

Total No. of Questions :5]

SEAT No. :

**P1836**

[Total No. of Pages :5

[5134] - 11

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

**COMPUTER SCIENCE**

**CS - 101: C - Programming**

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

*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()

{

int i = 1;

static int j = 1;

printf ("i = %d j = %d\n", i, j);

i ++;

j ++;

}

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 x, i = 0, j = -1, k = 2;
        x = (i == ++j)? (++j >= k)? j: k: (i < k)? i: j;
        printf ("x = %d", x);
    }

```

b) Find error and explain (Any two)

[2×4=8]

```

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

```

```

ii) main()
    {
        char s = "Welcome";
        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.
  - i) gets()
  - ii) puts()
  - iii) getchar()
  - iv) getche()
- b) Write a note on multidimensional arrays.
- c) What is recursion? Explain with example.

- d) Define:
  - i) Identifier
  - ii) Function
  - iii) Array
  - iv) Structure
- e) Write a note on register storage class.

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

- a) Write a C program using function to check whether given number is palindrome or not.
- 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 and minimum number of single dimensional array.
- 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) `getpixel`.
  - ii) `putpixel`.
  - iii) `line`
  - iv) `circle`
- c) Write a note on command line arguments.
- d) Differentiate between structure and union.
- e) Give syntax and explain with example any four built in library functions for operations on string.

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

**[4×4=16]**

- a) Write a C program using structure to accept details of students such as rollno, name, percentage etc. and display all students who has percentage greater than 60.
- b) Write a C program using command line arguments to accept three numbers through command line and find maximum number out of that.
- 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.
  - iii) Find length of the string.
- e) Write a C program to compute addition of two matrices.



Total No. of Questions : 5]

SEAT No. :

**P1837**

**[5134]-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 following addressing modes of pentium processor
  - i) Immediate
  - ii) Direct
- b) Explain Half adder circuit.
- c) What is PCI and name its command.
- d) Briefly explain Block Diagram of I/O interface.
- e) Explain concept of parallel processing.

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

**[2 × 8 = 16]**

- a) Briefly explain flip - flops.
- 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 subtractor with example.
- b) Explain Digital logic gates.
- c) What are interrupts and explain its two type.
- d) Compare RISC and CISC.
- e) Explain decimal to BCD encoder.

**P.T.O.**

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

**[4 × 4 = 16]**

- a) Explain 3 bit Asynchronous Up - Down counter.
- b) What is RISC pipelining.
- c) Explain ISA in detail.
- d) Briefly explain shift Registers.
- e) What is MUX explain with 4 : 1 MUX logic diagram.

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

**[2 × 8 = 16]**

- a) Briefly explain combinational and sequential circuits.
- b) Briefly explain counters (Ripple and synchronous counters)
- c) Briefly explain intel processor architectures.

**x x x**

Total No. of Questions : 5]

SEAT No. :

**P1838**

**[5134]-13**

[Total No. of Pages :3

**M.C.A.-I (Under Science Faculty)**  
**CS-103: Mathematical Foundation**  
**(2008 Pattern) (Semester - I)**

*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) *Use of non-programmable scientific calculator is allowed.*

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

**[16]**

- a) Let  $X = \{1, 2, 3, 4, 5, 6, 7, 8\}$  and  $U = \{1, 2, 5\}$ ,  $V = \{1, 3, 5, 6, 8\}$ . Verify DeMorgan's laws.
- b) If  $A$  is set of all integers and  $B$  is set of all even integers then find  
i)  $A \cup B$   
ii)  $A \cap B$   
iii)  $A - B$   
iv)  $(A \cup B) - (A \cap B)$
- c) Let  $f: \mathbb{R} \rightarrow \mathbb{R}$  and  $g: \mathbb{R} \rightarrow \mathbb{R}$  defined as  $f(x) = 2x^2 + 3$  and  $g(x) = \sin x$   
Find  
i)  $(f \circ g)(x)$   
ii)  $(g \circ f)(x)$
- d) Let  $f: \left( \frac{-\pi}{2}, \frac{\pi}{2} \right) \rightarrow \mathbb{R}$  defined as  $f(x) = \cos x$ . Is  $f$  one-one and onto function.  
Justify your answer.
- e) Let  $Z$  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.

**P.T.O.**



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

- a) Prove that if  $(a,m)=1=(b,m)$  then  $(ab,m)=1$
- b) If  $a,b,c$  are integers such that  $a|bc$  and  $(a,b)=1$  then prove that  $a|c$ .
- c) Show that, if  $n$  is odd then  $n^2-1$  is divisible by 8.
- d) Find values of  $x$  and  $y$  which satisfy  $243x + 198y = 9$ .
- e) Find g.c.d of  $f(x) = x^4 - x^3 - 2x + 2$  and  $g(x) = x^3 + x - 2$ .

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

- a) Compute  $\sigma^{-1}\tau\sigma$  where  $\sigma = (1, 3,5)(1,2)$ ,  $\tau = (1, 5, 7,9)$ ,  $\sigma$  &  $\tau$  are permutations.
- b) Show that group  $G$  is abelian if and only if  $(ab)^2 = a^2 b^2$  for all  $a,b \in G$ .
- c) Define following terms with proper example.
  - i) Semigroup
  - ii) Monoid
- d) Prove that,  $H=\{1,-1,i,-i\}$  is group under usual multiplication as binary operation.
- e) Let  $G = z'_7 = \{\bar{1}, \bar{2}, \bar{3}, \bar{4}, \bar{5}, \bar{6}\}$ . Find all the subgroups of  $G$

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

- a) By using truth table, show that statements  $\sim(p \vee q)$  and  $\sim p \wedge \sim q$  are logically equivalent.
- b) Show that  $(p \wedge q) \wedge \sim p$  is a contradiction.
- c) Prove that  $\sqrt{5}$  is irrational.
- d) Prove that there are infinitely many pairs of  $X$  and  $Y$  satisfying g.c.d.  $(x,y) = 5$  and  $x + y = 100$ .
- e) Define :
  - i) Group
  - ii) Permutation group.

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

a) Find the inverse of following matrix.A by adjoint method (If it exists)

$$A = \begin{bmatrix} 2 & 0 & 4 \\ 2 & 1 & 1 \\ -1 & 1 & -2 \end{bmatrix}$$

b) Solve the following system of linear equations by using Cramer's rule

$$\begin{aligned} x + 2y + 3z &= 14 \\ 2x - y + 5z &= 15 \\ 3x - 2y - 4z &= -13 \end{aligned}$$

c) Solve the following system of linear equations by Gauss-elimination method.

$$\begin{aligned} x + 2y - z - w &= 5 \\ 3x - 6y + 3z - 2w &= 20 \\ y - 5z + w &= 7 \\ x - 2z + 6w &= 8 \end{aligned}$$



Total No. of Questions :5]

SEAT No. :

P1839

[Total No. of Pages :4

[5134] - 14

M.C.A. -I (Under 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.

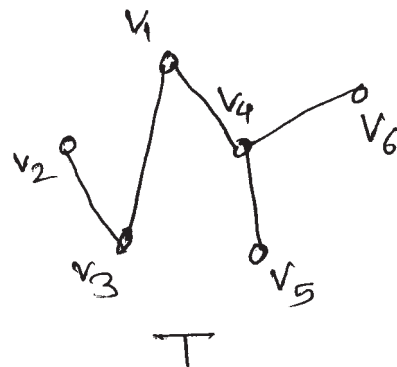
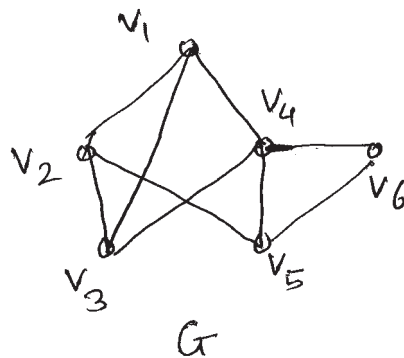
Q1) Attempt any four of the following:

[16]

- a) Find the smallest integer  $n$  such that  $K_n$  has at least 600 edges.
- b) Draw the following graphs:
  - i) A complete bipartite graph which is complete graph.
  - ii) An Eulerian graph which is not Hamiltonian.
- c) Draw the graph  $G$  having incidence matrix and find its adjacency matrix

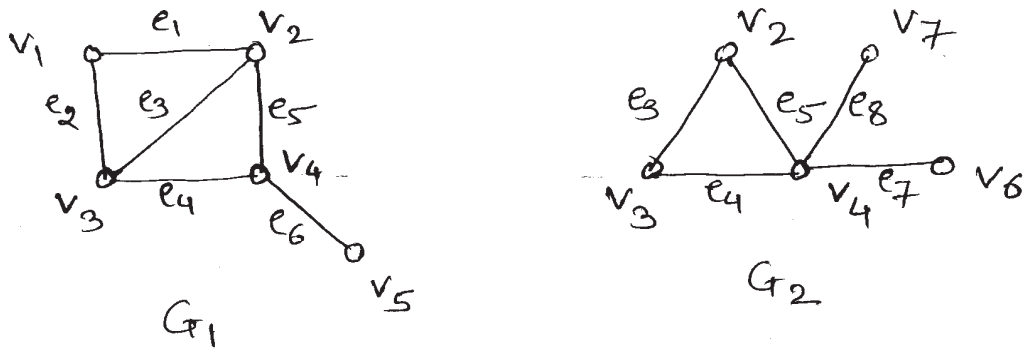
$$\begin{bmatrix} 1 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix}$$

- d) Find all the fundamental cycles in  $G$  with respect to its spanning tree  $T$ .



