Total No. of Questions : 5]

SEAT No. : ____

P603

[Total No. of Pages : 3

[4340] - 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) ***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)
```
# include <stdio.h>
void main()
{    int i = 3, *j, k;
     j = ti;
Printf("%d\n", i**j *i+*j);
}
```

ii)
```
Void main()
{    int c = 97;
     switch (c)
{    case 'a':
     if (c > 3)
     Case 'b':
     c = 10
printf("%d", c);
}
```

iii)
```
Void main()
{    int x[25];
     x[0] = 100;
     x[24] = 400;
     Printf("\n%d%d", *x, *(x+24)+*(x+0));
}
```

P.T.O.

b) Find out the error and explain (any two) : **[2 × 4 = 8]**

i)
```
void main()
{   int ch
    switch (ch);
{   case 0;
    Printf("valid no\n")
    case 1;
    Printf(" Invalid no")
}
```

ii)
```
main()
{   int i, *j, *k;
    i = 2;
    j = 4i;
    k = j* 2;
Printf("%u /n", k);
}
```

iii)
```
main()
{
    struct employee
{
    char name [25];
    int   age;
    float salary;
}
    employee e;
    age = 25;
    salary = 10000;
    printf("\n%d d", e. age, salary);
}
```

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

a) Explain the concept of recursion with example.

b) What are the differences between structure and union? Illustrate with an example.

c) What is Dynamic memory allocation in 'C' language? State it's use.

d) What is an array? What are the advantages and disadvantages of an array?

e) Discuss the different storage classes in the 'C' language.

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

a) Write a ‘C’ program to convert decimal number to binary number.

b) Write a ‘C’ program for transpose of the matrix e.g.

7	4
5	6
1	2

Transpose matrix is

7	5	1
4	6	2

c) Write a ‘C’ program to check whether the given string is palindrome or not.

d) Write a recursive function to calculate sum of digits of given number.

e) Write a ‘C’ program to accept and display information of student (rollno, name, address, class) using structure.

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

a) Explain library functions provided in ‘C’ language to manipulate string.

b) Write down the difference between macro and function.

c) Explain different operations on pointers in ‘C’.

d) Give the difference between while and dowhile loop.

e) Explain basic datatypes in ‘C’ language.

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

a) Write a ‘C’ program to copy contents of one file to another. The filenames are passed using command line argument.

b) Write a ‘C’ program for menu driven operations on string using user defined function.

c) Write a ‘C’ program for matrix subtraction.

d) Write a ‘C’ program to accept a number from user & check whether the given number is armstrong number or not.

e) Write a ‘C’ program to display the first n prime numbers.

Total No. of Questions : 5]

SEAT No. : ____

P604

[Total No. of Pages : 2

[4340] - 102

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

COMPUTER SCIENCE

CS - 102 : Computer Architecture

(2008 Pattern)

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) Draw logic diagram of full adder circuit. Explain its working.

b) Explain following addressing modes of pentium microprocessor

i) Register addressing mode.

ii) Direct addressing.

c) State any four features of 8 bit ISA bus.

d) Explain 4-bit R-2R digital to analog converter.

e) Explain basic concept of parallel computer structure.

Q2) Attempt any two of the following : **[2 × 8 = 16]**

a) Explain level triggered J-K Flip flop. What is race around condition? How can it be removed?

b) State and explain the working of any four components of microprocessor.

c) Explain dual slope analog to digital converter. State its advantages over single slope ADC.

P.T.O.

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

a) What is flip-flop? Draw logic diagram of R-S flip-flop and write its truth-table.

b) Compare EISA and PCI bus.

c) State the size in number of bits and working of following registers of 64-bit microprocessor in real mode operation.

i) Source index ii) Code segment

d) What is interrupt? Explain in short interrupt processing.

e) Explain decimal to BCD encoder.

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

a) State any four features of pentium-pro microprocessor.

b) Explain with proper example, parallel processing by 'pipelining'.

c) Draw block diagram of I/O interface. Explain the function of 'Timing and control' block.

d) What is multiplexer? Explain 4 : 1 multiplexer with appropriate logic diagram.

e) Explain 'Universal Serial Bus'.

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

a) Draw neat block diagram of Intel-Math co-processor and explain its 'Numeric Execution unit'.

b) Explain 3 bit asynchronous Up-Down counter.

c) How does data get transferred between I/O device and RAM using DMA controller in computer system.

