

Total No. of Questions : 5]

SEAT No. :

P700

[Total No. of Pages : 4

[4240] - 101

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

COMPUTER SCIENCE

CS - 101 : C Programming

(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) *Neat diagrams must be drawn wherever necessary.*

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

**[2 × 4 = 8]**

- i) Void fun (int \*, int \*)
- ```
int main()
{
    int i = 5, j = 2;
    fun (&i, &j);
    printf ("%d %d", i, j);
    return 0;
}
Void fun (int *i, int *j)
{
    *i = *i * *i;
    *j = *j * *j;
}
```
- ii) main ( )
- ```
{
    int x = 9876;
    printf ("%d\n",x);
    printf ("%6d\n",x);
    printf ("\n%06d",x);
}
```

**P.T.O.**

```

iii) static int i = 200 ;
      main ()
      {
        static int i = 300 ;
        xyz ();
        printf (“%d”,i) ;
      }
      xyz ()
      {
        printf (“%d”,i) ;
      }

```

b) Find out the error and explain (any two) :

**[2 × 4 = 8]**

```

i) # include <stdio.h>
    main()
    {
      int k = 10;
      int fun (char);
      k = fun (k = fun (k = fun (k)));
      printf (“k = % d” , k)
    }
    int fun (int .n)
    {
      ntt;
      return n;
    }
ii) struct test
    {
      Int x;
      struct test *t;
    };
    main ()
    {
      test * t1, *t2
      t2 = x = 100
      t1 = t = t2
      printf (“ x in t2 = % d”, t1, x) ;
    }

```

```

iii) # define pow (x * x * x * x)
      main ()
      {
          int x, y = 4 ;
          x = pow (y ++);
          printf ("%d",x);
          printf ("%d\n",y);
      }

```

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

- a) Compare if - else and switch - case statement with an example.
- b) Explain the concept of formal and Actual parameter with suitable example.
- c) What is a structure? Explain with an example.
- d) Write a note on preprocessor Directives.
- e) What is file? State any four operations on file by giving proper example.

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

- a) Write a 'C' program to read information from a text file and find the length of the longest line.
- b) Write a 'C' program to display a number in words. For example : 5768 will be displayed five thousand seven hundred sixty eight.
- c) Write a 'C' program to accept  $m \times n$  matrix and generate  $m+1 \times n+1$  matrix such that the  $m+n$  row contains sum of elements of corresponding columns and  $n+n$  column contains sum of elements of corresponding rows.

e.g. Input	output
1 2 3	1 2 3 6
4 5 6	4 5 6 15
7 8 9	7 8 9 24
	12 15 18 45

- d) Write a function GCD ( ) to find out GCD of two numbers.
- e) Write a 'C' program to accept a number and check whether it is a perfect number. (perfect number i.e. sum of it's factor = number itself)

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

**[4 × 4 = 16]**

- a) Explain malloc ( ) & calloc ( ) function with the suitable example.
- b) Explain getchar ( ) and putchar ( ) with suitable example.
- c) Explain Break and continue with proper example.
- d) What do you mean by array of pointers and pointer to array? Explain with an example.
- e) Explain the concept of conditional compilation. Also list various preprocessor directives used for the same.

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

**[4 × 4 = 16]**

- a) Write a 'C' program to accept and display the information of 'n' books.  
Book (book no, book name, author, publication, price)
- b) Write a 'C' program to produce the following out put.  
A  
A B  
A B C  
A B  
A
- c) Write a 'C' program to display 'n' prime numbers.
- d) Write a 'C' program to accept n numbers in an array and shift all negative number to the end of an array (Note : Do not sort the array)  
e.g. Input      5      15      -2      45      -36      -9      12  
                  5      15      45      12      -2      -36      -9
- e) Write a function for interchanging the content of two variable.



Total No. of Questions : 5]

SEAT No. :

P701

[Total No. of Pages : 2

[4240] - 102

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

COMPUTER SCIENCE

CS - 102 : Computer Architecture

(2008 Pattern) (Sem. - I)

*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) *Draw neat diagrams wherever necessary.*

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

**[4 × 4 = 16]**

- a) What is Half adder? How is it used to design full adder circuit?
- b) What does 'VESA' stands for, in Computer bus structure? State its features.
- c) Draw logic diagram of 2:4 Decoder and explain its working.
- d) Explain with suitable example 'Instruction Cycle' in Microprocessor.
- e) Explain 4 bit binary weighted digital to analog converter.

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

**[2 × 8 = 16]**

- a) Explain registers of 64 bit Intel Microprocessor with neat block diagram.
- b) Explain following operations of shift register using D-flip-flop.
  - i) Serial In Serial Out.
  - ii) Serial In Parallel Out.
  - iii) Parallel In Serial Out.
  - iv) Parallel In Parallel Out.
- c) Explain with neat diagram, 3 bit flash ADC,

**P.T.O.**

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

- a) What are the features of RISC architecture?
- b) What is parallel processing? Explain Instruction Pipelining method of parallel processing.
- c) Explain with neat block diagram 'Diskette controller'.
- d) Explain asynchronous communication technique.
- e) Why is PCI bus preferred than EISA bus in advanced computer system?

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

- a) Explain J-K flip - flop.
- b) State any four features of 80486 microprocessor.
- c) Explain with neat block diagram I/O interface.
- d) What is Interrupt? Explain software interrupts.
- e) Explain basic architecture of uniprocessor.

**Q5)** Attempt any two of the following : **[2 × 8 = 16]**

- a) Draw the block diagram of IC 8255 and explain its function in Bit Set Reset (BSR) mode.
- b) Explain 'T' flip - flop. How is it used to design 3 bit asynchronous up-down counter.
- c) Explain following addressing modes of microprocessor.
  - i) Register Indirect.
  - ii) Immediate.
  - iii) Based - Indexed with displacement and without displacement.



Total No. of Questions : 5]

SEAT No. :

P702

[Total No. of Pages : 3

[4240] - 103

M.C.A. (Science Faculty)

CS - 103 : Mathematical Foundations

(2008 Pattern) (Sem. - I)

Time : 3 Hours]

[Max. Marks :80

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicates full marks.
- 3) All questions carry equal marks.
- 4) Use of non programmable scientific calculator is allowed.

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

- a) For any sets A, B and C, show that  $A - (B \cup C) = (A - B) \cap (A - C)$ .
- b) For any sets A and B, show that  $(A \cap B)^c = A^c \cup B^c$ .
- c) Give an example of a relation on a set which is symmetric but not antisymmetric. Justify your answer.
- d) Let  $A = \{a, b, c\}$ ,  $B = \{1, 2\}$ .  
Does there exists a one - one function from set A to set B Justify.
- e) Let  $f: \mathbb{R} \rightarrow \mathbb{R}$  and  $g: \mathbb{R} \rightarrow \mathbb{R}$ , defined as  $f(x) = e^x$  and  $g(x) = \sin(x^2 + 1)$ .  
Find
  - i)  $(f \circ g)(x)$
  - ii)  $(g \circ f)(x)$ .

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

- a) Find the remainder when  $1! + 2! + 3! + 4! + \dots + 100!$  is divided by 10.
- b) For any integer 'a' show that  $\gcd(5a + 2, 7a + 3) = 1$ .
- c) Let  $a, b, c, m \in \mathbb{Z}$ ,  $m \neq 0$ . If  $a \equiv b \pmod{m}$  and  $c \equiv d \pmod{m}$  then show that
  - i)  $a + c \equiv b + d \pmod{m}$
  - ii)  $ac \equiv bd \pmod{m}$
- d) Find all incongruent solutions of the congruence  $18x \equiv 30 \pmod{42}$ .
- e) Let  $Z_5 = \{0, 1, 2, 3, 4\}$  be the set of residue classes modulo 5. Prepare composition tables for  $(Z_5, +_5)$  and  $(Z_5, X_5)$  where '+<sub>5</sub>' denote the addition modulo 5 and 'X<sub>5</sub>' denote the multiplication modulo 5.

P.T.O.

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

**[16]**

- a) Let  $G = \left\{ \begin{bmatrix} a & b \\ c & d \end{bmatrix} \mid ad - bc \neq 0, a, b, c, d \in \mathbb{R} \right\}$  show that  $G$  is a group with respect to the usual matrix multiplication.
- b) Let  $G$  be a group. If  $x^2 = e, \forall x \in G$  then prove that  $G$  is abelian.
- c) Find inverse of the following matrix

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & 5 \\ 3 & -2 & -4 \end{bmatrix}$$

- d) Solve the following system of linear equations, by using Cramer's rule.
- $$\begin{aligned} 2x + 3y - 4z &= -8 \\ 3x + 2y + 4z &= 3 \\ 5x - 4y + 5z &= 18 \end{aligned}$$
- e) For the following matrices  $A$  and  $B$  show that  $(AB)^t = B^t A^t$ .