P.T.O.

e) For the following graphs  $G_1$  and  $G_2$ , find  $G_1 \cup G_2$  and  $G_1 \cap G_2$ .



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

[16]

a) Solve the following recurrence relation

$$a_n - 2a_{n-1} = 3 \cdot 2^n$$

b) Draw all self complementary graphs on 4 vertices.

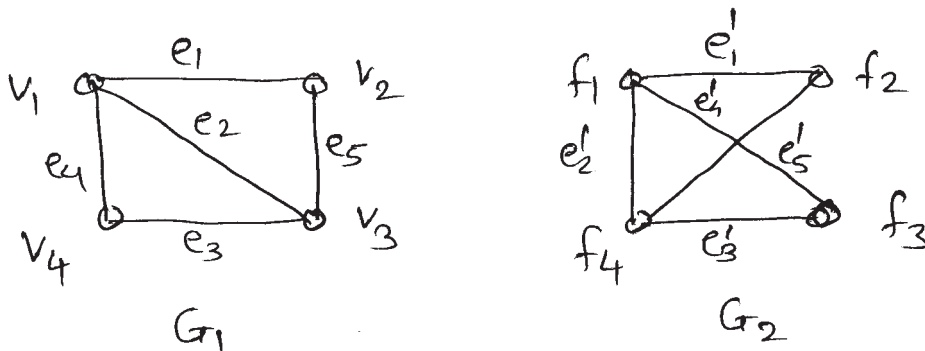
c) What is the diameter of Peterson's graph?

d) Define:

i) Symmetric digraph

ii) Complementary graph

e) Show that the following two graphs are isomorphic.



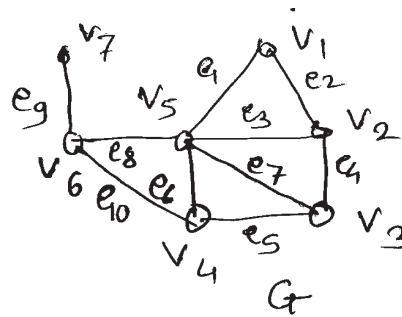
**Q3)** Attempt any four of the following:

[16]

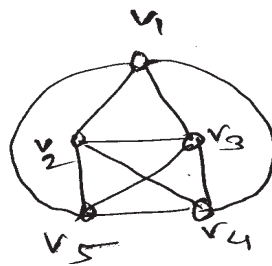
a) Prove that, the maximum number of edges in a simple graph with  $n$

vertices and  $k$  components is  $\frac{(n-k)(n-k+1)}{2}$

- b) Let  $G$  be the graph given below  $U = \{v_3, v_4\}$ ,  $F = \{e_1, e_4, e_7, e_{10}\}$ . Find vertex deleted subgraph  $G - U$  and edge deleted subgraph  $G - F$ .



- c) Show that, the edge  $e_i$  of a graph  $G$  is an isthmus if and only if  $e_i$  does not belong to any circuit in  $G$ .
- d) Using Fleury's algorithm find Eulerian trail in the following graph.



- e) Explain the travelling salesman problem.

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

**[16]**

- a) Draw the arborescence and express in polish notation

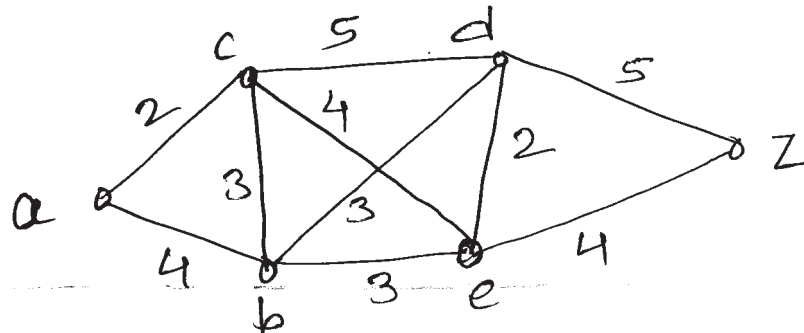
$$\frac{X+Y}{C - \frac{d^4}{5} + b} + e$$

- b) Write Kruskal's algorithm to find minimum weight spanning tree.
- c) If degree of every vertex of a connected graph  $G$  is even. Then prove that  $G$  is Eulerian.
- d) Solve the recurrence relation  $a_n = 2a_{n-1} + 3a_{n-2}$  with  $a_0 = 1, a_1 = 11$ .
- e) If  $T$  is a tree with  $n$  vertices, then prove that it has  $(n-1)$  edges.

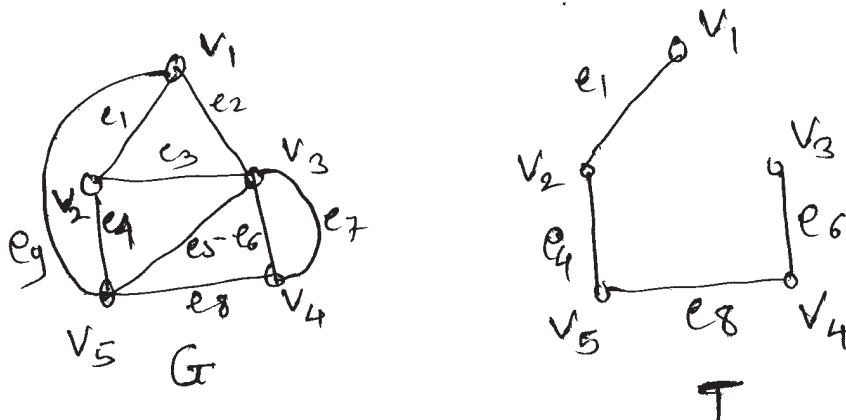
Q5) Attempt any two of the following:

[16]

- a) Use Dijkstra's algorithm on the following connected weighted graph to find the length of the shortest paths from the vertex 'a' to each of the other vertices.



- b) Consider the following graph G and its spanning tree T. List all fundamental circuits and cutsets for G respect to T.



- c) Write Prim's algorithm to find minimum spanning tree.

EEE

Total No. of Questions :5]

SEAT No. :

**P1840**

[Total No. of Pages :3

[5134] - 21

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

**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.*

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

**[4×4=16]**

- a) What is data structure? Explain with different types of it with example.
- b) Explain indexing with its types?
- c) Write 'C' function to create linked list using array.
- d) What is linked list? Explain its advantage?
- e) Define - stack. How it is implemented using linked list.

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

**[4×4=16]**

- a) What is graph? Explain its types ?
- b) How one can convert infix expression to postfix expressions(in detail).
- c) Write 'C' function for queue representation
  - i) delete Q()
  - ii) Isempty Q()
- d) Write 'C' function to delete element from linked list at any position.
- e) Explain
  - i) RR Rotation
  - ii) RL Rotation

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

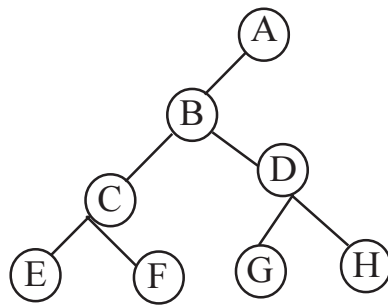
**Q3)** Attempt any four of the following:

**[4×4=16]**

- a) Convert following infix expression to postfix expression.

$$((A + B) * (C - D))$$

- b) Write short note on doubly linked list.
- c) Define circular queue? What is full circular queue?
- d) Fine preorder, postorder and inorder tree traversal for following binary tree.



- e) Sort following data using Heap sort.

26, 5, 77, 1, 61, 11, 59, 16.

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

**[4×4=16]**

- a) Write 'C' function to concatate two linked list.
- b) Write algorithm to add two polynomials.
- c) Construct BST for following elements. Show all iterations for it.

10, 20, 15, 6, 1, 13,

- d) Write short note on primary indexing.
- e) Write 'C' function for merge sort.



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

**[4×4=16]**

- a) Sort the following numbers using merge sort.  
9, 5, 6, 10, 15, 18, 13, 2, 25, 4.
- b) Write algorithm of binary search method for an array of integer.
- c) Write steps for DFS algorithm.
- d) What do you mean by sorting? Explain any one method of sorting in details.
- e) What is Bt tree? Explain it in details.