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Total No. of Questions : 5]

SEAT No. :

P605

[Total No. of Pages : 3

[4340] - 103

M.C.A. (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 A and B are sets. Show that $A-B = A \cap B^C$.

b) For any sets A and B, show that $(A \cup B)^C = A^C \cap B^C$.

c) Let ~ be a relation define on the set of integers Z by $x \sim y$ if and only if $3x + 4y$ is divisible by 7. Show that ~ is an equivalence relation.

d) Let $f : \left(\frac{-\pi}{2}, \frac{\pi}{2}\right) \longrightarrow R$ defined as $f(x) = \sin x$. Is f one-one and on-to function. Justify your answer.

e) Let $f : R \to R$ and $g : R \to R$, defined as $f(x) = 2x^2 + 3$ and $g(x) = \sin x$. Find

i) $(fog)(x)$ ii) $(gof)(x)$.

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

a) Let $a, b, c \in Z$, $a \neq 0$, if $a|b$ and $a|c$, then prove that $a|(bx + cy)$ for any $x, y \in Z$.

b) Find gcd of 942351 and 7214561.

c) Let a, b $\in Z$, $m \in Z$ be non zero.

If $a \equiv b \pmod m$ then prove that

$a^K \equiv b^K \pmod m$.

P.T.O.

d) Find all incongruent solutions of the congruence $gx \equiv 21 \pmod{30}$.

e) Let $Z_6 = \{0, 1, 2, 3, 4, 5\}$ be the set of residue classes modulo 6. Whether $+_6$ (addition modulo 6) and X_6 (multiplication modulo 6) are binary operations on the set Z_6? Justify your answer.

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

a) $S = \left\{ \begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix} \middle/ \alpha \in R \right\}$

Show that S is a group with respect to the usual multiplication of matrices.

b) Show that group G is abelian if and only if $(ab)^2 = a^2b^2$ for all $a,b \in G$.

c) Find inverse of the following matrix $A = \begin{bmatrix} 1 & 2 & 1 \\ -1 & 0 & 2 \\ 2 & 1 & -3 \end{bmatrix}$.

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

$x + 2y + 3z = 14$

$2x - y + 5z = 15$

$3x - 2y - 4z = -13$

e) Define following terms with proper example.

i) Transpose of matrix.

ii) Symmetric matrix.

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

a) By using truth table, show that statements $\sim(p \rightarrow q)$ and $(p \wedge \sim q)$ are logically equivalent.

b) Show that $(p \wedge q) \rightarrow (p \vee q)$ is a tautology.

c) Show that, if n^2 is an even integer then n is an even integer.

d) i) Rewrite the following proposition using symbols $\forall$ and $\exists$.

'All students are clever'

ii) Negate the following proposition.

'All good students study hard'

e) What is the truth value of the statement

'$\forall\, x\, (x^2 \geq x)$' if the domaim is,

i) set of all real numbers?

ii) set of all integers?

Justify your answer.

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

a) Find the solution for the system of congruences,
$x \equiv 5 \pmod{11}$, $x \equiv 14 \pmod{29}$, $x \equiv 15 \pmod{31}$.

b) Find gcd of following polynomials and express it their linear combination.
$p(x) = x^2 + 2x + 4$, $q(x) = x^4 + 3x^3 + 2x + 1$.

c) Let $\rho = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 2 & 1 & 4 & 5 & 3 & 7 & 8 & 9 & 6 \end{pmatrix}$.

i) Express ρ as product of disjoint cycles.
ii) Express ρ as product of transpositions.
iii) Whether ρ is odd or even.?
iv) Find order of ρ.
v) Find ρ^{-1}.
vi) Whether ρ^{-1} is odd or even?
vii) Find order of ρ^{-1}.
viii) Find $\rho\ \rho^{-1}$.