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix} \qquad B = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 0 \end{bmatrix}$$

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

**[16]**

- a) By using truth table show that statements  $P \vee (q \wedge r)$  and  $(p \vee q) \wedge (p \vee r)$  are logically equivalent.
- b) By using series of logical equivalences, show that statements  $\neg (p \vee (\neg p \wedge q))$  and  $\neg p \wedge \neg q$  are logically equivalent.
- c) Prove the following statement by method of contradiction.  
'If  $3n + 2$  is odd then  $n$  is odd'
- d) i) Let  $Q(x, y)$  denote the statement " $x = y + 3$ " What are the truth values of the propositions  $Q(1, 2)$  and  $Q(3, 0)$ .
- ii) Translate the following sentence in symbolic form.  
'Some lawyers who are politician are congressmen.'
- e) i) Negate the following proposition.  
'All fish swim'
- ii) Find a counter example for following statement.  
'If  $a > b$  then  $a^2 > b^2$ '



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

**[16]**

- a) Find the solution for the following system of congruences,  
 $2x \equiv 1 \pmod{5}$   
 $5x \equiv 9 \pmod{11}$   
 $4x \equiv 1 \pmod{7}$
- b) Find gcd of  $f(x) = 3x^3 + 6x^2 + 3$  and  $g(x) = 3x^4 + 9x^3 + 6x^2 - 3x + 9$  and find  $m(x)$  and  $n(x)$  such that  
 $\gcd(f(x), g(x)) = f(x) m(x) + g(x) n(x)$ .
- c) Let  $\rho = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 2 & 1 & 4 & 5 & 3 & 7 & 8 & 9 & 6 \end{pmatrix}$
- Express  $\rho$  as product of disjoint cycles.
  - Express  $\rho$  as product of transpositions.
  - Whether  $\rho$  is odd or even?
  - Find order of  $\rho$ .
  - Find  $\rho^{-1}$ .
  - Whether  $\rho^{-1}$  is odd or even?
  - Find order of  $\rho^{-1}$ .
  - Find  $\rho \rho^{-1}$ .



[4240] - 104

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

MATHEMATICS

CS - 105 : Graph Theory

(2008 Pattern) (Semester - I)

Time : 3 Hours]

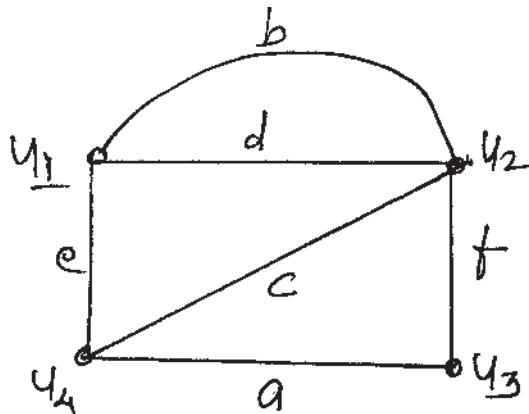
[Max. Marks :80

Instructions to the candidates:

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

Q1) a) Attempt each of the following : [8]

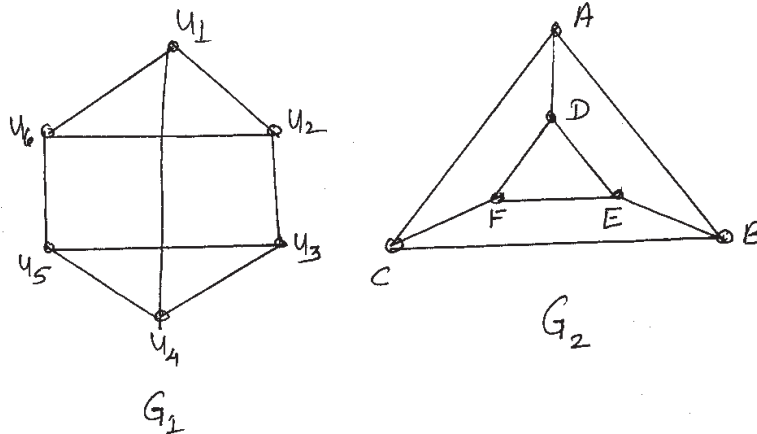
- i) State if the following statement is True or False : Every tree is a bipartite graph.
- ii) State if the following statement is True or False : There exists a simple graph on 10 vertices and with 20 edges and 5 components.
- iii) Write the incidence matrix of the following graph.



- iv) Give an example of a regular digraph.
- v) Write the definition of a bipartite graph.
- vi) Give an example of a graph in which every edge is not an isthmus.
- vii) What is the vertex connectivity of a graph that contains an isthmus.
- viii) Write the definition of union of two graphs.

b) Attempt any two of the following : [8]

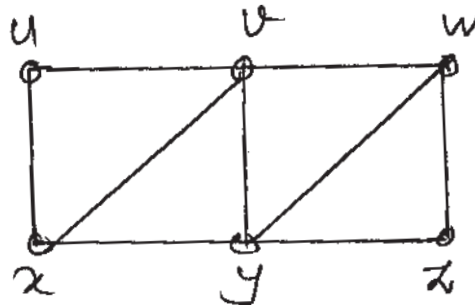
i) Determine if the following graphs are isomorphic.



- ii) Let  $G$  be a simple graph with  $n$  vertices and  $\bar{G}$  be its complement. Prove that for every vertex  $v$  in  $G$ ,  $d_G(v) + d_{\bar{G}}(v) = n - 1$ .
- iii) Give an example of a complete bipartite graph which is Hamiltonian, but not Eulerian. Justify your answer.

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

- a) Let  $G$  be a simple graph with  $n$  vertices, where  $n \geq 2$ . Prove that  $G$  has two vertices  $u$  and  $v$  such that  $d(u) = d(v)$
- b) Find eccentricities of all vertices in the following graph.



- c) Let  $G$  be a connected graph. If  $V(G) = V_1 \cup V_2$  be any partition of the vertex set  $V(G)$ , then prove that there is an edge in  $G$  with one end-vertex in  $V_1$  and another in  $V_2$ .
- d) Prove that if  $G$  is a self-complementary graph with  $n$  vertices, then  $n$  is either  $4t$  or  $4t + 1$ , for some integer  $t$ .
- e) Give an example of a graph with vertex connectivity 2 and edge connectivity 4. Justify your answer.

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

- a) Explain the Chinese postman problem.
- b) Draw the arborescence and convert the following expression into polish notation :  
$$\frac{x^2 - 5}{2y + 3x}$$
- c) Solve the recurrence relation :  
 $a_n = 7a_{n-1} - 10a_{n-2}; \quad n \geq 2$  with  $a_0 = 0$  and  $a_1 = 3$ .
- d) Using generating function, solve the recurrence relation :  
 $a_n = 2a_{n-1} + 4; \quad n \geq 1$  with  $a_0 = 1$ .
- e) Define :  $(\alpha)$  directed walk  
 $(\beta)$  strongly connected digraph.

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

- a) Prove that any connected graph with  $n$  vertices and  $(n-1)$  edges is a tree.
- b) Prove that every tree has either one or two centers.
- c) If  $T$  is any tree with  $n$  vertices ( $n \geq 2$ ), then prove that  $T$  has at least two pendant vertices.
- d) Draw the rooted binary tree of the expression.  $(x-2y) \left( \frac{x}{x-3} \right)$  and write the expression in postfix notation.
- e) Draw all possible non-isomorphic trees with 6 vertices.

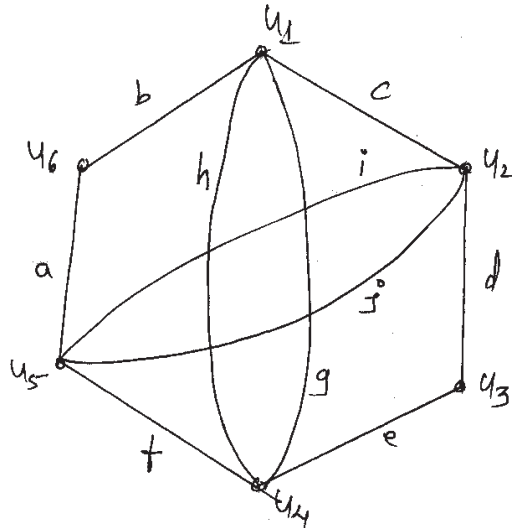
**Q5)** Attempt any two of the following : **[16]**

- a) Consider the graph  $G$  whose adjacency matrix is given below.

