a) Write a note on interrupt handles
- b) Explain contiguous memory allocation method.
- c) Write a note on real - time O.S.
- d) Explain file operations in brief.
- e) Write a note on multilevel queue scheduling.

❖❖❖❖❖

Total No. of Questions : 5]

SEAT No. :

**P2309**

**[5334]-34**

[Total No. of Pages : 2

**M.C.A. (Under Science Faculty)**  
**CS - 305 : EVENT DRIVEN PROGRAMMING**  
**(Win 32 SDK)**  
**(2008 Pattern) (Semester - III)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *Figures to the right indicate full marks.*
- 2) *Neat diagrams must be drawn whenever necessary.*
- 3) *All question are compulsory.*
- 4) *Assume suitable data if necessary.*

**Q1)** Design the database for “College Admission” (Only Table Outline). **[12]**

- a) List the candidates registered their admission.
- b) List the candidates have 70% and above marks in Higher secondary Exams.
- c) List the students have taken admission in ‘Computer Science’ dept.

**Q2)** Write the program statements using Win 32 API for any of the following [Winmain ()] not required. **[5 × 4 = 20]**

- a) Place two buttons ‘+’ and ‘-’ at the centre of Client Area. If user Clicks on ‘+’ button, increase the size of window and ‘-’ button to decrease size of window.
- b) Create a memory metafile during WM-CREATE message and display the image 50 times during WM-PAINT message.
- c) Display the caret at the top left position in Client Area, Use function keys (F<sub>1</sub>, F<sub>2</sub>, F<sub>3</sub>, F<sub>4</sub>) to move caret left, right, up and down one position.
- d) Create two regions rectangles and ellipse. Combine these regions by XOR mode.
- e) Create menu like. File Edit View Font Display proper message on Clicking particular menu item.

**Q3)** Answer in brief (any eight) : **[8 × 2 = 16]**

- a) Differentiate : GetDC Vs Begin Paint.
- b) List the different mouse messages generated in client area.
- c) What is a difference between Get Message () and peek message ()?

**P.T.O.**

- d) How the child talks to parent?
- e) How to associate a Dlg Proc () to Dialog Box.
- f) What is static linking?
- g) What is Heap memory?
- h) How to register Window class?
- i) What are the contents of lParam and wParam for WM-SIZE message?
- j) What is MDI?

**Q4) Justify true / false (any six) :** **[6 × 2 = 12]**

- a) A critical section object cannot be moved copied.
- b) Metafiles either can exist temporarily in memory or can be saved as disk files.
- c) Timer messages are not synchronous.
- d) Every Scroll bar is not associated “range” “position”.
- e) A dialog box procedure will not receive a WM-CREATE message.
- f) WM-TIMER is a queued message.
- g) The effect of Hide Caret is additive.
- h) Windows program also has a message loop that retrieves messages from a message queue by calling Dispatch Message.

**Q5) Attempt any four:** **[4 × 5 = 20]**

- a) Define the Device Context? What is the use of Textout () GDI function.
- b) Note on : Modeless Dialog Box.
- c) How to transfer text to Clipboard?
- d) Show the Parent Child hierarchy of a window MDI Application.
- e) Write a note on “DIB-Device Independent Bitmap”.



Total No. of Questions : 5]

SEAT No. :

**P2310**

[Total No. of Pages : 3

[5334] - 41

**M.C.A. (Under Science Faculty)**

**CS-401: INTRODUCTION TO UNIX AND UNIX INTERNALS**

**(2008 Pattern) (Semester - IV)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicates full marks.*

**Q1)** Attempt all of the following:

**[8×2=16]**

- a) What is callout table?
- b) What is tie-breaker rule?
- c) Explain with syntax system call 'write'.
- d) What is use of remembered inode?
- e) Explain tput shell command.
- f) List three types of regions.
- g) Write a pseudo code for context switch.
- h) What is uarea? List its fields.