*EEE*

Total No. of Questions :5]

SEAT No. :

**P1841**

[Total No. of Pages :4

[5134] - 22

**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 where necessary.*
- 3) *Figures to the right indicate full marks.*

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

**[8×2=16]**

- a) What is symbol.
- b) Explain the term language.
- c) What is positive closure.
- d) Define term NFA.
- e) Define pumping Lemma.
- f) What is Turing machine.
- g) Explain regular grammer.
- h) What is useless symbols.

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

**[4×4=16]**

- a) Construct DFA Accepting the strings over alphabet {0, 1, 2} beginning with 0 ending with 2 and with '11' as a substring.
- b) Consider following CFG

$S \rightarrow AB \mid CA$

$B \rightarrow BC \mid AB$

$A \rightarrow a$

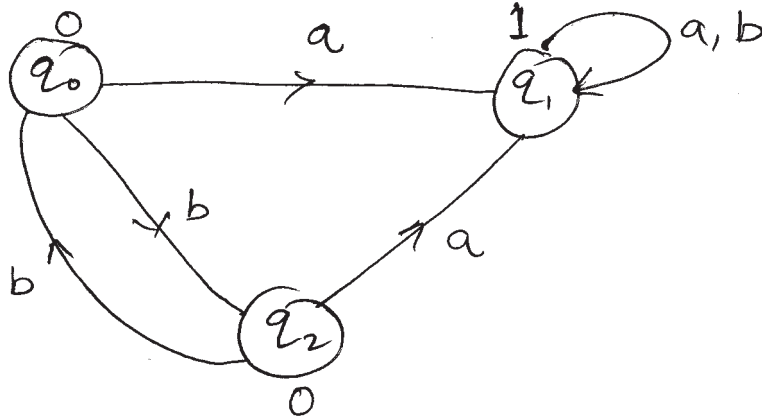
$C \rightarrow aB \mid b$

$D \rightarrow SS \mid d$

Eliminate useless symbols from grammer.

**P.T.O.**

- c) Prove that regular sets is closed under complement.
- 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)



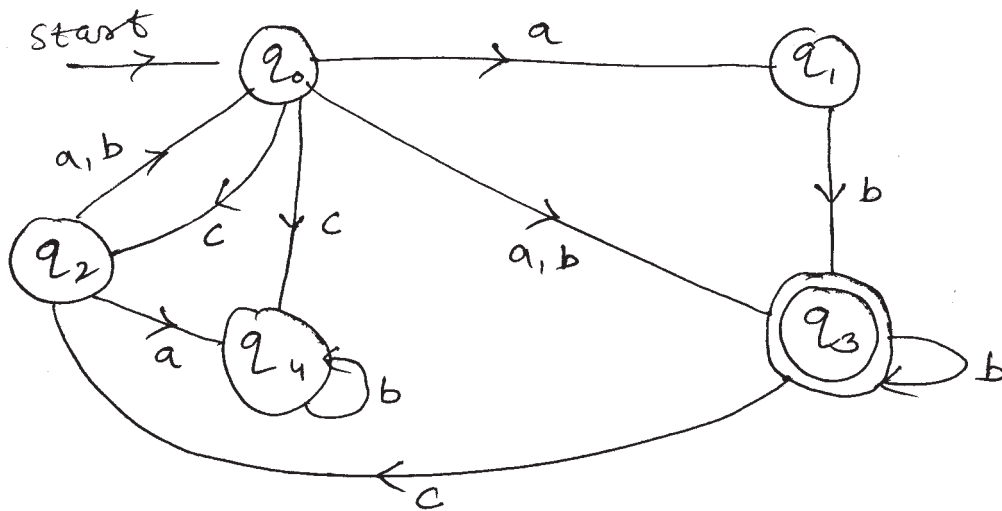
Q3) Attempt any four of the following:

[4×4=16]

- a) Construct CFG for language  $L = L_1^*$

$$L_1 = \{a^n bc^n \mid n \geq 1\}.$$

- b) Construct DFA equivalent to following NFA.



- c) Construct PDA equivalent to following CFG.

$$S \rightarrow aAb \mid aS$$

$$A \rightarrow Bb \mid a$$

$$B \rightarrow Sa \mid b$$

- d) Construct T.M. for  $0^*1^*$ .
- e) Construct grammer by eliminating  $\epsilon$  - productions.

$$S \rightarrow AB$$

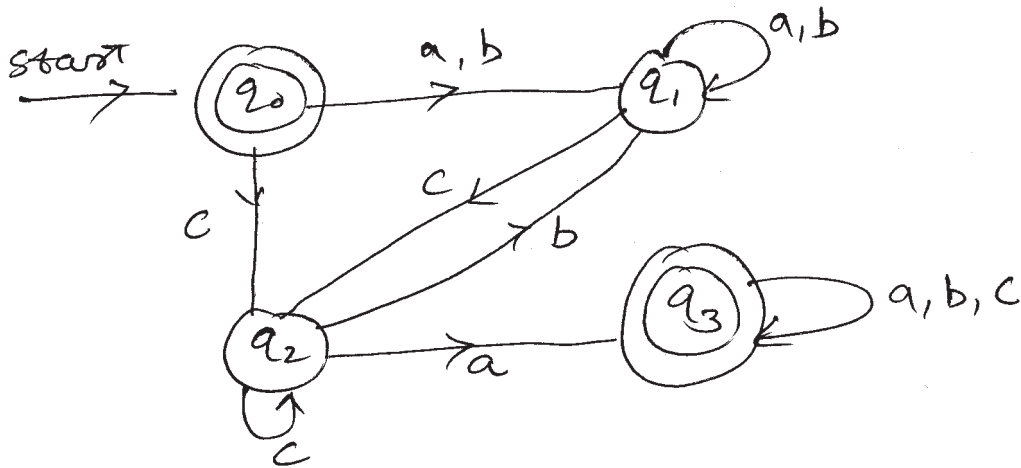
$$A \rightarrow SA \mid BB \mid bB$$

$$B \rightarrow b \mid aA \mid \epsilon$$

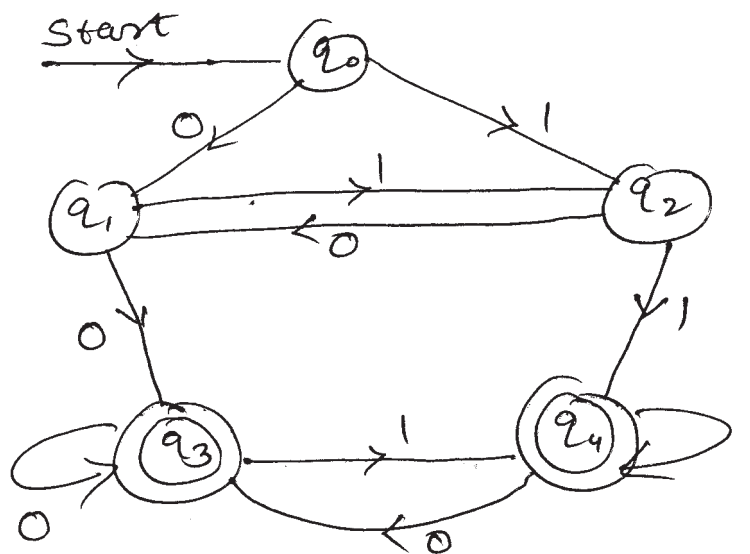
**Q4)** Attempt any four of the following:

**[4×4=16]**

- a) Construct PDA for  $L = \{0^m 1^n 2^n 0^m \mid m \geq 0, n \geq 1\}$ .
- b) Construct NFA for regular expression  $a + b * a$ .
- c) Show that  $L = \{ww \mid w \in \{a, b\}^*\}$  is not regular (using pumping lemma).
- d) Construct regular grammer for following DFA.



- e) Minimize the following DFA.



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

**[4×4=16]**

- a) Construct T.M. for  $L = \{a^m b^n \mid n \geq m \text{ and } m \geq 1\}$ .
- b) Convert following grammer into GNF.

$$S \rightarrow AB \mid B$$

$$A \rightarrow BS$$

$$B \rightarrow A1 \mid 1$$

- c) Construct DFA for  $L = L_1 \cap L_2$  over  $\{0, 1\}$  where  $L_1 =$  starting with 0 and ending with 11  $L_2 =$  having substring 010 in it.
- d) Convert following grammer into CNF

$$S \rightarrow 0A1 \mid 0BA$$

$$A \rightarrow S01 \mid 0 \mid B$$

$$B \rightarrow 1B \mid 1$$

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

*EEE*

Total No. of Questions :5]

SEAT No. :

**P1842**

[Total No. of Pages :3

[5134] - 23

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

**CS-203: OBJECT ORIENTED PROGRAMMING (C++ Programming)  
(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.*

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

**[8×2=16]**

- a) List functions of istream class. Explain any one.
- b) Give any two characteristics of member functions.
- c) Differentiate between pointer and reference.
- d) List the operators which can not be overloaded.
- e) Explain the following functions:
  - i) width ()
  - ii) fill ()
- f) Give the syntax for copy constructor with example.
- g) “A function returns a reference”. Justify the statement.
- h) Explain any two characteristics of object oriented programming.