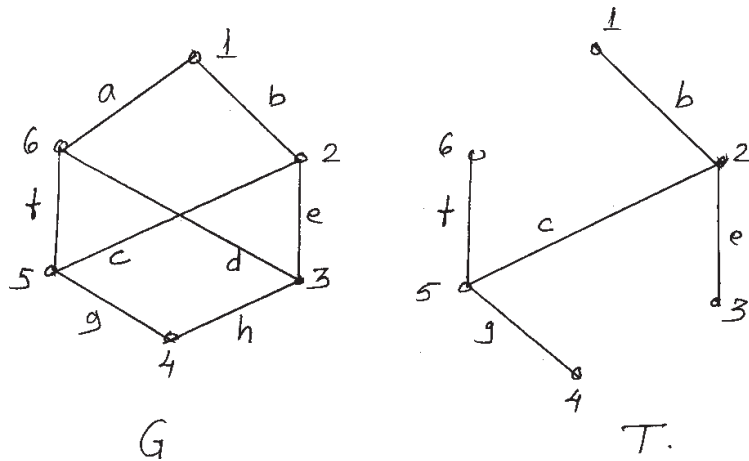
$$\begin{bmatrix} 0 & 0 & 1 & 0 & 2 \\ 0 & 0 & 0 & 2 & 0 \\ 1 & 0 & 0 & 0 & 2 \\ 0 & 2 & 0 & 0 & 0 \\ 2 & 0 & 2 & 0 & 0 \end{bmatrix}$$

Use the fusion process to determine whether the graph  $G$  is connected or not.

b) Use Fleury's algorithm to determine Euler tour in the following graph.



c) Consider the following graph G and its spanning tree T.



List all fundamental cutsets and cycles of G with respect to T.



Total No. of Questions : 5]

SEAT No. :

P704

[Total No. of Pages : 2

[4240] - 201

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

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

(2008 Pattern) (Semester - II)

Time : 3 Hours]

[Max. Marks :80

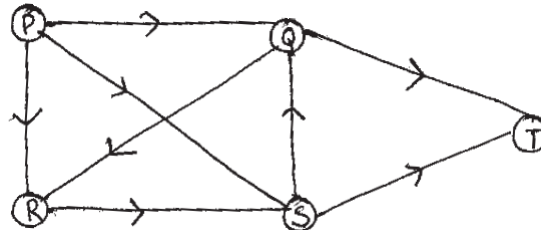
Instructions to the candidates:

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

Q1) Attempt any four of the following :

[4 × 4 = 16]

- a) Define queue and explain the static implementation.
- b) What is a circular linked list? Explain the create and delete node operations on it?
- c) Differentiate between a stack and array.
- d) Write a 'C' function to implement the bucket sort algorithm.
- e) Write adjacency matrix, indegree, outdegree and total degree of the following graph.



Q2) Attempt any four of the following :

[4 × 4 = 16]

- a) Write a 'C' function for binary search method for an array of integer.
- b) Explain any 2 asymptotic notations.
- c) Write short note on linked representation of a binary tree. With proper example.
- d) Write an algorithm to add 2 polynomials represented as a singly linked list.
- e) Sort the following numbers using bubble sort  
3, 97, 65, 71, 23, 57, 93, 100.

P.T.O.

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

- a) Write a function to insert an element at a particular position in a singly linked list.
- b) Write Dijkstra's Algorithm.
- c) Write a recursive 'C' function to find factorial of  $n = 5$  illustrating the use of stack in recursion.
- d) Define :
  - i) Forest
  - ii) Binary tree
  - iii) Strictly binary tree
  - iv) Complete Binary tree
- e) Construct an AVL tree for the following data.  
3, 2, 1, 4, 5, 6, 7.

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

- a) Explain any 2 overflow handling techniques.
- b) Describe clustered and non clustered indices.
- c) Compare singly linked list and doubly linked list.
- d) Show the stack contents and output while converting the following infix string to postfix.  
 $A/B \ \$C + D * E - F * G$
- e) Sort the following numbers using Heapsort method in ascending order.  
108, 96, 70, 22, 56, 92, 99.

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

- a) Write a C function for counting number of nodes in a binary tree.
- b) Write a function to reverse a singly linked list.
- c) What is dynamic memory allocation? Explain the best fit method?
- d) When is it preferable to use dense versus sparse index. Explain with suitable example.
- e) Construct a binary search tree for the following data and traverse it using all traversal methods.  
1, 5, 11, 13, 8, 9, 17, 16, 18.



Total No. of Questions : 5]

SEAT No. :

P705

[Total No. of Pages : 3

[4240] - 202

M.C.A. (Under Science Faculty)

COMPUTER SCIENCE

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) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*

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

**[8 × 2 = 16]**

- a) List any four Operations on sets.
- b) Define prefix and list all proper prefixes for string “abcd”
- c) Define tuples for Moore machine and Melay machine.
- d) Describe the language in English and give the language set for the following regular expression.  
$$a(a + b)^* b + b(a + b)^* a$$
- e) Define useless symbol. Give one example.
- f) Write the syntax and give one example of production of context sensitive Grammar.
- g) Let  $R = \{(1, 2), (2, 2), (2, 3)\}$  be a relation on the set  $\{1, 2, 3\}$ , Find out  $R^+$  and  $R^*$ .
- h) What is unsolvable problem? Give one example.

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

**[4 × 4 = 16]**

- a) Construct the DFA for the strings starting with 01 and ending with 00 over  $\{0, 1\}$ .

**P.T.O.**



b) Convert the Melay machine equivalent to Moore machine.

$M = (\{q_0, q_1, q_2, q_3\}, \{a, b\}, \{0,1\} \delta, \lambda, q_0)$  where:

State	$\delta$		$\lambda$	
	a	b	a	b
$q_0$	$q_0$	$q_1$	1	0
$q_1$	$q_3$	$q_3$	1	1
$q_2$	$q_1$	$q_2$	1	1
$q_3$	$q_2$	$q_0$	0	1

c) Define the language for following CFG.

i)  $G = (\{S\}, \{a, b\}, \{S \rightarrow aSb \mid \epsilon\}, S)$

ii)  $G = (\{S, C\}, \{a, b\}, P, S)$  where P is

$S \rightarrow aCa \quad C \rightarrow aCa \mid b$

d) Write a short note on elimination of  $\epsilon$ -production from the CFG. Explain with example.

e) Construct NFA for the following :

i) To accept all strings ending with 110 over  $\{0, 1\}$ .

ii) To accept strings starting with a, ending with b or starting with b, ending with a.

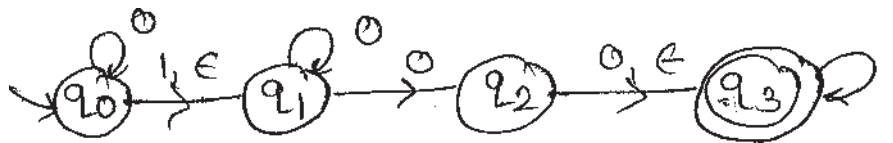
**Q3) Attempt any four of the following :**

**[4 × 4 = 16]**

a) Convert the following CFG  $G = (\{S, A, B\}, \{0, 1\}, P, S)$  to its equivalent CNF Where P is :  $S \rightarrow 0A1 \mid 0BA \quad A \rightarrow S01 \mid 0B \quad B \rightarrow 1B \mid 1$ .

b) Construct the PDA for  $L = \{0^m 1^n 2^n 0^m \mid m \geq 0, n \geq 0\}$ .

c) Convert the following NFA with  $\epsilon$ -transition to equivalent DFA.



d) Define equivalence theorem of Moore and Melay machine with suitable example.

e) Convert the following DFA to equivalent regular expression, using Arden's theorem.



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

**[4 × 4 = 16]**

- State and prove pumping lemma for regular languages.
- Construct the Turing machine for  $L = \{0^a 1^b 2^{a+b} \mid a, b \geq 1\}$ .
- Convert the following CFG  $G = (\{S, A, B\}, \{a, b\}, P, S)$  to equivalent GNF.

Where  $P : S \rightarrow AB \quad A \rightarrow BS \mid a \quad B \rightarrow SA \mid b$

- Convert the following CFG  $G = (\{S, A, B\}, \{a, b\}, P, S)$  to equivalent PDA

$P : S \rightarrow aB \mid bA \quad A \rightarrow a \mid aS \mid bAA \quad B \rightarrow b \mid bs \mid aBB$

- Minimize the following DFA.

State	$\delta$	
	a	b
$q_0$	$q_2$	$q_4$
$q_1$	$q_0$	$q_5$
$q_2$	$q_2$	$q_4$
$q_3$	$q_0$	$q_4$
$Q_4$	$q_1$	$q_3$
$Q_5$	$q_0$	$q_5$

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

**[4 × 4 = 16]**

- Prove that the language  $L = \{a^n b^n c^n \mid n \geq 1\}$  is context free using pumping lemma.
- Prove that the regular languages are closed under inverse homomorphism.
- Construct the Turing machine to find the 2's complement of binary number.
- Describe the language represented by following regular expressions.
  - $R = (1 + 10)^*$
  - $R = (a + b)^* a(a + b)^* . a.(a + b)^*$
- Show that DPDA and NPDA are not equivalent with an appropriate example.