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Total No. of Questions : 5]

SEAT No. : ____

P606

[Total No. of Pages : 4

[4340] - 104

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

MATHEMATICS

CS - 105: Graph Theory

(2008 Pattern)

Time : 3 Hours] ***[Max. Marks :80***

Instructions to the candidates:

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

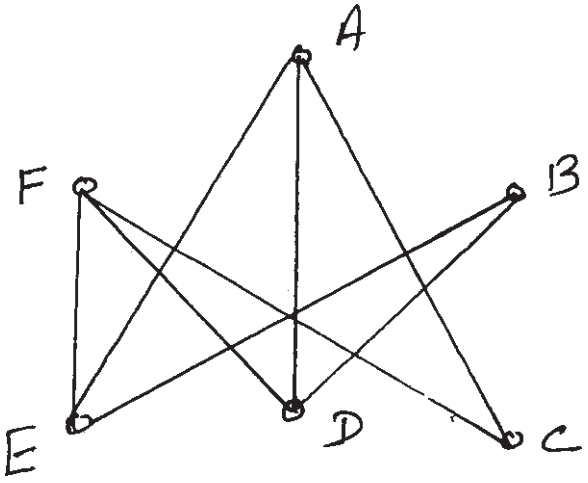
Q1) a) Attempt each of following : **[8]**

i) What is the complement of a null graph on n vertices.

ii) Draw the graph whose incidence matrix is

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

iii) Determine whether the following graph is bipartite



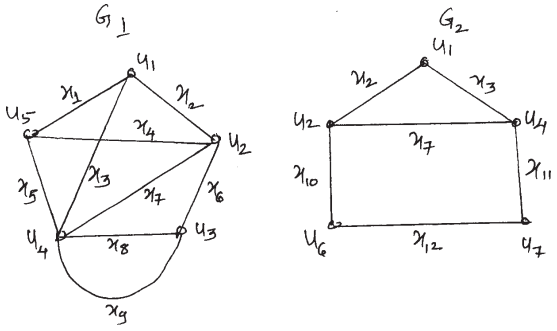
P.T.O.

iv) What is the homogeneous solution of the recurrence relation

$a_n = -4\ a_{n-1} + 3a_{n-2} + 18\ a_{n-3}$

v) Give an example of a weakly connected graph that is not strongly connected.

vi) Find the ring-sum of the following graphs.



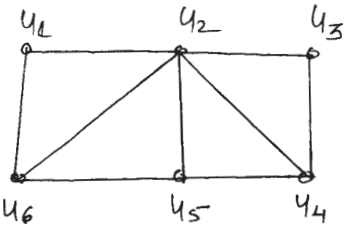
vii) Write the definition of the weighted graph.

viii) State if the following sentence is 'true' or 'false' : Every Vertex of a tree on n vertices ($n \geq 3$) is a cut vertex.

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

i) Draw all possible non-isomorphic simple graphs on 4 vertices.

ii) List all paths of length 3 from the vertex u_1 to vertex u_4 in the following graph.

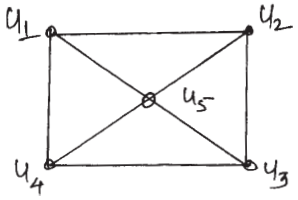


iii) Given any two vertices u and v of a graph G, prove that every $u - v$ walk contains a $u - v$ path.

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

a) If u is a vertex of odd degree in a graph G, then prove that there must be a path in G from u to another vertex v of odd degree.

b) Compute eccentricities of all vertices of the following graph.



Hence, find radius and diameter of the given graph.

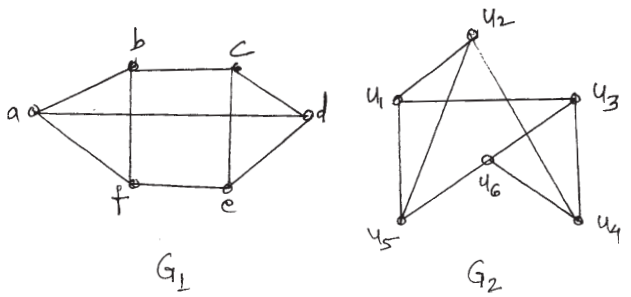
c) If degree of every vertex of a connected graph G is even, then prove that G is Eulerian.

d) Give an example of a graph that is Hamiltonian, but not Eulerian. Justify your answer.

e) Give an example of a graph with vertex connectivity k(G) = 3 and edge connectivity $\lambda(G) = 5$. Justify your answer.