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

**[4×4=16]**

- a) Give syntax for getline(). Explain it with example.
- b) Explain any four manipulators with example.
- c) Explain ‘this’ pointer with example.

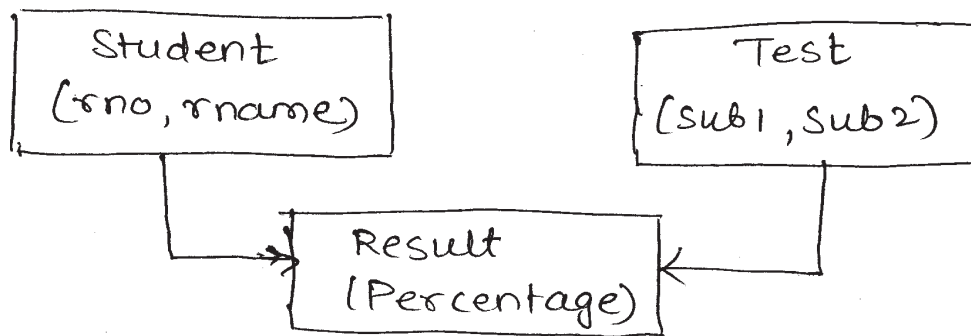
***P.T.O.***

- d) Explain the following functions.
- i) seekp()
  - ii) seekg()
  - iii) tellg()
  - iv) tellp()
- e) What is polymorphism? Explain with suitable example.

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

**[4×4=16]**

- a) Consider the following class hierarchy.



Write a program to define above inheritance relationship.

- b) Write a short note on iterator.
- c) How to overload binary operator using member function?
- d) How to rethrow an exception. Explain with example.
- e) What are different ways to open a file in C++.

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

**[4×4=16]**

- a) What is an abstract class? How to make a class abstract? What is the use of it?
- b) What are static data members? Explain with example.
- c) Write a C++ program for performing mathematical operations +, -, \* & /. For this accept (+) ve integer value from user. Raise an exception if inputed no. is (-)ve. Also for division operation if denominator is zero, then raise an appropriate exception.
- d) Write C++ program to find sum of two complex numbers. Use friend function.
- e) Differentiate between function overloading and overriding.

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

**[4×4=16]**

- a) Trace the output for the program given below and explain it.

```
int main (int & x, int &y)
{
    if (x < y)
        return x;
    else return y;
}
int main ()
{
    int a = 10, b = 20;
    min (a, b) = -1;
    cout << a << endl;
    cout << b;
}
```

- b) How template function can be overloaded.
- c) Write C++ program to read matrix of size  $m \times n$  Display the transpose of matrix.
- d) Explain runtime polymorphism. With example.
- e) How an object is created? How is memory allocation is done to an obj? What is its lifetime.

*EEE*



Total No. of Questions : 5]

SEAT No. :

**P1843**

**[5134]-24**

[Total No. of Pages : 5

**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) *Answers to the two sections should be written in separate answer books.*
- 2) *Answer any three questions from each section.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right side indicate full marks.*
- 5) *Use of Calculator is allowed.*
- 6) *Assume Suitable data if necessary.*

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

**[16]**

- a) What is specialization? Explain with example.
- b) List the users of DBMS.
- c) Explain the difference between Primary Key and Foreign Key.
- d) Which are two types of DML? Give example.
- e) What is deadlock? State any two prevention techniques of deadlock.
- f) What are the languages provided by DBMS?
- g) What is shared lock?
- h) Define Entity. Explain Weak Entity.

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

**[16]**

- a) Explain 2 phase Locking protocol.
- b) Define the terms:
  - i) DBMS
  - ii) Foreign key
  - iii) Attribute
  - iv) Roll back

**P.T.O.**

- c) What do you mean by Integrity constraint? Discuss types of constraints used in table definition.
- d) Write note on Thomas Write Rule.
- e) The following is the list representing the sequence of events in an interleaved execution of set transaction  $T_1, T_2, T_3$  assuming two phase locking protocol (X is exclusive, S is shared).

Time Transaction Code

$t_1$	$T_1$	Lock (A, S)
$t_2$	$T_2$	Lock (B, S)
$t_3$	$T_3$	Lock (A, X)
$t_4$	$T_1$	Lock (C, S)
$t_5$	$T_2$	Lock (A, X)
$t_6$	$T_3$	Lock (D, X)
$t_7$	$T_1$	DISP (A - C)
$t_8$	$T_2$	Lock (D, S)
$t_9$	$T_3$	Lock (C, X)
$t_{10}$	$T_1$	COMMIT
$t_{11}$	$T_2$	Lock (C, S)

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

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

- a) What do you mean by pattern matching? Discuss pattern matching operators in SQL.
- b) What is mapping cardinality? Explain with example.
- c) 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.  $F^+$ .
- d) What are advantages and disadvantages of DBMS over file system?
- e) Explain group by & order by clause with example.

Q4) Attempt the following:

[16]

- a) What is data model? State different data models.
- 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 'Dhoom3'.
  - iv) List the names of actors starting with character 'A'.
- c) What are the undesirable properties of Bad Database Design?
  - d) Consider the following non-serial schedule.

$T_1$	$T_2$
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  $\langle T_1, T_2 \rangle$ .

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

**[16]**

- a) What is transaction? What are its states explain in detail?
- 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) Find all the hospital in Pune city.
- iii) List the name of hospital to which Dr. Amit has visited on 10-12-02.

- d) The following is, list of events in an interleaved execution of set of transactions  $T_1, T_2, T_3$  with two phase locking protocol.

Time	Transaction	Code
$t_1$	$T_1$	Lock (A, X)
$t_2$	$T_2$	Lock (B, S)
$t_3$	$T_3$	Lock (A, S)
$t_4$	$T_1$	Lock (C, X)
$t_5$	$T_2$	Lock (D, X)
$t_6$	$T_1$	Lock (D, S)
$t_7$	$T_2$	Lock (C, S)
$t_8$	$T_3$	Lock (B, S)

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

- e) A reputed general hospital has decided to computerize their system. In the hospital many doctors are working. Personal information of doctors are maintained. The patients are admitted to the hospital into the room. They are treated by various doctors. Sometimes patients perform certain pathological tests which carried out into the labs. Using above database.
- Draw E-R Diagram for the information System Design.
  - Convert E-R diagram into Relational Database & 3NF.



Total No. of Questions :4]

SEAT No. :

**P1844**

[Total No. of Pages :4

[5134] - 31

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

**COMPUTER SCIENCE**

**CS - 301: Design and Analysis of Algorithms**

**(2008 Pattern) (Semester - III)**

*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.*
- 4) *Assume suitable data, if necessary.*

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

**[8×2=16]**

- a) Define P-class and NP-class.
- b) Define articulation point and bridge edge.
- c) State optimality principle. Give one difference between greedy method and dynamic programming.
- d) What are two constraints used in backtracking? Explain.
- e) Name two algorithms which uses divide and conquer strategies.
- f) 'Partial solution obtain during Kruskal's algorithm are also tree', justify true of false.
- g) What do you mean by branch and bound? Give an example of an application where this technique might be useful.
- h) What do you mean by best case time complexity of quick sort algorithm?