Total No. of Questions : 5]

SEAT No. :

P706

[Total No. of Pages : 3

[4240] - 203

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

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.*
- 3) *All questions carry equal marks.*

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

**[4 × 4 = 16]**

- a) What are advantages of object oriented programming?
- b) What is an iterator? Explain any two.
- c) What are access specifiers in C++? Explain with example.
- d) What is an inline function? What are advantages and disadvantages of it.
- e) Explain in short.
  - i) Data hiding
  - ii) Abstract class
  - iii) Setw
  - iv) This pointer

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

**[4 × 4 = 16]**

- a) Explain memory management operators in C++.
- b) Explain the following with syntax.
  - i) try
  - ii) throw
  - iii) catch.
- c) “Function can return a reference in C++”. Comment and explain with example.
- d) Write syntax for read ( ) and write ( ) functions for file handling in C++. Also explain with example.
- e) What is function template? Explain with example.

**P.T.O.**

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

**[2 × 8 = 16]**

- a) Write an object oriented program in C++ to store the following details:  
Base class Patient : Pat-name, age, sex.  
Base Class IPD : Wardno, bed-no, chargeperday.  
Derive a class IPD-Patient from these base classes with no-of -days-  
admitted attribute.  
Write necessary member functions for
- Input n records
  - Display all records
  - Search a patient by patient name.
- Also write a main function to test above functions
- b) Consider the following class definition class string
- ```
{  
    int length;  
    char x ptr;  
public: // member function definitions  
};
```
- Write following functions to
- Overload ! operator to change case of a string object.
  - Constructor to allocate memory.
  - Destructor to release memory
- c) Define a class to represent complex number and write functions for the following :
- Friend function to add two complex numbers.
  - Member function to subtract two complex numbers.
  - Display complex number.

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

**[4 × 4 = 16]**

- Write characteristics of constructor and destructor.
- What is scope resolution operator? Explain any two uses of it.
- What is virtual function? What are its Characteristics?
- How operator function is invoked if defined as
  - Member function
  - Friend function.

Explain with example (Assume binary operator overloading)

- e) Write output for the following program segment and explain it.

```
Class A {public:
    A () { cout << "Constructor \n";}
    ~A() { cout << "Destructor \n";}
};
A a1, a2;
main ()
{
    A a3, a4, a5 ;
    int j = 0 ;
    if(j) {A a6 ;}
    else exit(1);
    A a7;
}
```

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

**[4 × 4 = 16]**

- What is hierarchical inheritance? Explain with example.
- Write a C++ program with class person with attributes per-name, age and sex, that prompts the user for a positive age value. If negative age is entered then throw an exception as "age not positive".
- Write a C++ prog. that takes two command line arguments - filename , key (a number). Read the contents of a file and encrypt with a key and display it on the screen.
- Write a class template in C++ for stack. Also define its primitive operations.
- Trace the output for the following program segment.

```
class A { public : A () {cout << " cntr A \n" ; } };
class B : public A
    { public : B () {cout << "cntr B \n" ; } };
class C : virtual public B, public A
{
    public :
    c () { cout << " cntr C\n"; }
};
main ()
{
    c c1;
}
```

Explain the o/p statements.



Total No. of Questions : 5]

SEAT No. :

P707

[Total No. of Pages : 3

[4240] - 204

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 suitable data, if necessary.*

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

**[4 × 4 = 16]**

- a) Write a note on different users of database management system.
- b) Define the concept of aggregation. Explain with two suitable examples.
- c) What is lock? Explain types of locks.
- d) What is time - stamp? How does system generate time - stamp.
- e) Write short note on following :
  - i) BCNF
  - ii) Canonical cover

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

**[4 × 4 = 16]**

- a) Explain the component architecture of DBMS.
- b) Explain Primary key. Candidate key and super key with example.
- c) Explain following with example.
  - i) Natural join
  - ii) Full outer join
- d) Explain desirable properties of decomposition.

**P.T.O.**

- e) Consider following transaction. Find out a non serial schedule which is serializable to serial schedule  $\langle T_1 T_2 T_3 \rangle$

| $T_1$         | $T_2$       | $T_3$        |
|---------------|-------------|--------------|
| Read (x)      | Read (z)    | Read (y)     |
| $x = x + 100$ | Read (y)    | Read (z)     |
| Write (x)     | $y = y + z$ | $y = y + 50$ |
| Read (y)      | Write (y)   | Write (y)    |
| $y = y - 100$ | Read (x)    | $z = z + y$  |
| Write (y)     | $x = x - z$ | Write (z)    |
|               | Write (x)   |              |

Q3) Attempt any four of following :

[4 × 4 = 16]

- a) Following is the list of events in an interleaved execution of sets  $T_1, T_2, T_3$  &  $T_4$  assuming 2 PL. Is there dead lock in the system? If yes which transactions are involved in dead lock.

| Time  | Transaction | Code        |
|-------|-------------|-------------|
| $t_1$ | $T_1$       | lock (A, S) |
| $t_2$ | $T_2$       | lock (B, X) |
| $t_3$ | $T_3$       | lock (C, X) |
| $t_4$ | $T_4$       | lock (A, S) |
| $t_5$ | $T_1$       | lock (C, X) |
| $t_6$ | $T_2$       | lock (A, S) |
| $t_7$ | $T_3$       | lock (D, X) |
| $t_8$ | $T_4$       | lock (B, S) |

- b) Define transaction. Explain ACID property with example.

- c) Explain any two DML commands with example.

- d) Consider following RDB.

Account (Branch-name, Account-no)

Customer (Cust - name, Street, city)

Depositor (Cust - name, Account - no)

Write following queries in SQL.

- i) Find average balance for each customer who live in pune & has at least 3 accounts.
  - ii) Find the number of depositors for each branch.
- e) What are basic steps involved in query processing? Explain with diagram.

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

**[4 × 4 = 16]**

- a) State the advantages of encryption technique used for data security in database.
- b) What is dead lock? What are different methods that are used to prevent dead lock.
- c) Consider the relation  $R = \{ A, B, C, D, E, H \}$  With following FDs.  
 $F = \{ A \rightarrow BC, CD \rightarrow E, E \rightarrow C, D \rightarrow AEH, ABH \rightarrow BD, DH \rightarrow BC \}$   
and  $\alpha = \{BCD\}$  Compute  $\alpha^+$ .
- d) Define following terms :
  - i) Prime Attribute
  - ii) View
  - iii) Weak entity
  - iv) Relationship
- e) Define Boyce - Codd normal form. How does it differ from 3NF?

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

**[2 × 4 = 8]**

- a)
  - i) Explain pattern matching operators in SQL with example.
  - ii) Write a short note on DBA.
  - iii) Write a note on DDL & DCL commands in SQL.
- b) Attempt any two of following : **[2 × 4 = 8]**

Consider the following database.

Doctor (D-no, D-name, address, city).

Hospital (H-no, name, street, city)

Doctor - Hospital is a many to many relationship.

Doctor visit hospital on certain date.

Create a RDB and solve following queries.

  - i) Draw an E-R diagram.
  - ii) Count the number of doctors visited to Ruby Hospital on 1<sup>st</sup> march 2008.
  - iii) List all doctors in pune city.





Total No. of Questions : 4]

SEAT No. :

P708

[Total No. of Pages : 4

[4240] - 301

M.C.A. (Science Faculty)

CS - 301 : DESIGN & ANALYSIS OF ALGORITHMS

(2008 Pattern) (Semester - III)

*Time : 3 Hours]*

*[Max. Marks :80*

*Instructions to the candidates:*

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

**Q1)** Attempt all :

**[8 × 2 = 16]**

- a) How many average number of comparisons are made by binary search for successful search in the given array? Assume that each key is searched with same probability.  
[4, 20, 25, 30, 80, 90, 95, 98, 100]
- b) What is an algorithm? State its criterias.
- c) Define LIFO and FIFO search.
- d) Draw diagram reflecting relationship among P, NP, NP-complete and NP-hard.
- e) What is dead node? When a live node becomes dead?
- f) What is dominance principle in merge and purge?
- g) Compare Greedy and dynamic Programming.
- h) Define articulation point and bridge.