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

a) Determine if the following graphs G_1 and G_2 are isomorphic.



b) Explain the travelling salesman problem.

c) Write the definition of complete symmetric and complete asymmetric digraphs. Give their examples also.

d) Determine the vertex connectivity of a complete bipartite graph Km,n.

e) Solve the recurrence relation :

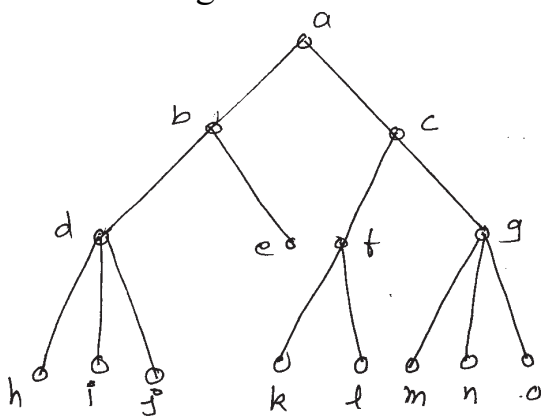
$a_n = 2^n + 4\ a_{n-1} + 5\ a_{n-2}$; $n \geq 2$ and $a_0 = 1$, $a_1 = 2$.

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

a) Find the value of the following expression in polish notation :

* + 3 + 3 ↑ 3 + 3 3 3

b) Consider the following ordered rooted tree.



Find the order in which the vertices of the given ordered rooted tree be visited by using (α) inorder traversal, (β) postorder traversal.

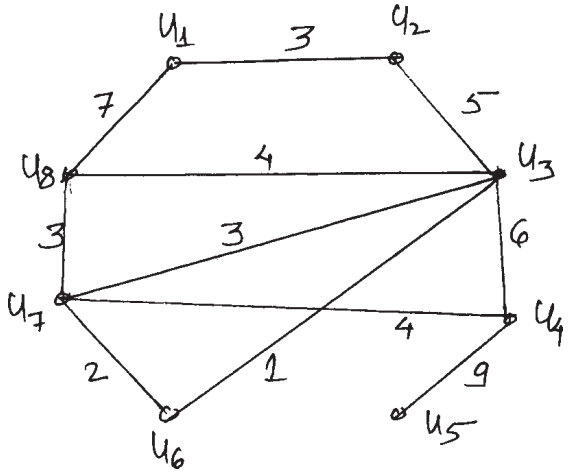
c) If T is a tree with n vertices, then prove that it has (n – 1) edges.

d) Define Binary tree and prove that the number of pendant vertices in a binary tree with n vertices is $\left(\frac{n+1}{2}\right)$.

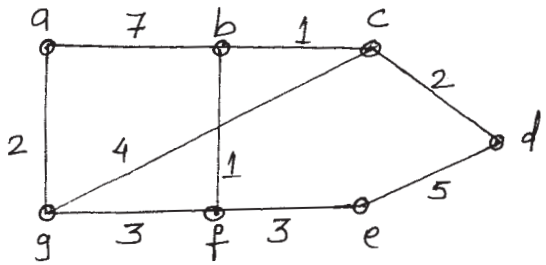
e) If G has 17 edges, then find the maximum possible number of vertices of G.

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

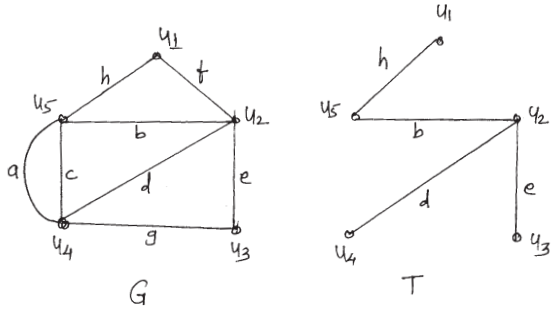
a) Find the minimal spanning tree of the following weighted connected graph, using Prim's algorithm.



b) 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.



c) Consider the following graph G and it's spanning tree T. List all fundamental circuits and cutsets of G with respect to T.



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Total No. of Questions : 5]

SEAT No. : ____

P607

[Total No. of Pages : 3

[4340] - 201

MCA - I (Science Faculty)

CS - 201 : Data and File Structures Using 'C'

(2008 Pattern) (Semester - II)

Time : 3 Hours] ***[Max. Marks :80***

Instructions to the candidates:

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

Q1) Attempt any four of the following : **[4 × 4 = 16]**

a) i) Write short note on Array as ADT.

ii) Consider an array A[2][3]. How do you represent it using row major and column major representation?

b) Explain sparse indexing in brief.

c) Write a 'C' function to create linked list using array representation and another function to display the list.

d) What are the different types of linked list? Explain in brief.

e) Define stack. How stack is represented using linked list. List the applications of stack.