**Q2)** State true or false. Justify your answer (Any four):

**[4×4=16]**

- a) 'exec' and 'fork' system calls are similar.
- b) The kernel always spawns or schedule special process to handle interrupt.
- c) Process goes to 'sleep' for 'not sure' events.
- d) Inode number starts from zero.
- e) If 'exec' system call is successful, it never returns.

**P.T.O.**

**Q3) Attempt any four of the following:**

**[4×4=16]**

- a) List all functions handled by clock interrupt handler.
- b) Explain the logical format of executable file.
- c) List and explain any four inconsistencies checked by fsck.
- d) Explain how protection fault is handled by system in demand pagina.
- e) Explain blcok diagram of system Kernel in detail.

**Q4) Attempt any four of the following:**

**[4×4=16]**

- a) Write a shell script to read a file name as a command line argument and display all the details of the file.
- b) Write a 'C' program the create 'n' children. When the children will terminate, display total cumulative time children spent in user and kernel mode.
- c) Explain behaviour of following program.

```
main ()
{
    f ();
    g ();
}

f ()
{
    v for k ();
}

g ()
{
    int b [10], i;
    for (i = 0; i <10; i ++)
        b[i] = i;
}
```

- d) Write a shell script to accept command line argument. Check and display whether it contains any special case character.
- e) Write a C program to generate parent process to write unnamed pipe and will read from it.

**Q5)** Attempt any four of the following:

**[4×4=16]**

- a) What do you mean by process sleeping at interruptible priority? What is sleep address?
- b) Explain region and region table entry in detail.
- c) Discuss the services provided by Unix operating system.
- d) What is process table? Explain all its fields in detail.
- e) How are process can signal to another process? Explain in detail.

*EEE*

Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

**P2311**

**[5334] - 42**

**M.C.A - II**

**(Science Faculty)**

**CS - 402 : Advanced Networking and Mobile Computing  
(2008 Pattern) (Semester - IV)**

*Time : 3 Hours]*

*[Max. Marks :80*

*Instructions to the candidates:*

- 1) *All Questions are compulsory*
- 2) *Figures to the right indicate full marks*
- 3) *All questions carry equal marks*

**Q1)** Attempt all :

**[8 × 2 = 16]**

- a) What is HLR and VLR?
- b) What are the mode of operation “In TEINEL”?
- c) Define DNS
- d) What is difference between Tcp & UDP?
- e) Explain shortly checksum
- f) What is multiplexing & name its types
- g) What is foreign Network?
- h) Define spread spectrum

**Q2)** Attempt any four of the following

**[4 × 4 = 16]**

- a) Explain direct sequence spread spectrum
- b) Differentiate SDMA, TDMA & FDMA
- c) Write a short note on E-mail Architecture
- d) Explain push architecture with diagram
- e) Explain different types of registration process in mobile IP

**P.T.O.**

**Q3)** Attempt any Four of the following **[4 × 4 = 16]**

- a) Explain IEEE 802.11 wireless LAN architecture
- b) What are the transaction services offered by WTP?
- c) Explain different scenarios of handover
- d) Explain TCP features
- e) What is cellular system? Give any two disadvantages.

**Q4)** Attempt any Four of the following **[4 × 4 = 16]**

- a) Write a short note on Reverse Tunneling
- b) Explain different Teleservices provided by GSM
- c) Explain IP-Packet delivery of mobile IP
- d) How can MACA still fail in case of hidden/expose terminal problem?
- e) Write a short note on MMS architecture

**Q5)** Attempt any Four of the following **[4 × 4 = 16]**

- a) Explain different WEB documents
- b) Write a short note on Radio subsystem in GSM
- c) What is shopping TCP? Explain its advantages & disadvantages
- d) Explain WAP architecture
- e) Write a short note on polling



Total No. of Questions :4]

SEAT No. :

[Total No. of Pages :3

**P2312**

**[5334] - 43**

**MCA (Science Faculty)**

**CS-403 : Distributed Database System**

**(2008 Pattern) (Semester - IV)**

*Time : 3 Hours]*

*[Max. Marks :80*

*Instructions to the candidates:*

- 1) *Figures to the right indicate full marks.*
- 2) *Neat diagrams must be drawn whenever necessary.*
- 3) *All questions are compulsory.*

**Q1)** Attempt the following:

**[8 × 2 = 16]**

- a) What is hybrid Fragmentation.
- b) Give two architectural alternatives of DDBMS.
- c) Differentiate MTBF and MTTR.
- d) What are promises of DDBMS.
- e) State different layers of query processing.
- f) What are types of transaction.
- g) Explain : 1) Serializability  
2) Atomicity
- h) State different types of failures in DDBMS.