**P.T.O.**

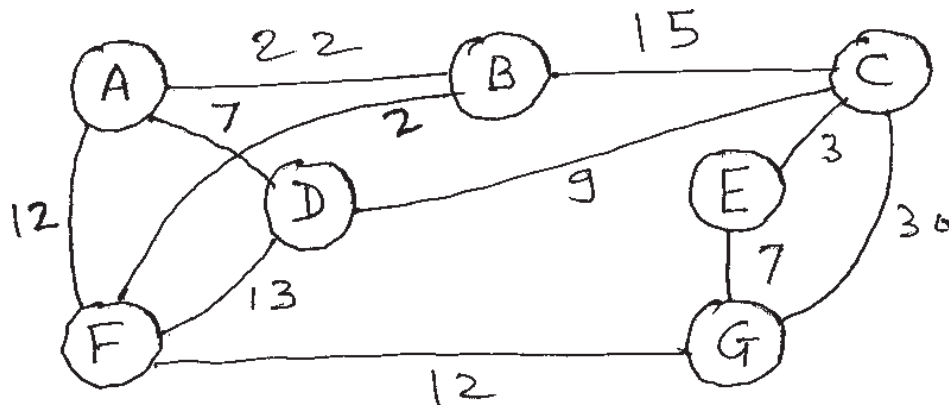
Q2) Attempt any four :

[4 × 5 = 20]

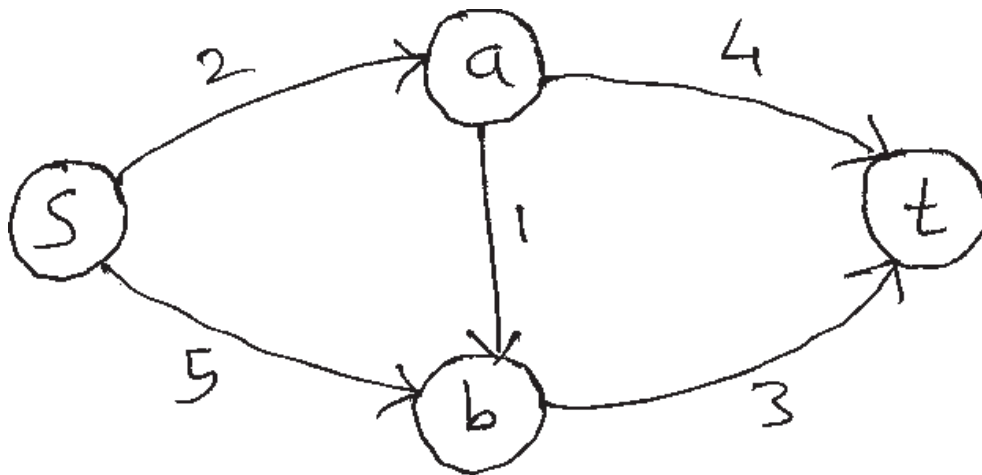
- a) Multiply the given 2 matrices using strassen's matrix multiplication. Show each step.

$$A = \begin{bmatrix} 3 & 4 \\ 4 & -1 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 1 \\ 2 & 1 \end{bmatrix}$$

- b) Apply prim's algorithm on the following graph.



- c) Apply Ford - Fulkerson's algorithm on the following network.

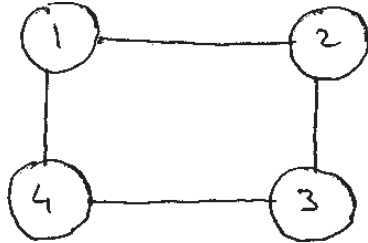


- d) Consider the following string and do encoding. Also draw decode tree.  
"Go Go GOPHERS"
- e) Transform X = "SPAKE" into string Y = "PARK" using dynamic programming.

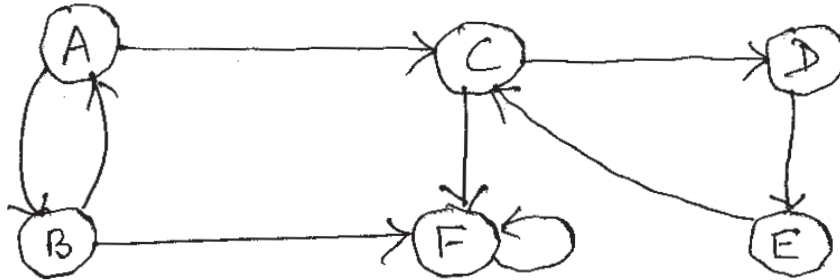
Q3) Attempt any four :

[4 × 8 = 32]

- a) What is m – colorability optimization problem? What is chromatic number of a graph? What are implicit and explicit constraints? Draw state space tree for the following graph and find all solutions for m-colorability optimization case.



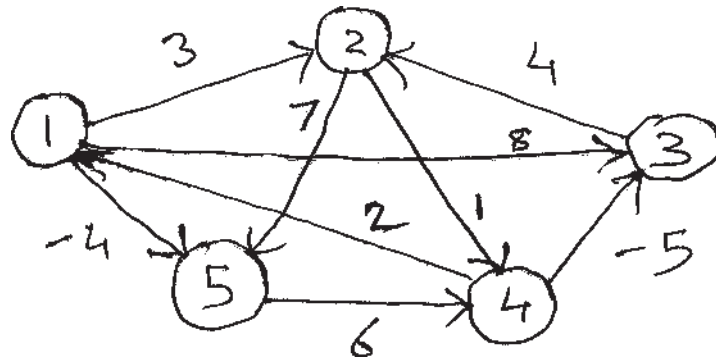
- b) What do you mean by strongly connected components? Give an algorithm for the same using DFS. Find it for the following graph using above algorithm.



- c) i) Find an optimal solution to the fractional knapsack problem using greedy method.  $n = 4$ ,  $m = 26$ ,  $w = (12, 13, 9, 14)$ ,  $P = (15, 39, 18, 48)$ .
- ii) Which of the following sorting algorithms are stable? Insertion, merge, heap and quick sort? Give simple scheme that makes any sorting algorithm stable. How much additional space and time does it entail?
- d) Explain TSP using LCBB approach. Consider the following TSP instance defined by the given cost matrix. Obtain reduced cost matrix. Which node will be selected using LCBB approach?

$$\begin{bmatrix} \infty & 10 & 20 & 0 & 1 \\ 14 & \infty & 15 & 3 & 1 \\ 2 & 4 & \infty & 1 & 3 \\ 18 & 5 & 17 & \infty & 2 \\ 15 & 3 & 6 & 15 & \infty \end{bmatrix}$$

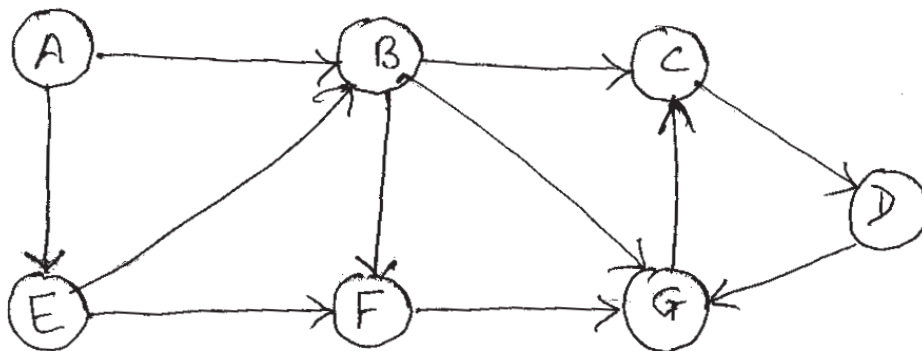
e) Apply Floyd-Warshall's algorithm on the following graph.



Q4) Attempt Any Three :

[3 × 4 = 12]

- a)
  - i) Order the given functions in ascending order of their growth rates :  $\log^n$ ,  $n$ ,  $n^2$  and  $2^n$ .
  - ii) Define big - Oh & Prove the following :  
 $20n^3 + 10n \log^n + 5 = O(n^3)$
- b) Let  $n=4$ ,  $P = (100, 10, 15, 27)$ ,  $d = (2, 1, 2, 1)$ . Find optimal solution for above instance of job sequencing with deadlines.
- c) Write recursive insertion sort and obtain its recurrence relation. Find its time complexity.
- d) Apply BFS on the following graph. Assume starting vertex is 'A'.



⌘⌘⌘

Total No. of Questions : 5]

SEAT No. :

P709

[Total No. of Pages : 2

[4240] - 302

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) *Figures to the right indicate full marks.*
- 3) *All questions carry equal marks.*
- 4) *Assume suitable data, if necessary.*
- 5) *Neat diagrams must be drawn wherever necessary.*

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

**[8 × 2 = 16]**

- a) What is pipelining?
- b) Define Network Architecture.
- c) Show the NRZ-L and Manchester encoding for the bit stream 01101001.
- d) Compare adaptive and Non-adaptive routing algorithms.
- e) Find out the class, Netid, Hostid for the IP address 156.26.30.32
- f) Define Reservation. Protocol
- g) Consider a noiseless channel with a bandwidth of 4000 Hz transmitting a signal with two signal level. What will be the maximum bit rate?
- h) What is unicasting and multicasting?

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

**[4 × 4 = 16]**

- a) What is framing ? Explain any two methods of framing.
- b) Explain Network Address Translation.
- c) Compare circuit switching and packet switching with timing diagram.
- d) What are the design issues of the layer?
- e) Explain any four fields of IPV<sub>4</sub> packet format.