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

a) Explain two types of graphs. Discuss various applications of graph.

b) Write the algorithm to convert prefix expression to infix expression.

c) Write following 'C' functions for static queue representation.

i) DeleteQ ( )

ii) Isempty Queue ( )

d) Write a 'C' function to delete a element from linked list at any given position. The list is declared as -

```
Struct node
{
    int  data;
    struct  node  *next;}
```

P.T.O.

e) Explain the following rotations which are performed to balance a tree.

i) RR rotation

ii) RL rotation.

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

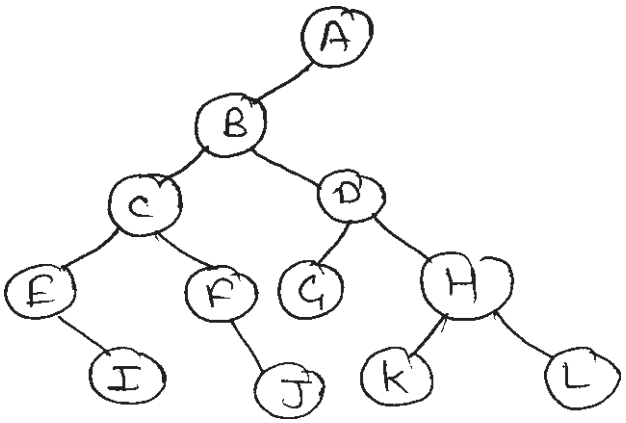
a) Convert following infix expression to postfix expression. Show operand stack and operator stack contents at each step.

((A + B) * C)

b) Define circular queue. what is full circular queue? What are different solutions to cheque if queue full?

c) Write short note on doubly linked list.

d) Find preorder, postorder and inorder tree traversal for following binary tree.



e) Sort following data using Heap sort. Show all iterations.

26, 5, 77, 1, 61, 11, 59, 15

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

a) Write a 'C' function to concatenate two linked lists.

b) Write algorithm to multiply two polynomials.

c) Construct BST for following elements. Show all iterations.

10, 20, 15, 5, 1, 6, 13.

d) Write short note on primary indexing.

e) Write a 'c' function for bubble sort.

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

a) Sort the following numbers using merge sort.

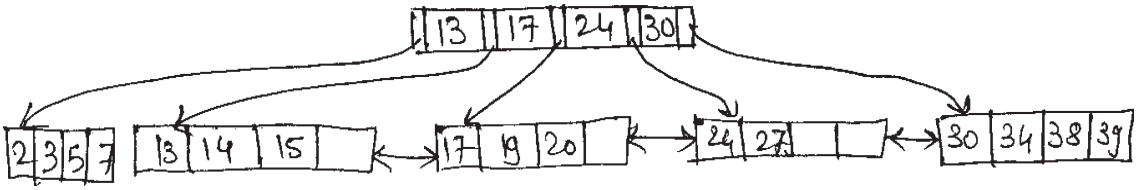
9, 5, 6, 10, 15, 17, 13, 2, 25, 3.

b) Write algorithm of Binary search method for an array of integer.

c) Write the steps of BFS algorithm.

d) What is B+ tree structure? Give characteristics of B+ tree.

e) Consider following B+ tree.



i) Show the B+ tree after deleting element 14.

ii) Show the B+ tree after inserting element 4.

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Total No. of Questions : 5]

SEAT No. :

P608

[Total No. of Pages : 4

[4340] - 202

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

COMPUTER SCIENCE

CS - 202 : Theoretical Computer Science

(2008 Pattern)

Time : 3 Hours] *[Max. Marks :80*

Instructions to the candidates:

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

Q1) Attempt all of the following : **[8 × 2 = 16]**

a) Write regular expression and draw NFA for all strings starting with 'a' and ending with 'b' over {a, b}.

b) State pumping lemma for Regular set.

c) Define Recursive Enumerable Language. Give one example.

d) What is Equivalence Relation. Give one example.

e) List Prefixes and Suffixes of a string "abcd".

f) Explain Finite and Infinite sets with examples.

g) What is ambiguous grammar. Give one example.

h) State True or False and Justify. DPDA and NPDA are not equivalent.

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

a) Construct DFA to accept all strings over {a, b} such that if it starts with 'a' then it should contain even number of b's and if it starts with 'b' then it should contain odd number of a's.

b) Convert the following CFG into CNF.