**Q2)** Attempt any four :

**[4 × 5 = 20]**

- a) Explain deadlock avoidance scheme used in DDBMS.
- b) Explain how normalization is done in query decomposition.
- c) Explain components of DDBMS.
- d) Differentiate between DDBMS & MDBMS.
- e) Write a note on Bottom up approach.

***P.T.O.***

Q3) Attempt any four :

[4 × 6 = 24]

a) Transformation the following query into optimized operators tree.

Select ename

From proj, emp, asg

where asg.eno = emp.eno

and asg.pno = proj.pno

and (dur = 12 OR dur = 48)

and pname = "project1" and budget < 100000

and location = "Pune"

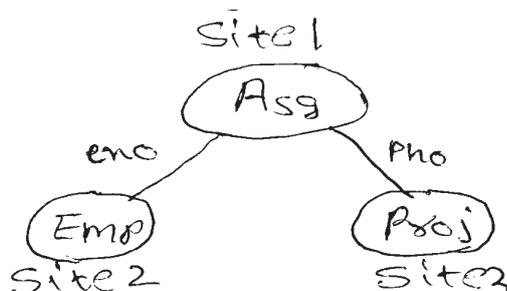
b) Consider the Following Schedule.

S1 = {R<sub>2</sub>(Z), W<sub>2</sub>(X), W<sub>2</sub>(Y), W<sub>1</sub>(X), R<sub>1</sub>(X), R<sub>3</sub>(X), R<sub>3</sub>(Z), R<sub>3</sub>(Y)}

S2 = {R<sub>3</sub>(Z), W<sub>2</sub>(X), W<sub>2</sub>(Y), R<sub>1</sub>(X), R<sub>3</sub>(X), R<sub>2</sub>(Z), R<sub>3</sub>(Y) W<sub>1</sub>(X)}

Explain whether S1 and S2 are serial or non-serial? And also check whether S1 and S2 are serializable or not.

c) Consider the join graph in the Following diagram for the relational algebra query  $\text{proj} \bowtie_{\text{pno}} \text{Asg} \bowtie_{\text{eno}} \text{Emp}$



Let Size (Emp) = 200

Size (Asg) = 400

Size (proj) = 600

Size (Asg  $\bowtie$  Emp) = 600

Size (Asg  $\bowtie$  Proj) = 400

Using the given information, describe a join program that will need minimum data transfer.

d) consider the following query

```
select person_name
```

```
from person P, disease d, person_disease pd
```

Where p.pno=pd.pno. and pd.dno =d.dno and

disname = 'Flu' and p.age < 45;

Optimize the above query, using the INGRES query optimization algorithm for centralized query optimization.

e) Let  $Q = \{a_1, a_2, a_3, a_4, a_5\}$  be the set of queries,

$A = \{A_1, A_2, A_3, A_4, A_5\}$  be the set of attributes

$S = \{S_1, S_2, S_3\}$  be the set of sites.

The matrix (A), given below, describe the attribute usage values and matrix (B) gives application access frequencies. Assume that  $ref_i(a_k) = 1$  for all  $a_k$  and  $S_i$  and that  $A_4$  is the key attribute. Do the vertical Fragmentations of set of attributes using BE algorithm and vertical partitioning algorithm using matrix A and B.