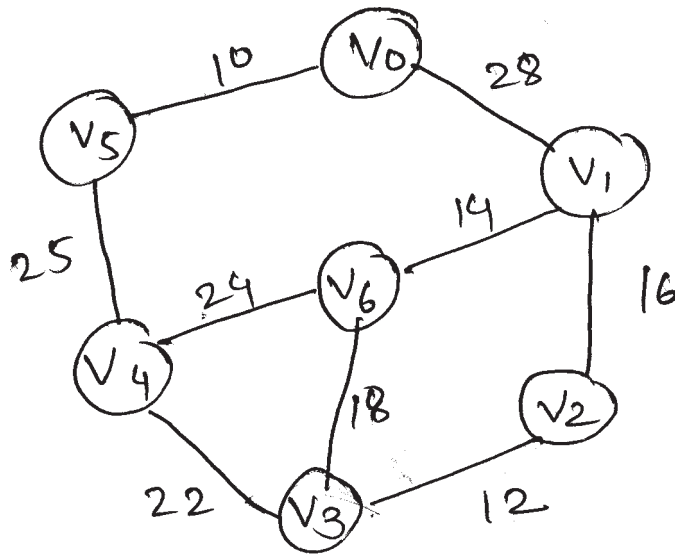
**Q2)** Attempt any four of the following:

**[4×5=20]**

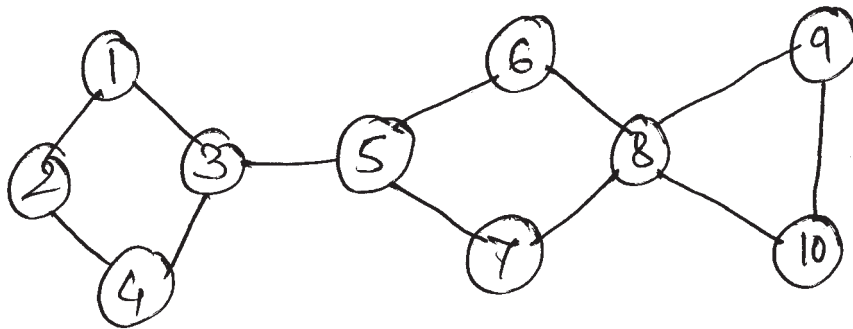
- a) Find an optimal binary merge pattern for 5 files whose lengths are (10, 5, 7, 20, 12) Also find weighted external path length.

**P.T.O.**

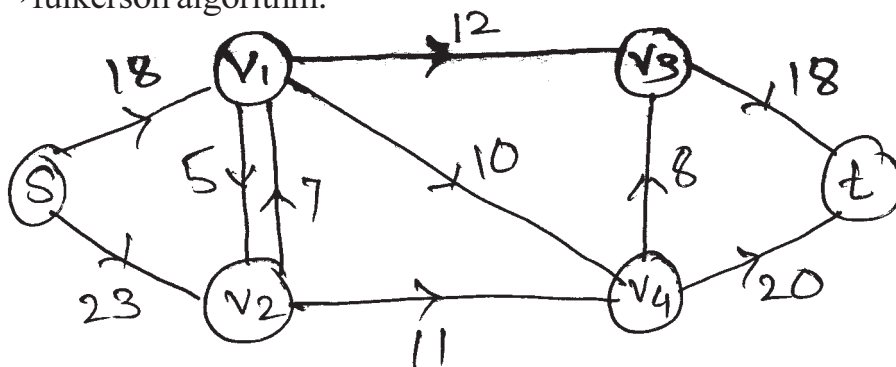
- b) Using Kruskal's algorithm find minimum cost spanning tree for following graph G



- c) What does it mean by articulation point? Write down the steps to find the articulation point and find the articulation point for the following graph.



- d) Find the maximum flow in the following network by applying ford-fulkerson algorithm.



- e) Sort the following elements using insertion sort algorithm by showing all passes. Also write complexity of insertion sort algorithm.  
10, 2, 35, 1, 15, 60

Q3) Attempt any four of the following:

[4×8=32]

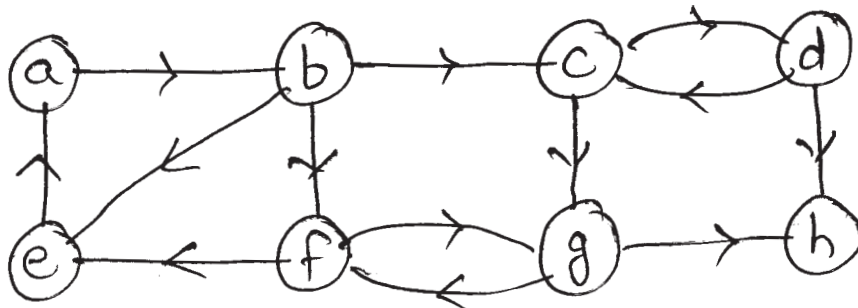
- a) Find optimal solution to the knapsack instance  $n=0$  and  $m = 15$ , by greedy method

$(p_1 \dots p_7) = (10, 5, 15, 7, 6, 8, 3)$

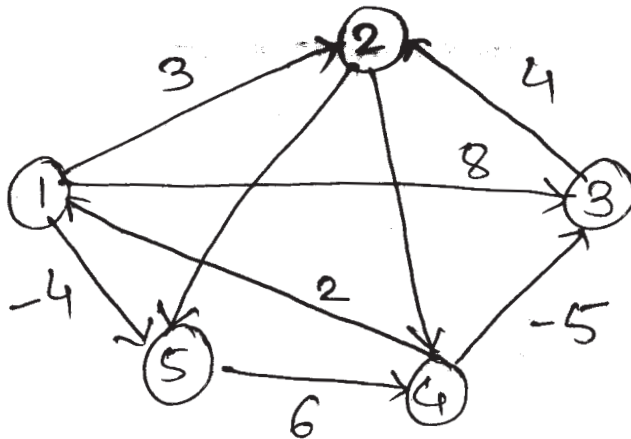
$(w_1 \dots w_7) = (2, 3, 5, 7, 1, 4, 1)$  by arranging the input in

- i) Non-increasing order of profit and calculate total profit
  - ii) Non-decreasing order of weight and calculate total profit.
- b) Find the strongly connected components of the following graph using the algorithm.

(starting vertex = C)



- c) Apply Floyd - warshall's algorithm on following graph.



- d) Derive the time complexity required by strassen's matrix multiplication. How the strassen's approach is different from ordinary matrix multiplication algorithm.
- e) Diagrammatically represent the eight queen's problem and give explicit & implicit constraints.



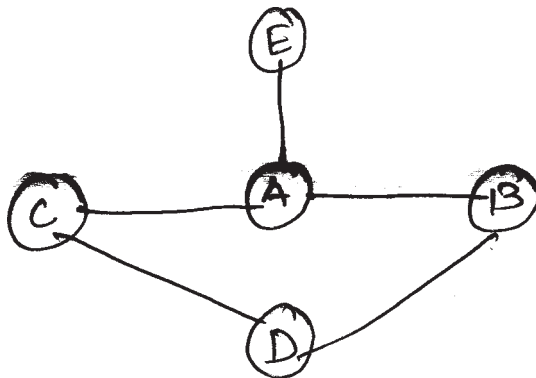
Q4) Attempt any three of the following:

[3×4=12]

- Write an insertion sort algorithm. Give run time complexity.
- Obtain Huffman's code for the message (m1.....m7) with relative frequencies  
(4, 5, 7, 8, 10, 12, 20)
- Explain p-class, np-class, np-hard and np-complete with example.
- Apply Floyd-warshall algorithm to find lengths of shortest paths from vertex u to vertex V for all u, v  $\in V(G)$ , Where adjacency matrix of G is

$$W = D^{(0)} \begin{bmatrix} 0 & 4 & 11 \\ 6 & 0 & 2 \\ 3 & \infty & 0 \end{bmatrix}$$

- Apply DFS tree for the following graph G.



Total No. of Questions : 5]

SEAT No. :

**P1845**

**[5134]-32**

[Total No. of Pages : 2

**M.C.A. - II (Under 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) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicates full marks.*

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

**[8 × 2 = 16]**

- a) Define:
  - i) Topology
  - ii) Protocol
- b) What is bit stuffing?
- c) Give names of the layers which performs following tasks in OSI model
  - i) Process to process delivery of entire message.
  - ii) Concerns with syntax and semantics of information exchanged between two systems.
- d) What is hamming distance? How we can increase hamming distance between two messages.
- e) Which network topologies are suitable for LAN?
- f) List different service primitives.
- g) An IP packet arrives with first 8 bits as 0100 0010. The receiver discards the packet. Why?
- h) What is switched Ethernet?

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

**[4 × 4 = 16]**

- a) What are the factors affecting the performance of the network?
- b) Explain ARQ protocol.
- c) Explain Pure and slotted ALOHA.
- d) Explain Manchester and differential Manchester encoding technique with example.
- e) What are different transmission modes?

**P.T.O.**

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

- a) What is pipelining? Explain Go-back-n and selective repeat methods.
- b) Explain factors affecting protocol efficiency.
- c) What are design issues of layers?
- d) Explain Shannon's capacity formula. If we have a channel with 4 kHz bandwidth. The SNR for this channel is 64. Find bit rate and signal level.
- e) Explain any four fields of IPV6 frame format.

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

- a) What is congestion? Give any two congestion prevention policies with limitations.
- b) What is protocol? What are key elements of protocol?
- c) What is control access? Explain reservation, polling and token passing.
- d) What is full - duplex Ethernet? Why there is no need for CSMA/CD on full duplex.
- e) Construct 7-bit hamming code for data bit = (0101). Consider even parity.

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

- a) Compare adaptive and non-adaptive algorithm.
- b) Construct CRC message for  $m=101001100101$  and the generator polynomial is  $x^5+x^2+1$ .
- c) Differentiate between physical, logical and port addresses.
- d) Explain improvement in gigabyte Ethernet over fast Ethernet.
- e) What are the functions of presentation layer and session layer?