**P.T.O.**

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

**[4 × 4 = 16]**

- a) Explain the access methods of wired LAN.
- b) Compare FDMA and TDMA.
- c) What are the functions of Network layer and transport layer in OSI model?
- d) Construct a CRC message for the given polynomial  $x^7 + x^5 + x^4 + x^2 + x^1 + x^0$  and generator polynomial  $x^5 + x^4 + x^1 + x^0$ .
- e) Explain the factors affecting protocol efficiency.

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

**[4 × 4 = 16]**

- a) What is routing? Explain all properties of routing algorithm.
- b) Explain VLAH with its advantages.
- c) What are the different transmission modes are available?
- d) Explain Hamming code method to correct burst errors?
- e) Differentiate between physical, logical and port addresses.

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

**[4 × 4 = 16]**

- a) Explain service primitives.
- b) Compare and contrast OSI and TCP/IP reference model?
- c) What are the goals of computer Network?
- d) Differentiate between frequency and time division multiplexing.
- e) Explain standard Ethernet.



Total No. of Questions : 5]

SEAT No. :

**P710**

[Total No. of Pages : 3

**[4240] - 303**

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

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

*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) *Neat diagrams must be drawn wherever necessary.*

**Q1)** Attempt all of the following

**[8 × 2 = 16]**

- a) What is Assembler?
- b) What is the role of the short-term scheduler?
- c) What is starvation?
- d) Define dispatcher latency time.
- e) Explain the concept of non-preemptive scheduling algorithm.
- f) Define loader and linker.
- g) What is spooling
- h) What is time shearing systems?

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

**[4 × 4 = 16]**

- a) Compare and contrast different memory allocation methods. first-fit, best-fit, worst-fit.
- b) What is a process? State and explain in brief different process states.
- c) Define the following terms
  - i) Compile time address
  - ii) Load time address
  - iii) Link time address
  - iv) Execution time address
- d) Write a short note on p-threads.
- e) Explain in brief different free-space management techniques.

**P.T.O**

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

- a) Consider the following processes with the length of CPU burst time given in milisecond and their arrival times in milisecond

| Process | Arrival time | Burst-time |
|---------|--------------|------------|
| P1      | 0            | 7          |
| P2      | 2            | 5          |
| P3      | 4            | 3          |
| P4      | 5            | 2          |

What is the average waiting time and turnaround time for these processes with pre-emptive SJF scheduling algorithm.

- b) Write a short note on resource allocation graph.

- c) Consider the following reference string

1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7

How many page fault will occur for the following algorithm with 3 page frames

- i) FCFS                      ii) LRU

- d) Suppose the head of a moving head disk with 200 tracks numbered 0 to 199 is currently at track 50. If a request in a queue are

98, 183, 87, 122, 14, 124, 64, 67.

What is the total head movement to satisfy. These request using following scheduling algorithm.

- i) SSTF                      ii) SCAN

- e) Explain the method of polling.

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

- Explain readers-writers problem.
- Explain the concept of virtual file system.
- Explain in brief multilevel feedback queues
- Differentiate between internal and external fragmentation in terms of memory.
- What is scheduler? What are the different types of scheduler explain the function of each scheduler.



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

**[4 × 4 = 16]**

- a) Explain different techniques of deadlock handling in brief.
- b) Write a short note on demand paging.
- c) Explain the structure of process control block.
- d) Explain different file operations
- e) Write a note on semaphore.



Total No. of Questions : 5]

SEAT No. :

**P711**

[Total No. of Pages : 3

**[4240] - 304**

**M.C.A. (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) 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)** Write a complete Win 32 SDK program that is menu driven having following menu items and supporting given functionality. [WinMain is not required. Use ODBC APIs]

-List : Displays in a list box, names of all cricket teams. On clicking with mouse to select a team, team members are displayed on the right side of the client area.

-Accept : Opens a dialog box to accept team info details. The record gets inserted into the database when OK button on the dialog box is clicked.[12]

**Q2)** Write program statements using Win32 APIs for any four of the following:

**[4 × 5 = 20]**

- a) Display 3 scroll bars in the left half of the client area labeled “Red”, “Green”, & “Blue”. As you scroll the scroll bars, the right half of the client area changes to the composite color indicated by the mix of the 3 primary colors. The numeric values of the 3 primary colors are displayed under the 3 scroll bars.
- b) Set the timer for 1-second intervals. After every 1-second, it alternates coloring the client area blue and red along with a beep.

**P.T.O**

- c) Create a list box in the client area to display the name of current OS environment variables (such as PATH & WINDIR). As you select an environment variable, the environment string is displayed across the top of the client area.
- d) Create a dialog box having 2 groups of radio buttons. One group is used to select a color, and the other group is used to select either a rectangle or an ellipse. The rectangle or ellipse is shown in the dialog box with the interior colored with the current color selection. If you press OK button, the dialog box is ended, and the program's Wndproc draws the selected figure in its own client area. If you press cancel the client area of the main window remains the same.
- e) Construct a ball that bounces around in the window's client area. Use timer to pace the ball. The ball itself is a bitmap.

**Q3) Answer in brief: (Any Eight)**

**[8 × 2 = 16]**

- a) What will happen if Wndproc contains following code :  
case WM-PAINT : return 0;
- b) How parent talks to its child?
- c) Write 4 main sections of a DIB file.
- d) What needs to be done for recognizing mouse double-click events by the application?
- e) How application can determine whether a child window is visible or not?
- f) How to obtain width and height of a list box?
- g) What is metafile? Metafile enumeration?
- h) What is delayed rendering?
- i) What is frame Window? Client window?
- j) Differentiate: Queued Vs. Nonqueued messages

**Q4) Justify: True/False.(any six)**

**[6 × 2 = 12]**

- a) An import library is a special form of an object library file.
- b) Critical sections can co-ordinate threads among two or more processes.
- c) The document window procedure receives the WM\_MDIACTIVATE message whenever the window becomes active or inactive.

- d) Metafiles can be stored on hard disk.
- e) A font cannot be rotated.
- f) The origin of a top-down DIB is the same as of the origin of a bottom-up DIB.
- g) The bitmap is independent of any device context.
- h) It is not possible to store bitmap data in the clipboard.

**Q5)** Attempt any four

**[4 × 5 = 20]**

- a) Draw a neat labeled schematic for characters in system font.
- b) What do you mean by caret? Explain any four caret functions.
- c) Which message precedes all other mouse messages? Explain its significance in detail.
- d) Write not-so-obvious applications of timer.
- e) Differentiate between windows scroll bars & scroll bar controls.



Total No. of Questions : 5]

SEAT No. :

**P712**

[Total No. of Pages : 4

**[4240] - 401**

**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) *All questions carry equal marks.*
- 3) *Figures to the right indicate full marks.*
- 4) *Neat diagrams must be drawn whenever necessary.*
- 5) *Assume suitable data, if necessary.*

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

**[8 × 2 = 16]**

- a) Describe the meaning of the following Shell Command:  
\$mail mjb<letter
- b) What do you mean by prober? What is its purpose?
- c) What happens when process executes close(0) and then dup with an already opened file?
- d) What do you mean by daemon processes?
- e) Which algorithms are called by kernel to lock a buffer? To unlock a buffer?
- f) Why does the kernel copy the code for the exec system call to the user address space of process1?
- g) Give formula for the calculation of process priority. Assume that process has already executed nice system call and that the system uses fair share scheduler.
- h) Is it possible to open an unnamed pipe with no delay option? Justify.

**P.T.O.**

**Q2) Justify True/False: Attempt Any Four of the following: [4 × 4 = 16]**

- a) The kernel is not a separate set of processes that run in parallel to user processes but it is part of each user process.
- b) `mknod` system call is used to create named pipes.
- c) Every C Program running under UNIX begins its execution from `main()`.
- d) Processes never go to sleep for “not sure” events.
- e) `Stat` is more efficient than `fstat`.

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

- a) Suppose that a process wants to read from a file at a byte offset 1835000. Explain how it does so assuming that one disk block is of size 1KB, and that storing one disk block number requires 8 nibbles.
- b) Consider the following C code snippet and its generated assembly code. Explain how system call is executed with the help of suitable diagram.

```
main(int argc, char*argv[])  
{ int fd;      fd=creat(argv[1],0666); }
```

// assembly code

| Addr | Instruction |
|------|-------------|
|------|-------------|

# code for main

...

|     |          |
|-----|----------|
| 64: | jsr 0x7a |
|-----|----------|

...