Matrix (A)					Matrix (B)				
	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>	A <sub>5</sub>		S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>
a <sub>1</sub>	0	1	1	1	0	a <sub>1</sub>	20	4	0
a <sub>2</sub>	1	1	1	0	0	a <sub>2</sub>	25	10	0
a <sub>3</sub>	1	1	0	0	0	a <sub>3</sub>	15	0	0
a <sub>4</sub>	0	0	0	1	1	a <sub>4</sub>	0	0	30
a <sub>5</sub>	0	0	1	1	1	a <sub>5</sub>	0	20	25

**Q4)** Attempt any four :

**[4 × 5 = 20]**

- a) Explain C2PL locking based concurrency control algorithm.
- b) Write note on “out place update?”
- c) What is the difference between centralized deadlock detection and Hierarchical deadlock detection.
- d) Write a note on query optimization.
- e) Explain 2 PC protocol.



Total No. of Questions :4]

SEAT No. :

**P2313**

[Total No. of Pages :2

**[5334] - 44**

**M.C.A.**

**SCIENCE FACULTY**

**CS - 405 : Object Oriented Software Engineering**

**(New) (2008 Pattern) (Semester - IV)**

*Time : 3 Hours]*

*[Max. Marks :80*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicates full marks.*
- 3) *Assume suitable data, if necessary.*
- 4) *neat diagrams must be drawn wherever necessary.*

**Q1) Attempt all of the following:**

**[8 × 2 = 16]**

- a) What is unit testing?
- b) What is swim lanes?
- c) DefineActive class.
- d) What is Beta Testing and Alpha Testing?
- e) What is Black box and white box testing?
- f) What is object orientation?
- g) Which are the elements of use-case diagram?
- h) State the use of polymorphism.

**Q2) Attempt any four of the following:**

**[4 × 4 = 16]**

- a) Explain 'Extend' and 'Include' relationship in use case diagram.
- b) Explain generalization and specialization with example.
- c) State various advantages of UML.
- d) What is qualifier? Explain with suitable example.
- e) Discuss the steps followed to forward engineer a class diagram.

***P.T.O.***

**Q3) Attempt any four of the following:**

**[4 × 8 = 32]**

- a) Draw state chart diagram for coffee vending machine.
- b) Draw class diagram and sequence diagram for flight reservation system.
- c) Prepare an object oriented diagram showing at least 7 relationships among the following object classes. Include associations, aggregation and generalization, show multiplicity, additional attributes may be added if necessary.

Play ground, School, Principal, Classroom, Student, Book, Teacher, computer, Desk, Chair.

- d) Prepare use elevators to move from one floor to another. Discuss different scenarios and prepare activity diagram.
- e) Explain component diagram and deployment diagram.

**Q4) Attempt any four of the following:**

**[4 × 4 = 16]**

- a) What are benefits of Iterative Development?
- b) Write a note on generic components of object oriented design model.
- c) Explain Rational Unified Process.
- d) Which are the attributes of well structured deployment diagram.
- e) Discuss the resource management component.



Total No. of Questions : 8]

SEAT No. :

**P2314**

[5334]-51

[Total No. of Pages : 2

**M.C.A. (Science)**

**CS - 501 : CRYPTOGRAPHY AND NETWORK SECURITY**

**(2008 Pattern) (Semester - V)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) Neat diagrams must be drawn wherever necessary.*
- 2) Figures to the right side indicate full marks.*
- 3) Use of Calculator is allowed.*
- 4) Assume Suitable data if necessary.*

**Q1)** Attempt all of the following.

**[16]**

- a) Explain the working of cookies.
- b) Explain the working of Biometrics?
- c) Which parties are involved in KERBEROS Protocol?
- d) What protections are associated with firewall system?
- e) Define SHTTP' & TSP.
- f) List the contents of Digital Certificates.
- g) List the strengths of MD5.
- h) Consider the following Plain Text" MCA SCIENCE UNIVERSITY OF PUNE". The key to encrypt the text is an alphabet 4 places down the line. Using Caesar Cipher construct Cipher text

**Q2)** Attempt any four of the following.

**[16]**

- a) Explain in brief principle of security.
- b) What is virus? Write the steps to eliminate the virus.
- c) What is Stagenography? What are the uses of Stagenography?
- d) What are the different algorithm modes? Explain in brief.
- e) What are the variations of triple DES, explain in brief.