$S \rightarrow aB \mid bA$

$A \rightarrow a \mid aS \mid bAA$

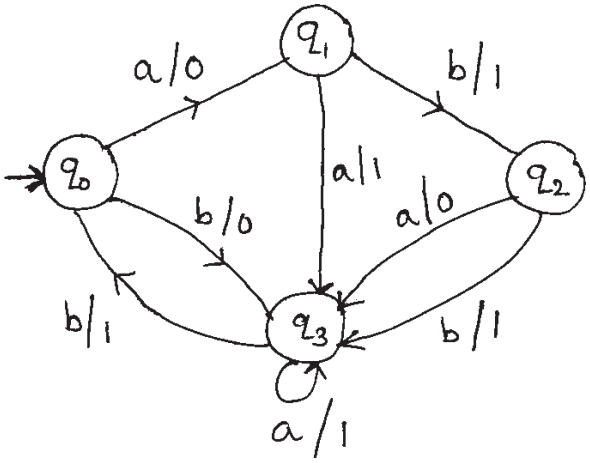
$B \rightarrow b \mid bS \mid aBB$

P.T.O.

c) Prove that Regular sets are closed under Intersection.

d) Construct PDA for L = $\{0^m\ 1^n\ 2^P \mid m, n \geq 1, P = m + n\}$

e) Construct Moore Machine equivalent to the following Mealy Machine.



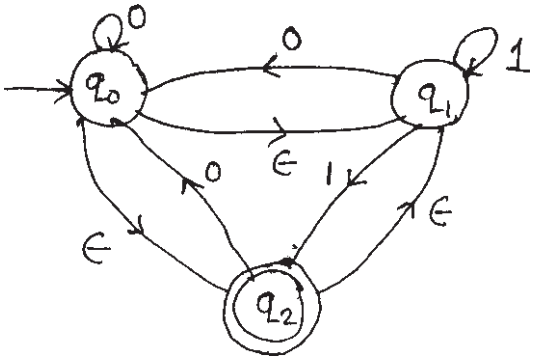
Q3) Attempt any four of the following : **[4 × 4 = 16]**

a) Construct CFG for L = $L_1 \cup L_2$ where

$L_1 = \{ a^n ba^{2n} \mid n \geq 0\}$

$L_2 = \{ a^n b^m \mid n, m \geq 1\}$

b) Construct DFA equivalent to the following NFA with $\in$ - transition.



c) Construct PDA equivalent to the following CFG.

$S \rightarrow 0A0$

$A \rightarrow 0A1 \mid B$

$B \rightarrow 1B \mid 1$

d) Construct T.M for L = $\{a^n bc^{n+2} \mid n \geq 1\}$

e) i) Rewrite the following grammar by eliminating $\in$ - productions.

$S \rightarrow 0A1B \mid A01$

$A \rightarrow B01 \mid \in$

$B \rightarrow B0 \mid \in$

ii) Rewrite the following grammar by eliminating unit productions.

$S \rightarrow A \mid bb$

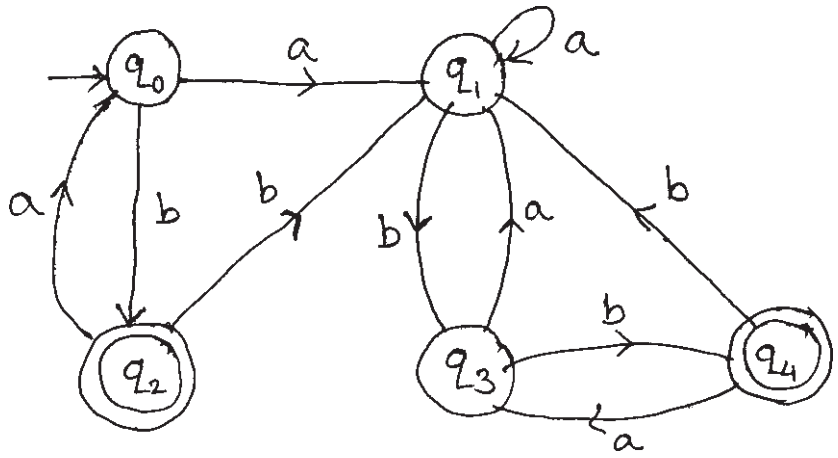
$A \rightarrow B \mid b$

$B \rightarrow S \mid a$

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

a) Construct PDA for $L = \{a^n b^n c^m d^m \mid n,m \geq 1\}$

b) Minimize the following DFA.



c) Prove that the language $L = \{a^n b^m c^n d^m \mid n, m \geq 0\}$ is context free using pumping lemma.

d) Convert the following CFG into GNF.