**x      x      x**

Total No. of Questions : 5]

SEAT No. :

**P1846**

**[5134]-33**

[Total No. of Pages : 3

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

**COMPUTER SCIENCE**

**CS- 303 : Introduction to System Programming & Operating  
System Concepts**

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

*Time : 3 Hours]*

*[Max. Marks :80*

*Instructions to the candidates:*

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

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

**[8 × 2 = 16]**

- a) What is virtual memory concept?
- b) What is assembler?
- c) What is system call?
- d) What is CPU scheduler?
- e) Define real time operating system.
- f) Explain linked file allocation method in file system.
- g) Explain multiprocessor system.
- h) Define semaphares.

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

**[4 × 4 = 16]**

- a) Explain what is process scheduling ? Discuss types of schedulars.
- b) What is deadlock? Explain different conditions which may cause deadlock in the system.
- c) Explain different strategies used to implement dynamic storage allocation.
- d) Consider the following reference string from a word program.  
112, 230, 335, 450, 102, 220, 520, 105, 225, 345, 455, 525.  
The page size is of 100 words. Assume the frames are initially empty.  
calculate the no.of page faults using FIFO page replacement algorithm  
when 3 frames are available & when 4 frames are available. Show Belady's  
anomoly in the example.
- e) Write a short note on :- PCB

**P.T.O.**

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

**[4×4=16]**

- a) Define following terms:-
- i) Buffering
  - ii) Caching
  - iii) Spooling
  - iv) Device driver
- b) What is pthread and Java thread?
- c) Let head of a moving disk with 200 tracks numbered from 0 to 199 is currently at 80. It has served the previous request at 70. Consider the queue of request as follows:-
- 100, 40, 25, 60, 120, 90, 110.
- Compute the total head movements using SSTF and Look algorithms.
- d) Explain different file attributes.
- e) Explain optimal page replacement algorithm.

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

**[4×4=16]**

- a) Explain Contiguous memory allocation method.
- b) For the following snapshot of the system, Compute the average waiting time using
- i) Non-preemptive SJF
  - ii) SRTF

process	Arrival-Time	Burst-time
p1	0	7
p2	2	4
p3	4	1
p4	5	4

- c) Explain the following terms:-
- i) Turnaround time
  - ii) Waiting time
  - iii) Response time
  - iv) Throughput
- d) Write a short note on Demand paging

e) Consider following segment table

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical addresses for the following logical addresses.

- i) 0,430      ii) 1,10      iii) 2,500      iv) 3,400

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

**[4 × 4 = 16]**

a) Consider the following snapshot of a system.

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

Answer the following questions using Banker's Algorithm.

- What is the content of the matrix Need?
  - Is the system in a safe state?
  - If a request from process 'pi' arrives for (0,4,2,0) can the request be granted immediately?
- Explain different deadlock recovery technique.
  - Explain dining philosopher's Problem.
  - Write a note on segmentation.
  - Write a note on file operations.



Total No. of Questions : 5]

SEAT No :

**P1847**

**[5134]-34**

[Total No. of Pages :3

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

**CS - 305: EVENT DRIVEN PROGRAMMING  
( 2008 Pattern) ( Semester - III) (Win 32 SDK)**

*Time : 3 Hours]*

*[Max. Marks :80*

*Instructions to the candidates:*

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

**Q1) Case Study**

**[1×12=12]**

A college database stores information about students such as stud\_Id, s\_name, class, department, marks etc. in a data store named 'Stud'. Write a menu driven SDK program which having following facilities

- Display class wise student list
- List all students, who are in First class.
- Insert new student.

[Make use of ODBC API (Win Main not needed)]

**Q2) Write program statements using Win 32 APIs for any four of the following:**

**[4×5=20]**

(Win Main not required)

- a) Create an animation window. Use timer control such that a triangle changes its colour after one second.
- b) The application display a static text onto the screen. By passing "HOME" key the cursor can be move to the beginning of the text.
- c) Display a "Wel-come" message at the point in client area, when the mouse is double clicked and erased when that window is minimized.
- d) The window caption bar shows "Focus" when window gets the input Focus and shows "Lost Focus" when window loses the Focus.

**P.T.O.**

- e) Display two push buttons 'Up' and 'Down' when 'Up' is pressed windows size increases, while it decreases if 'Down' is pressed.

**Q3) Answer in brief any Eight** **[8×2=16]**

- a) Give any Four primitives of Graphics Device Interface.
- b) Give Advantages of D.L.L.
- c) Why Virtual-keys are used?
- d) Give a sequence of messages generated when user presses shift key followed by 'B' key.
- e) Why windows is registered in Win Main?
- f) What is difference between sending message and posting a message?
- g) What is the size of PSTR and LPSTR data types in 32 bit version of window? Why?
- h) What are the modes of multitasking?
- i) What are the parameters of WM\_MENUSELECT message?
- j) WM\_PAINT message is fired under which situations?

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

- a) Program can call WinProc indirectly.
- b) The effect of HideCaret is additive.
- c) PeekMessage Function returns false when WM\_QUIT message is received.
- d) System Menu cannot be modified.
- e) It is preferable to process SB\_THUMBPOSITION message that SB\_THUMBTRACK message.
- f) A child Window controls are used for simple I/O tasks.
- g) To display the bitmap in program, we must select the bitmap into the memory device context.
- h) hSource is a parameter related to LoadBitmap() API function.



**Q5) Attempt any four:**

**[4×5=20]**

- a) Discuss any two Synchronization objects giving API function associated with them.
- b) How to create persistent storage for threads, which is unique to each thread?
- c) Explain status window messages.
- d) Explain the structure of D.I.B. files.
- e) Write differences between DDE and DDEML.



Total No. of Questions :5]

SEAT No. :

**P1848**

[Total No. of Pages :4

[5134] - 41

**M.C.A. -II ( 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) *Figures to the right indicate full marks.*
- 2) *Neat diagrams must be drawn whenever necessary.*
- 3) *All questions are compulsory.*
- 4) *All questions carry equal marks.*
- 5) *Assume suitable data, if necessary.*

**Q1)** Attempt all:

**[8×2=16]**

- a) List any two services provided by Linux operating system.
- b) What is a shell? What are the different types of shell?
- c) What is Asynchronous write operation?
- d) What is Uarea? Name any two fields in it.
- e) What is real UserID and Effective UserID.
- f) What is “death of child” signal?
- g) What is the use of stime () system call.
- h) Define fair share scheduler.

**Q2)** Justify True /False: Attempt any four of the following:

**[4×4=16]**

- a) As soon as process executes exit system call to terminate its execution, the slot allocated for process table is freed immediately.
- b) Context switching is done only when process changes its mode of execution i.e. user to kernel mode or kernel to user mode.
- c) Once the execution of a process starts its size cannot be changed dynamically.
- d) A buffer can be on the hash queue as well as the free list simultaneously.
- e) The page stealer is a kernel process that swaps in memory pages that are no longer part of the working set of a process.

**P.T.O.**

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

**[4×4=16]**

- a) What is the difference between interrupt and exception.
- b) Write a shell script to accept length and breadth of a rectangle and calculate area and perimeter of the rectangle.
- c) Explain “Different kernel data structure in Unix when a file is open”.
- d) Explain different scenario for the retrieval of buffer.
- e) What is superblock? Explain its fields in detail.

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

**[4×4=16]**

- a) Write a C program that changes its root to a particular directory and then display the content of that directory.
- b) Explain the behaviour of the following ‘C’ program

```
char string [ ] = “hello”;
main ()
{
    char buf [1024];
    char * CP1, *CP2;
    int fds[2]
        CP1 = string;
        CP2 = buf;
    while (*CP1)
        *CP2 ++ = * CP1 ++;
    pipe (fds);
    for (; ;)
    {
        write (fds [1], buf, 6);
        read (fds [0], buf, 6);
    }
}
```

- c) Explain the behaviour of the following C program.

```
# include <fcntl.h>
char string [ ] = "hello";
main (argc, argv)
{
    int argc ;
    char * argv [ ];
    int fd ;
    char buf [256];
    mknod ("fifo", 010777, 0);
    if (argc == 2)
        fd = open ("fifo", 0_WRONLY);
    else
        fd = open ("fifo", 0_RDONLY);
    for (; ;)
        if (argc == 2)
            write (fd, string, 6);
        else
            read (fd, buf, 6);
}
```

- d) Give output of the following

```
main ()
{
    int i = 0;
    for (i = 0 ; i < 2 ; i ++ )
    {
        fork ();
        printf ("\n I am a process at i = % d", i);
    }
    if (fork () == 0)
        printf ("\n This is a child process ...");
}
```

e) Give output

```
main ()
{
    int child;
    if ((child = fork ()) == 0)
    {
        printf ("child PID %d \n", getpid());
        pause ();
    }
    printf ("child PID %d \n", child);
    exit (child);
}
```

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

**[4×4=16]**

- a) If a process wants to access byte offset of 3,50,000 in a file, find block number and byte offset in the block. Show direct /indirect block of this offset allocated in inode with the help of a diagram.
- b) What is a pipe file? Explain two types of pipe file.
- c) Explain the process state diagram explaining different states of a process.
- d) What is principle of locality? Also explain what is working set of a process.
- e) Explain "System Boot & Init process".