**P.T.O.**

**Q3)** Attempt any four of the following. **[16]**

- a) Explain Double DES encryption and Double DES decryption.
- b) Explain the following
  - i) Public key cryptography
  - ii) Man-in-the-middle attack
- c) How subkey is generated in RC5?
- d) What are the problems of Diffie-Hellman Key exchange algorithm?
- e) Write a short note on Digital signature.

**Q4)** Attempt any four of the following. **[16]**

- a) Write down the steps to verify digital certificates.
- b) Explain the working of certificate based Authentication.
- c) What is firewall? What are the types of firewall?
- d) Explain Handshake Protocol in brief.
- e) Write a short note on Secure Electronic transaction (SET) process.

**Q5)** Attempt any four of the following. **[16]**

- a) Consider the plain text.  
"DOG". Using Hill Cipher construct the cipher text. Let the key matrix be

$$\begin{bmatrix} 6 & 24 & 1 \\ 13 & 16 & 10 \\ 20 & 17 & 15 \end{bmatrix}$$

- b) Consider the plain text "MCA SEMESTER FIVE". One time pad is QACDZMOUXGIJNVB using vernal Cipher construct the cipher text.
- c) Apply Play Fair technique and convert the following plain text into cipher text. Plain text : UNIVERSITY OF PUNE
- d) Consider the values of  $n = 17$  and  $g = 13$ . Apply Diffie - Hellman Algorithm and generate keys  $K_1$  and  $K_2$ .
- e) Consider the plain text "10". Let  $P = 7$  and  $Q = 17$ . Construct the cipher text using RSA algorithm and also decrypt the cipher text you have constructed to get the original plain text.



Total No. of Questions : 5]

SEAT No. :

**P2315**

[5334]-52

[Total No. of Pages : 2

**M.C.A. - III (Science Faculty)**

**COMPUTER SCIENCE**

**CS - 502 : Internet Programming Using PHP**

**(2008 Pattern) (Semester - V)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

**Q1)** Attempt all of the following.

**[8×2=16]**

- a) What is cookies?
- b) What is use of default parameter in function?
- c) "HTTP is stateful protocol". Justify true /false.
- d) Explain the un serialize and wakeup methods
- e) Define type juggling.
- f) What do you mean by XML Parser?
- g) Whole PHP code is case sensitive justify true or false.
- h) What are the components of web services?

**Q2)** Attempt any four of the following.

**[4×4=16]**

- a) How are raster graphics advantageous than vector graphics?
- b) Explain client server model with the help of diagram.
- c) Describe features of PHP in detail.
- d) Explain any four sorting functions in array.
- e) What is file upload explain in detail.

**P.T.O.**

**Q3) Attempt (Any four one):**

**[4×4=16]**

- a) Write a short note on abstract class and interfaces.
- b) Write an example to validate the email-id. using regular expression
- c) Write a PHP script to read directory name from user and display all files with their sizes in tabular formats.
- d) Write steps in PEAR DB to access database.
- e) Write a note on regular expressions.

**Q4) Attempt any four of the following:**

**[4×4=16]**

- a) Write PHP script for following:  
Create a class account (accno,cust\_name).drive two classes from account as saving\_acc(bal, min\_amt) and current\_acc (bal,min\_amt) display a menu
  - i) Saving account
  - ii) Current account.
- b) Write short note on Json- responses.
- c) What are the differences between free( ) and disconnect ( ) methods
- d) Explain global variables in PHP.
- e) Explain POP and HTTP protocols.

**Q5) Attempt any four of the following:**

**[4×4=16]**

- a) Write PHP program to perform the following operations:
  - i) Union of two arrays.
  - ii) Calculate sum of array elements.
  - iii) Check the array elements in negative or not using filter.
- b) Write PHP script for the following.  
Design a form to accept the directory name from the user, display the contents of the directory.
- c) Explain ereg ( ) builtin construct.
- d) Explain execute and prepare statements.
- e) Explain different types of argument passing to functions.