# library code for creat

|     |     |
|-----|-----|
| 7a: | ... |
|-----|-----|

|     |           |
|-----|-----------|
| 7c: | trap/chmk |
|-----|-----------|

|     |     |
|-----|-----|
| 7e: | ... |
|-----|-----|

- c) Why does kernel usually protect a page containing virtual address 0? Explain in detail.
- d) In algorithm breada, if the first or second block is not in the cache, the later test to see if the buffer data is valid implies that the block could be in the buffer pool. How is this possible?

e) Consider the sample kernel code given below:

```
struct queue {...} *bp, *bp1;
bp1->forp=bp->forp;
bp1->backp=bp;
bp->forp=bp1;
/*consider possible context switch here*/
Bp1->forp->backp=bp1;
```

Suppose a context switch happens when the code reaches the comment, and suppose another process removes a buffer from the linked list by executing the following code.

```
remove(struct queue*qp)
{
    qp->forp->backp=qp->backp;
    qp->backp->forp=qp->forp;
    qp->forp=qp->backp=NULL;
}
```

Consider three cases:

- The process removes the structure bp1 from the linked list.
- The process removes the structure that currently follows bp1 on the linked list.
- The process removes the structure that originally followed bp1 before bp was half placed on the linked list.

What is the status of the linked list after the original process completes executing the code after the comment.

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

- a) Write a C program which takes multiple file names as command line argument, and then prints its size in bytes.
- b) Write a C program takes a file name as command line argument to print its last access time, then waits for 5 minutes, and then prints its access time again if the file was accessed in last 5 minutes, or else it just loops again.

- c) What is the exact output of the following code?

```
#include<stdio.h>
#include<unistd.h>
#include<fcntl.h>
main() {int i, j; i=fork();
        for(j=0; j<3; j++) {
            if(i==0 && j==0) printf("Cats\n");
            else if(i==0) {sleep(2); printf("Dogs\n");}
            else{sleep(2); printf("Raining\n");}}
```

- d) Explain behavior of the following C program;

```
main() {int i; char*cp; extern char*sbrk(); cp=sbrk(10);
        for(i=0; i<10; i++) *cp++='a'+i;
        sbrk(-10); cp=sbrk(10);
        for(i=0; i<10; i++) printf("%d%c", i, *cp++);
    }
```

- e) Write a Shell Script to determine whether given file exist or not, file name is supplied as command line argument, also check for sufficient number of command line argument.

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

- Why kernel writes newly allocated inode to disk before it writes directory with the new name to disk during execution of creat?
- What strange things could happen if inode reference count of excec file becomes 0 after successful execution of exec system call?
- Explain thrashing due to swapping.
- Describe the contents of PSW register associated with each process during execution of system call.
- Which permissions are needed for the process on/and etc directories to create a new file named "test" in a directory "/etc"? Assume that the process current working directory is "/usr/bin". How is it related with rwx permissions associated with the directory?





Total No. of Questions : 5]

SEAT No. :

**P713**

[Total No. of Pages : 2

**[4240] - 402**

**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) *All questions carry equal marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Figures to the right indicate full marks.*

**Q1) Attempt all:**

**[8 × 2 = 16]**

- a) Give two basic reasons for handover.
- b) Define : piconnet, scatter net.
- c) What is difference between primary server and secondary server?
- d) What is URL? What are its components?
- e) What is Multiplexing and give types of multiplexing.
- f) What are Teleservices?
- g) What are 3 FTP transmission modes?
- h) What are hidden and exposed terminals?

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

**[4 × 4 = 16]**

- a) Define multipath prorogation and what are the effects of delay spread on signal representing data?
- b) Explain architecture of GSM?
- c) How mobile TCP can be used to solve disconnection problems?
- d) What are the services of user agent in SMTP?
- e) What are advantages and disadvantages of CDMA?

**P.T.O**

- Q3)** Attempt any four of the following **[4 × 4 = 16]**
- a) Compare SDMA and TDMA.
  - b) Define ad-hoc network, hard hand off, soft hand off and cell dragging.
  - c) What is COA? What are two possible occurrences of COA?
  - d) What are the uses of UDP (user datagram protocol)?
  - e) What are the issues to be considered while connecting different LANs using bridges?

- Q4)** Attempt any four of the following **[4 × 4 = 16]**
- a) Explain frequency hopping with advantages and disadvantages?
  - b) Write short note on GPRS.
  - c) How connection is established in TCP? What is SYN flooding attack? What are the strategies to alleviate the effects of a SYN attack?
  - d) What is the purpose of following methods in HTTP/
    - i) GET
    - ii) HEAD
    - iii) POST
    - iv) PUT
  - e) Explain path loss of radio signals with free space loss?

- Q5)** Attempt any four of the following **[4 × 4 = 16]**
- a) Explain system architecture of IEEE 802.11
  - b) Explain security issues in WAP?
  - c) Write a note on Pop3
  - d) What is WSP? What features offered by WSP for content exchange between client and server?
  - e) What are services offered by SCTP to application layer processes?



Total No. of Questions : 4]

SEAT No. :

**P714**

[Total No. of Pages : 3

**[4240] - 403**

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

**CS-403 : Distributed Database Systems**

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

*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.*

**Q1)** Attempt all

**[8 × 2 = 16]**

- a) What are promises of DDBMS?
- b) What are correctness criteria for fragmentation?
- c) State different steps in query decomposition?
- d) What are search strategy & search space?
- e) What is checkpointing?
- f) Write a short on the ways, concurrency control approaches can be classified.
- g) What is Phantom?
- h) Define :- i) Autonomy                      ii) Heterogeneity

**Q2)** Attempt any four

**[4 × 5 = 20]**

- a) Write a note on fragmentation & replication transparency?
- b) Differentiate between DDBMS & MDBMS?
- c) Write a note on “Layers of query processing”?
- d) Which are alternative design strategies for DDBMS? Explain any one in detail?
- e) Explain different types of transactions?

**P.T.O**

Q3) Attempt any four

[4 × 6 = 24]

- a) Explain whether following schedules are serial or non serial?  
S1 : {W1(x), R1(x), W1(x), W2(x), R2(x), W2(x), W2(y), R2(y),  
C2, W0(y), W0(y) C1}  
S2 : {R3(z), W2(x), W2(y), R1(x), R3(x), R2(z), R3(y), C3, W1(x),  
C2, C1}
- b) Simplify the following query & check whether it is semantically correct or not?

Select title, pname  
From emp, asg, proj  
Where emp.eno=asg.eno  
And Proj. pno=asg.pno  
And ename= "shane"  
And budget<=50000  
And Resp= "Analyst"

- c) Let Q={q1, q2, q3, q4, q5} be the set of queries, A={A1, A2, A3, A4, A5} be the set of attributes & S = {S1, S2, S3} be the set of site. Use the attribute usage value & access frequencies & Do the vertical fragmentation of set of attributes using BE algorithm.

|    | A1 | A2 | A3 | A4 | A5 |
|----|----|----|----|----|----|
| q1 | 0  | 1  | 1  | 0  | 1  |
| q2 | 1  | 1  | 1  | 0  | 1  |
| q3 | 1  | 0  | 0  | 1  | 1  |
| q4 | 0  | 0  | 1  | 0  | 0  |
| q5 | 1  | 1  | 1  | 0  | 0  |

Attribute usages matrix

|    | S1 | S2 | S3 |
|----|----|----|----|
| q1 | 15 | 25 | 0  |
| q2 | 10 | 0  | 15 |
| q3 | 0  | 40 | 10 |
| q4 | 0  | 15 | 0  |
| q5 | 0  | 10 | 0  |

Access frequencies

- d) Select ename, pname  
From emp, asg, proj  
Where dur < 36  
And emp.eno=asg.eno  
And asg.pno=proj.pno  
And (title= "system admin" or asg.pno > "p4")  
Apply INGRES algorithm to the above query & illustrate the successive detachments & sub substitutions by giving monorelation subqueries generated.

e) Consider relation,

asg(eno, pno, resp, dur)

proj(pno, pname, bud, loc)

Assume the proj & asg are horizontally fragmented as,

proj1 = pno < p2 and proj2 = pno > = p2

asg1 = pno < p2, asg2 = p2 < pno < p5 and asg3 = pno > = p5

Transform the query into operator tree,

Select pname

From asg, proj

Where as.pno = proj. pno

And bud < 25000

And dur = 24

**Q4)** Attempt any four

**[4 × 5 = 20]**

- a) Explain distributed reliability protocol?
- b) What are the information requirements during allocation?
- c) What is the difference between hierarchical deadlock detection & distributed deadlock detection?
- d) Write note on “out place-update”?
- e) Define the following terms,
  - i) Reliability
  - ii) Availability
  - iii) Failure
  - iv) Network partition
  - v) Fault



Total No. of Questions : 4]

SEAT No. :

**P715**

[Total No. of Pages : 2

**[4240] - 404**

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

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

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

*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:

**[8 × 2 = 16]**

- a) What is Reverse Engineering.
- b) Write the difference between aggregation and association.
- c) What is the use of extends relation in use case diagram.
- d) Which are the components in an interaction diagram.
- e) What is the significance of role names in an object diagram.
- f) What are Interfaces.
- g) Specify the types of testing.
- h) Generalization and inheritance are transitive across an arbitrary no. of levels. Justify whether True or False.