*EEE*

Total No. of Questions :5]

SEAT No. :

**P1849**

[Total No. of Pages :3

[5134] - 42

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

**CS-402: ADVANCED NETWORKING & MOBILE COMPUTING**

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

*Time : 3 Hours]*

*[Max. Marks :80*

*Instructions to the candidates:*

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

**Q1) Attempt all:**

**[8×2=16]**

- a) What is HLR & VLR?
- b) Define HUB & Repeater.
- c) What is polling?
- d) Name the three types of stations based on their mobility defined in IEEE 802.11.
- e) What is FQDN?
- f) Define socket Address.
- g) What is PIN & PUK of mobile station.
- h) What is tunneling & encapsulation in mobile IP.

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

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

**[4×4=16]**

- a) Explain the problems occurs with reverse tunneling.
- b) Write a short note on OSS of GSM.
- c) Explain the services provided by SCTP.
- d) Write a short note on Bluetooth layer.
- e) Explain WAP architecture.

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

**[4×4=16]**

- a) Write a note on Agent discovery in mobile IP.
- b) Explain transparent bridge.
- c) Write a short note on localization & calling in GSM.
- d) What are the services of user agent in SMTP.
- e) Explain push architecture.

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

**[4×4=16]**

- a) Write a short note on signal propagation effect.
- b) Explain POP3 protocol.
- c) Define the following related to TCP.
  - i) Byte Number
  - ii) Sequence number
  - iii) Acknowledgement number
  - iv) Port number
- d) Explain TDMA & CDMA mechanism.
- e) Explain how mobile node is registered with home agent after getting COA.

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

**[4×4=16]**

- a) Explain connection establishment phase of TCP.
- b) Explain three modes of operation used in TELNET.
- c) Explain in brief DHSS.
- d) Write a short note on Half close mechanism of TCP.
- e) Define the following:
  - i) IMEI
  - ii) Piconet
  - iii) BTS
  - iv) Foreign Network

*EEE*



Total No. of Questions :4]

SEAT No. :

**P1850**

[Total No. of Pages :4

[5134] - 43

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

**CS-403: DISTRIBUTED DATABASE SYSTEMS**

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

*Time : 3 Hours]*

*[Max. Marks :80*

*Instructions to the candidates:*

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

**Q1)** Attempt the following:

**[8×2=16]**

- a) Define the process of localization of distributed data involved in a query?
- b) List the goals of transaction management?
- c) Top-down design approach is suitable when a distributed database system is being designed from scratch. Comment.
- d) Which are the restrictions applied to reduce the size of search space?
- e) Define:
  - i) Reliability
  - ii) Availability
- f) What are the properties of time stamp?
- g) Replication of data in DDBMS reduces reliability of distributed data. Justify?
- h) State the objectives of query processing.

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

**Q2)** Attempt any four:

**[4×5=20]**

- a) Providing transparency is necessary in DDBMS. Comment?
- b) Write a short note: “Distributed Catalog Management”.
- c) Explain the problem of allocation of fragments?
- d) Explain the variations of 2PC. Which have been proposed to improve its performance?
- e) Describe three components of query optimizer?

**Q3)** Attempt any four:

**[4×6=24]**

- a) Consider data items x and y with the following read and write time stamps.

$$\text{RTS (x)} = 20 \quad \text{WTS (x)} = 20$$

$$\text{RTS (y)} = 32 \quad \text{WTS (y)} = 24$$

If the following sequence of requests is received what will be the behavior of basic time ordering algorithm?

$\langle \text{R(x), 22} \rangle, \langle \text{W(x), 22} \rangle, \langle \text{R(x), 20} \rangle, \langle \text{W(x), 15} \rangle,$

$\langle \text{R(y), 24} \rangle, \langle \text{W(x), 15} \rangle, \langle \text{W(x), 20} \rangle, \langle \text{W(y), 20} \rangle$

The request is of the form  $\langle \text{operation, time stamp of transaction which has requested the operation} \rangle$ .

- b) Give the query graph for the following query, select ename, pname from emp, asg, proj where asg. duration <36 and emp.eno = asg. eno and emp. title = “manager” and asg. pno = proj.pno?
- c) Let  $Q = \{a_1, a_2, a_3\}$  be the set of queries,  $A = \{A_1, A_2, A_3, A_4\}$  be the set of attributes and  $S = \{S_1, S_2\}$  be the set of sites. The matrix ‘a’ given below, describes the attribute usage values and matrix ‘b’ gives application access frequencies.

Assume that  $ref_i(a_k) = 1$  for all  $a_k$  and  $S_1$  and  $A_3$  is the key attribute. Apply clustering algorithm and partitioning algorithm (if required) and obtain vertical partitions of the relation

$A_1$	$A_2$	$A_3$	$A_4$	$S_1$	$S_2$
$a_1$	1	1	0	$a_1$	10
$a_2$	0	1	0	$a_2$	20
$a_3$	0	0	1	$a_3$	35

Matrix 'a'
Matrix 'b'

d) Draw an operator tree for the following query.

Select emp.ename from emp, dept where emp.sex = "male" and emp.age > 40 and dept. budget > 300000 and emp.dno = dept. dno;

The dept relation is fragmented horizontally as

dept 1 = 6 budget < 300000 (dept),

dept 2 = 6 budget >= 300000 (dept)

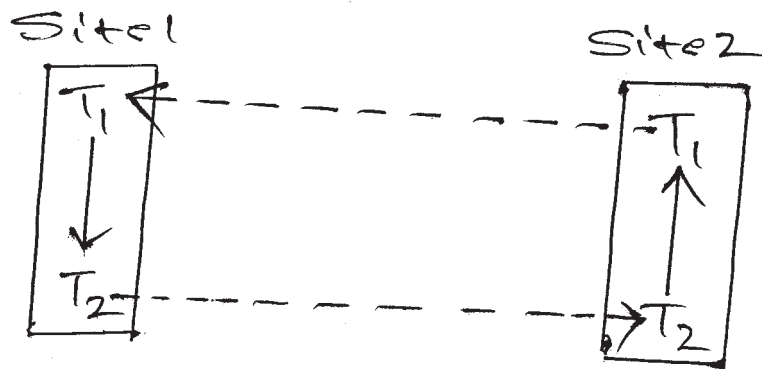
emp relation is fragmented using derived horizontal fragmentation as

emp 1 = emp  $\times$  dept 1 and

emp 2 = emp  $\times$  dept 2

Conver operator tree to generic tree and then reduce it.

e) Consider the following DWFG given below:



Detect deadlock, if any using the distributed deadlock detection algorithm.

**Q4)** Attempt any four:

**[4×5=20]**

- a) Write a short note on: “Network partitioning”.
- b) Explain Termination and recovery protocol for 2 PC?
- c) How INGRES algorithm works?
- d) Write note: “Work Flows”?
- e) Explain hill - climbing method of query optimization?

*EEE*

Total No. of Questions : 4]

SEAT No. :

**P1851**

**[5134]-44**

[Total No. of Pages : 3

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

**CS - 405 : OBJECT ORIENTED SOFTWARE ENGINEERING  
(2008 Pattern) (Semester - IV) (New)**

*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 the following:

**[8 × 2 = 16]**

- a) What is meant by stereotypes?
- b) List the elements which commonly contains in activity diagram.
- c) Specify principles of modeling.
- d) Briefly explain Inception Concept.
- e) Which are components in deployment diagram.
- f) What do you mean by recursive aggregation. With example.
- g) Discuss importance of system design.
- h) Explain SDLC in brief.

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

**[4 × 8 = 32]**

- a) A system is to be designed for a departmental store dealing in consumer items. Members enjoy facility and can purchase items as and when he or she needs them. Store has several counters and one can get almost all kinds of consumer items after visiting these counters.

He becomes member by paying initial membership amount and gets a credit card. This has to pay his outstanding on quarterly basis. System sends reminders to the members. Defaulters are not allowed to purchase items, until the default amount is cleared.

Consider different aspects of above problem and show following diagrams.

- i) Class diagram.
- ii) State transition diagram.

**P.T.O.**

- b) An automated system is to be designed for ATM banking. A bank can have multiple customers and all of them issued ATM cards. Customers swap the cards which is verified by ATM. Customer selects kinds of a transaction. If transaction is to withdraw amount, it verifies the limit and minimum balance is required. It also prints various transaction reports, account balance statement.