Total No. of Questions : 5]

SEAT No :

[Total No. of Pages : 2

**P 2316**

**[5334]-53**

**M.C.A. (Science Faculty)**

**CS - 503 :Design Patterns  
(2008 Pattern) (Semester - V)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

**Q1)** Attempt all of the following :

**[8×2 = 16]**

- a) Define design pattern.
- b) What is an idiom?
- c) Define any two advantages of architectural pattern.
- d) What is difference between pipe and filters?
- e) What are the elements of a design pattern?
- f) Give intent of observer design pattern.
- g) What is collaboration of singleton design pattern?
- h) “Idioms are less ‘portable’ between programming languages” Justify & comment.

**Q2)** Attempt any four of the following :

**[4×4 = 16]**

- a) What is pattern ? Explain relationships between patterns.
- b) Explain in details broker architectural pattern.
- c) Explain MVC architectural pattern.
- d) Explain intent, motivation of blackboard architectural pattern?
- e) Explain layered architectural pattern.

**P.T.O.**

**Q3)** Attempt any four of the following : **[4×4 = 16]**

- a) Explain motivation and applicability of adapter pattern?
- b) What are consequences of abstract factory design pattern?
- c) State Intent and applicability of prototype design pattern.
- d) Explain consequence of singleton design pattern.
- e) What is difference between creational and structural design pattern?

**Q4)** Attempt any four of the following : **[4×4 = 16]**

- a) Give the structure and participants of proxy design pattern.
- b) What is difference between abstract factory and prototype pattern?
- c) What are benefits and liabilities of decorator design pattern?
- d) Explain consequence of command design pattern.
- e) What is GOF intent of observer design pattern? Also explain where is it used?

**Q5)** Attempt any four of the following : **[4×4 = 16]**

- a) Explain consequence of strategy design pattern.
- b) Define and explain following terms:
  - i) Idioms
  - ii) Counted pointer idioms
- c) What are benefits and liabilities of command design pattern?
- d) Explain collaboration of observer design pattern.
- e) Explain consequence and implementation of strategy design pattern.

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Total No. of Questions : 5]

SEAT No. :

**P2317**

**[5334]-54**

[Total No. of Pages : 2

**M.C.A. - III (Science)  
COMPUTER SCIENCE**

**CS - 505 : Software Testing & Quality Assurance  
(2008 Pattern) (Semester - V)**

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

- 1) *All questions are compulsory.*
- 2) *All questions carry equal marks.*
- 3) *Figures to right indicate full marks.*

**Q1)** Attempt all of the following:

**[8 × 2 = 16]**

- a) Define security testing.
- b) Explain nature of Errors.
- c) Explain software safety.
- d) Explain software reviews.
- e) Define the term 'Measure'.
- f) Define Beta Testing.
- g) Define stub.
- h) Write different testing tools.

**Q2)** Attempt any four of the following:

**[4 × 4 = 16]**

- a) What is graph metric? Explain in details.
- b) What is regression testing?
- c) Explain run charts.
- d) What are benefits of smoke testing.
- e) Explain attributes of effective software matrices.

**Q3)** Attempt any four of the following:

**[4 × 4 = 16]**

- a) Explain white Box testing in detail.
- b) Write a short note on "loop testing".
- c) Explain six-sigma quality in detail.
- d) Which characteristics lead to testable software?
- e) Explain "Statistical quality assurance".

**P.T.O.**

**Q4)** Attempt any four of the following:

**[4 × 4 = 16]**

- a) Write a short note on deployment testing.
- b) Explain top down integration testing.
- c) Explain steps to design test cases?
- d) Explain ISO - 9000 quality standards.
- e) Differentiate between validation & verification.

**Q5)** Attempt any four of the following:

**[4 × 4 = 16]**

- a) Discuss load runner in detail.
- b) What are testing fundamentals.
- c) Write short note on Size Oriented Metrics.
- d) Write short note on SQA activities.
- e) State and explain any two software quality factors.