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

**[4 × 8 = 32]**

- a) A system is to be designed for a “Medical store”. Different suppliers supply medicines to this store. The customer purchases different medicines prescribed by the doctor. The system should check the manufacture date, expiry date etc. If the expiry date is over the medicines are sent back to the supplier. For each medicine the customer has to pay 4% of local tax extra. The system should keep the record of all medicines. It should also check for re-order level. The customer gets a bill which is generated by the system. Draw the Sequence diagram and Object diagram.

**P.T.O.**

- b) Draw all levels of DFD for Airline Reservation System. The passenger is required to fill in the details for his journey. The system Checks the availability and prepares a booking statement.
- c) Draw a component and deployment diagram for 'e-Learning System' where the students can search for specific topic of study.
- d) Draw state diagram and sequence diagram for considering different scenarios for mobile handset selection.
- e) Draw a State Transition and Activity diagram for different operations supported by Microwave.

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

- a) How are test cases designed for Object Oriented Software.
- b) Draw a sequence diagram for issuing books.
- c) Discuss inheritance and its types and polymorphism.
- d) Write a note on Agile UP.
- e) Explain UML architecture.

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

- a) Draw a class diagram for ATM banking system.
- b) Explain inter class test case design.
- c) Write a note on Generic components of OO Design model.
- d) Discuss importance and principles of modeling.
- e) Draw a component and deployment diagram for 'Satellite Communication System'.



Total No. of Questions : 5]

SEAT No. :

**P716**

[Total No. of Pages : 2

**[4240] - 501**

**M.C.A - III (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) *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 key wrapping?
- b) Explain packet sniffing.
- c) List features offered by PGP.
- d) Define security association database.
- e) What is IP address spoofing?
- f) What are objectives of blowfish algorithm?
- g) What is IPv6?
- h) List the features of authentication token.

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

**[4 × 4 = 16]**

- a) What is an active attack? Explain its types.
- b) Explain working of circuit gateway.
- c) Compare and contrast SSL and SET.
- d) How the digital certificate is verified.
- e) Explain in detail output transformation step of IDEA

**P.T.O**



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

- a) Explain screened subnet firewall.
- b) Compare MD5 with SHA-1.
- c) Explain contents of MIME header in an E-mail message
- d) How does certificate based authentication works?
- e) Explain cipher feedback mode of an algorithm.

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

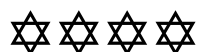
- a) Explain blowfish encryption process.
- b) Write a short note on variation of DES.
- c) What are the steps of a single SHA-1 iteration.
- d) How message digest are used to avoid the storage and transmission of clear text password?
- e) Explain AH transport mode and tunnel mode.

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

- a) Consider the plain text “RIO OLYMPICS” one time pad is “XMAYQNGHVRS”. Using vernam cipher construct the cipher text.
- b) Consider the values  $n = 3$ ,  $g = 7$ ,  $x = 4$  and  $y = 5$  Apply diffie-Hellman algorithm to generate keys  $K_1$  and  $K_2$ .
- c) Consider the plain text “4”. Let  $P = 7$ ,  $Q = 11$  Construct cipher text using RSA algorithm.
- d) Apply single columnar transposition technique with multiple rounds and convert the following plain text into cipher text.  
plain text : “keep faith always”  
No. of columns : 6.  
Order of columns : 6, 3, 2, 4, 1, 5
- e) Consider the plain text “CAP” and key matrix as

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

Use Hill-cipher method to construct the cipher text.



Total No. of Questions : 5]

SEAT No. :

P717

[Total No. of Pages : 2

**[4240] - 502**  
**M.C.A (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 digrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

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

**[8 × 2 = 16]**

- a) Give any two primary uses of php.
- b) What is the difference between = = and = = = operators? Give an example.
- c) Write one similarity & one difference between associative and indexed arrays.
- d) How to find number of properties & methods of given class?
- e) What do you mean by \$-SERVER global array?
- f) What is XML parser? State its type.
- g) What is JSON? Give two uses of it.
- h) What is type juggling?

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

**[4 × 4 = 16]**

- a) What are the different functions for parsing in XML?
- b) Explain different types of regular expressions supported by php?
- c) Explain serialization in php with suitable example.
- d) Explain different functions of extracting multiple values of an array.
- e) Write a note on self processing pages with example.

**P.T.O.**

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

- a) Write a php script to read directory name and extension from the user. Display the files with specified extension from that directory.
- b) Write a php script to create a base class employee, derive the class & then apply introspection builtin construct to find methods and processing of both.
- c) Write a php script, to accept a string from the user and check whether it is a palindrome or not. (Implement stack operations using array built in functions)
- d) Write a php script which accepts student information on first page, marks in four subjects on second page and display the names of students and average marks on third page using cookies.
- e) Write a php script to accept two strings from user. Compare these two strings using appropriate function and display message on submit button click.

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

- a) Explain how to send email from a php script?
- b) Explain various style sheets used in XML?
- c) Explain in brief session and cookies.
- d) How to use JSON in AJAX?
- e) Explain reading and writing files with suitable examples. Also explain modes of files.

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

- a) Explain in detail, variable parameter function in php with suitable example.
- b) Explain do-while and for each control structures with syntax and example.
- c) Explain any four global arrays that contain the EGPCS information.
- d) What are well formed and valid documents in XML? Explain.
- e) Which are the different PEAR. DB methods to provide information on a query result object? Explain in detail with example.



Total No. of Questions : 5]

SEAT No. :

**P718**

[Total No. of Pages : 2

**[4240] - 503**

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

**COMPUTER SCIENCE**

**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 the following:

**[8 × 2 = 16]**

- a) What is design pattern?
- b) What do you mean by Tee and Join pipeline system?
- c) Give intent of proxy design pattern.
- d) State collaboration of strategy design pattern.
- e) State participants of Decorator design pattern.
- f) What are advantages of layered architectural pattern?
- g) Define “Idiom”?
- h) “Idioms are highly portable between languages” comment.

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

**[4 × 4 = 16]**

- a) What is a pattern? What are a pattern categories?
- b) Discuss consequences of pipe and filter architectural pattern.
- c) Explain the step to implement Broker architectural pattern.
- d) What are benefits and liabilities of black board architectural pattern?
- e) Define model-view controller architectural pattern. Explain document view.

**P.T.O.**

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

- a) Explain how and when to use single tone design pattern.
- b) State motivation and applicability of prototype design pattern.
- c) Explain structure Participant and Implementation of abstract factory design pattern.
- d) What is difference between creational and structural design pattern?
- e) Explain the catalog organization of design pattern.

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

- a) How to use proxy pattern? State applicability and participant of proxy design pattern.
- b) Explain structure and participant Decorator design pattern.
- c) What are benefits and liabilities of adapter design pattern?
- d) Explain consequence prototype design pattern.
- e) What are difference between abstract factory and single tone design pattern?

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

- a) Explain structure and collaboration of command design pattern.
- b) What are benefits and liabilities of observer design pattern?
- c) Explain counted pointer Idioms.
- d) What are the strength and weakness of strategy design pattern?
- e) “Indented control flow style guide Idiom” comment.



Total No. of Questions : 5]

SEAT No. :

**P719**

[Total No. of Pages : 2

**[4240] - 504**

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

**COMPUTER SCIENCE**

**CS-505 : Software Testing and 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 the right indicate full marks.*

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

**[8 × 2 = 16]**

- a) Define drives.
- b) Define process capability indices.
- c) Explain testing GUI.
- d) What is quality movement?
- e) What is validation Testing?
- f) What is beta testing?
- g) Which are the features of win runner?
- h) What is the use of pareto diagram?

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

**[4 × 4 = 16]**

- a) What is stress testing and performance testing?
- b) Explain testing documents and help facilities.
- c) What are SQA activities?
- d) Explain scatter diagram with example.
- e) Explain quality costs for decision making.

**P.T.O**

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

**[4 × 4 = 16]**

- a) Which characteristics lead to testable software?
- b) Explain smoke testing.
- c) Explain attributes of effective software matrices.
- d) Explain software reviews.
- e) Explain nature of errors.

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

**[4 × 4 = 16]**

- a) Write steps required for model based testing.
- b) Explain top down integration testing.
- c) Explain function based matrices.
- d) Explain six sigma quality.
- e) Explain ISO-9000 quality standards.

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

**[4 × 4 = 16]**

- a) Write a short note on deployment testing.
- b) Discuss load runner in detail.
- c) Describe cyclomatic complexity.
- d) Explain loop testing in detail.
- e) What do you mean by testing of client server architecture?