Draw following diagrams:

- i) Use case diagram.
  - ii) Sequence diagram.
- c) i) Prepare object diagram showing atleast 6 relationships among following object classes. Show multiplicity and add atleast 65 attributes. File system, file directory, ASCII file, Disk, Ordinary file, drive, track.
- ii) Draw activity diagram for considering different scenarios for icecream preparation machine, where you get different flavours.
- d) i) Draw collaboration diagram for E-product purchasing.
- ii) Draw deployment diagram for online shopping for checking products.
- c) Draw class diagram and use case diagram for library management system.

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

**[4 × 4 = 16]**

- a) Write a note on generic components of object oriented design model.
- b) Discuss UP and RUP in detail.
- c) Explain inter class test case design with example.
- d) Explain use of include and extends relationship in detail and also discuss components of use case model.
- e) Automatic water level control system, which is used for controlling the water flow. Identify different states and draw state transition diagram.

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

**[4 × 4 = 16]**

- a) Write a short note on object oriented Testing.
- b) Explain task management component.
- c) Write a note on aggregation and generalization.
- d) Discuss different building blocks of UML.
- e) What is model and domain model and discuss importance of modeling.



Total No. of Questions :5]

SEAT No. :

[Total No. of Pages :2

**P1852**

**[5134] - 51**

**M.C.A.**

**SCIENCE FACULTY**

**CS - 501: Cryptography and Network Security**

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

*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) Explain the IP security scenario.
- b) What are source routing attacks?
- c) Explain phishing with appropriate example.
- d) Describe the key transformation process in DES.
- e) Why random challenge is used in password authentication?
- f) Give strengths of IPSee.
- g) What are the contents of digital certificate?
- h) “Interception causes loss of message confidentiality”. Comment.

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

**[4×4=16]**

- a) Explain Electronic code Book (EBC) and Cipher Block Chaining (CBC) modes in detail.
- b) Describe the working of function ‘F’ in blowfish algorithm.
- c) List and explain the steps for digital certificate creation.
- d) Explain the different contents of MIME content type.
- e) What is firewall? Discuss characteristics of firewall.

**P.T.O.**



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

- a) Explain in detail - “man-in-the-middle” attack.
- b) List and explain three primary steps in kerberos protocol.
- c) Comment: “SSL is located between application & transport layer”.
- d) Write short note on - PGP operations.
- e) How encapsulating security payload (ESP) protocol works in transport mode?

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

- a) Describe broad level steps in DES.
- b) Explain in detail one MD5 operation with diagram.
- c) What is cross-verification? How cross verification of CA's is done?
- d) Explain SET process.
- e) What are packet filters? Give its advantages and disadvantages.

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

- a) Consider the values  $n = 5$  and  $g = 13$ . Let  $x = 3$  and  $y = 4$ . Apply Diffie Hellman algorithm and find out keys  $K_1$  &  $K_2$ .
- b) Consider the plain text “6”. Let  $P = 3$ ,  $Q = 11$ . Construct the cipher text using RSA algorithm.
- c) Using Hill cipher, construct the cipher text. Where the matrix is -

$$\begin{bmatrix} 6 & 24 & 1 \\ 13 & 16 & 10 \\ 20 & 17 & 15 \end{bmatrix} \text{ and the plain text is - “DOG”}.$$

- d) Apply play fair to construct cipher text for the following plain text = “COMPUTER DEPT”  
where keyword = “ADMIN SECTION”.
- e) Apply simple columnar transposition technique with multiple rounds to find cipher text where-  
Plain text = “all the best for exam”  
number of columns = 6  
number of rounds = 2  
and the column order = 3, 5, 2, 1, 6, 4.



Total No. of Questions : 5]

SEAT No :

**P1853**

**[5134]-52**

[Total No. of Pages :2

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

**CS - 502:Internet Programming Using PHP  
( 2008 Pattern) (New Syllabus) (Semester-V)**

*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.*

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

**[8×2=16]**

- a) What is type juggling in php?
- b) How to compare values and datatypes of two variables in php?
- c) What are the environment variables of php?
- d) How to send output to the browser?
- e) List the applications of JSON.
- f) How to find parent class and its properties as well as methods?
- g) What is XML? State the features of XML.
- h) How an associative array is different from indexed array?

**Q2)** Attempt any four:

**[4×4=16]**

- a) Write note on CSS.
- b) List the usage of XML.
- c) Explain the XML DOM, and how documents are managed with it.
- d) Write note on garbage collection in php.
- e) State the differences between print\_r and var\_dump

**P.T.O.**

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

- a) Write a php script to accept two strings and check whether second string is reverse of first or not using stack.
- b) Write a php script to accept an extension and display all files with the same extension.
- c) Write a php program to accept account details on first page, transaction details on second page and display combined details on third page.
- d) Write a php script to copy odd elements to odd array and even elements to even array from the existing array.
- e) Write a php script to accept 3 numbers and find maximum of them using sticky form.

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

- a) Write a php script to accept two filenames and append second file to first file.
- b) Write note on self processing form.
- c) What is flock? Explain different operations on flock.
- d) Write note on cookie and session, also explain how to combine with suitable example.
- e) Explain environment variables in php.

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

- a) Write note on sending email using php with suitable example.
- b) Explain any five builtin array sorting functions.
- c) Write note on variable number of parameters function.
- d) Explain how to get JSON response into a variable from a script.
- e) Write any four builtin constructs to handle directory with example in php.



Total No. of Questions : 5]

SEAT No. :

**P1854**

**[5134]-53**

[Total No. of Pages : 2

**M.C.A -III(Science Faculty)**  
**COMPUTER SCIENCE**  
**CS-503: DESIGN PATTERN**  
**(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 the following:

**[16]**

- a) What design issue is addressed by single ton design pattern?
- b) What is the intent of command design pattern?
- c) What are dis-advantages of lay cred architectural pattern?
- d) Define “Idioms”.
- e) What are module base structure?
- f) state collaboration of strategy design pattern.
- g) “Idioms provide a vechicle for communication between programming languages” Justify.
- h) Describe pattern as mental Block.

**Q2)** Attempt the following (Any four)

**[16]**

- a) Describe how to use design pattern.
- b) What is difference between pipes and filters architectural pattern?  
Discuss disadvantages of pipe and filter architectural pattern.
- c) Explain the steps to implement model view controller architectural pattern.
- d) What are benifits and liabilities of abstract factory design pattern?
- e) Explain how the catalog of design pattern is organized?

**P.T.O.**

**Q3)** Attempt the following (Any four): **[16]**

- a) Explain how and when to use prototype design pattern.
- b) State motivation and applicability of Abstract factory design pattern.
- c) Explain structure, participants and Implementation of singleton design pattern.
- d) What is difference between Broker and Black board design pattern?
- e) What is a pattern? Explain pattern categories.

**Q4)** Attempt the following (Any four): **[16]**

- a) Give structure and participant of a adapter. Design pattern.
- b) Explain issue to be consider while implementing decorator design pattern.
- c) Explain How and when to use adopter design pattern.
- d) What is difference between creational and structural Design pattern.
- e) Discuss the intent and implementation issue of strategy design pattern.

**Q5)** Attempt the following (Any four): **[16]**

- a) Explain structure and collabration of a command design pattern.
- b) Explain Proxy design pattern with the help of structure and participants.
- c) What are benifits and liabilities of observer design pattern?
- d) Explain counted pointer Idioms.
- e) How Indented control flow style guide Idiom?



Total No. of Questions : 5]

SEAT No. :

**P1855**

**[5134]-54**

[Total No. of Pages : 2

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

**COMPUTER SCIENCE**

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

*Time : 3 Hours]*

*[Max. Marks : 80*

*Instructions to the candidates:*

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

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

**[8 × 2 = 16]**

- a) Why automated testing tools are used? Explain in short.
- b) Distinguish between static and dynamic testing.
- c) Define smoke testing.
- d) State different types of Errors.
- e) Define stub.
- f) Explain scatter diagram.
- g) What is graph matrix?
- h) Define cost of quality.

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

**[4 × 4 = 16]**

- a) Explain branch coverage criterion in white box testing.
- b) Explain complexity matrices.
- c) Explain all attributes of good testing.
- d) How are quality costs measured and collected in an organisation?
- e) Explain the concept of six-sigma quality.

**P.T.O.**

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

- a) Explain software testing life cycle.
- b) Explain Regression Testing in detail.
- c) What do you mean by sampling distribution?
- d) What is software safety.
- e) Which strategic options are available during selection of integration test strategy?

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

- a) Explain software Reliability.
- b) Differentiate between validation and verification process.
- c) Explain testing process in detail.
- d) Explain pareto diagram?
- e) Explain black box testing techniques.

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

Write a short note on

- a) Software Quality Assurance.
- b) Rational Robot.
- c) Alpha and Beta Testing.
- d) Data flow analysis and control flow analysis.
- e) ISO-9001.