$S \rightarrow AB \mid B$

$A \rightarrow BS$

$B \rightarrow A1 \mid 1$

e) Construct Mealy Machine that counts the occurances of substring 'bac' in a string over {a, b, c}.

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

a) Construct T.M for $L = \{a^n b^m \mid n > m, m \geq 1\}$

b) Construct CFG equivalent to the following PDA

$M = (\{q_0, q_1\}, \{0, 1\}, \{X, Z_0\}, \delta, q_0, Z_0, \phi)$ where δ is given as

$\delta (q_0, 1, Z_0) = (q_0, XZ_0)$

$\delta (q_0, 1, X) = (q_0, XX)$

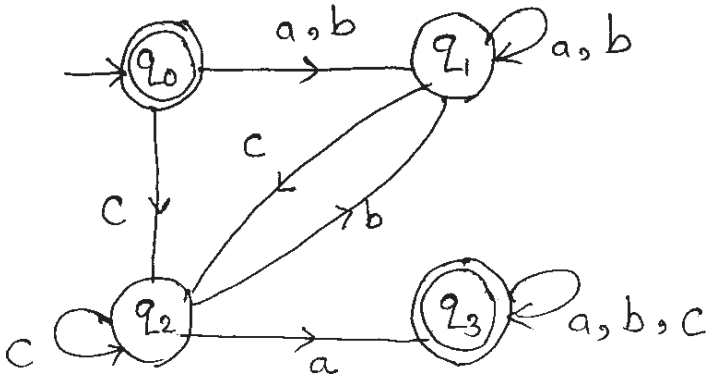
$\delta (q_0, 0, X) = (q_1, X)$

$\delta (q_0, \in, Z_0) = (q_0, \in)$

$\delta (q_1, 1, X) = (q_1, \in)$

$\delta (q_1, 0, Z_0) = (q_0, Z_0)$

c) Construct Regular Grammar for the following DFA.



d) Construct the following CFG without useless symbols if any. Justify your answer.

$S \rightarrow AB \mid CA$

$B \rightarrow BC \mid AB$

$A \rightarrow a$

$C \rightarrow aB \mid b$

$D \rightarrow SS \mid d$

e) Construct NFA for Regular Expression.

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

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Total No. of Questions : 5]

SEAT No. : ____

P609

[Total No. of Pages : 3

[4340] - 203

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

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

(2008 Pattern)

Time : 3 Hours] ***[Max. Marks :80***

Instructions to the candidates:

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

Q1) Attempt all of the following : **[8 × 2 = 16]**

a) Give any two characteristics of object oriented programming.

b) List the operators which can not be overloaded with friend function.

c) "A function returns a reference". Justify.

d) Write syntax for creating manipulate.

e) What is template function? Give its syntax.

f) Explain following functions :

i) width ( ) ii) fill ( )

g) List any two file mode parameter. Also writes its meaning.

h) Explain copy constructor. Give its syntax.

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

a) Explain the following with syntax

i) try ii) throw iii) catch

b) What are static data members? Explain with example.

c) Explain class template for vector in C++. Also define appropriate constructor and member function.

d) Explain single private inheritance with example.

e) Write characteristics of constructors.

P.T.O.

Q3) Attempt any two of the following : **[2 × 8 = 16]**

a) Write a C++ program to overload the following operators for class string

i) ! operator to change case of a string object.

ii) Binary + operator for concatenation.

iii) = = equality.

b) Write a C++ program to read data from a file cout number of lines and characters from a file and write this output to the another file. Display contents of another file.

c) Write a C++ program for performing mathematic operations like +, –, * and / (division). For this accept positive integer values from user. Raise an exception if input number is negative. Also for division operation if the denominator is zero, then raise an appropriate exception.

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

a) Write a short note on an inline function.

b) What do you mean by iterators? Also explain its types.

c) How operator overloading function is invoked if defined as

i) member function.

ii) friend function.

d) Write a C++ program to accept records of 'n' players and store it in an array.

Consider class player with player-id, player-name totalscore as data members.

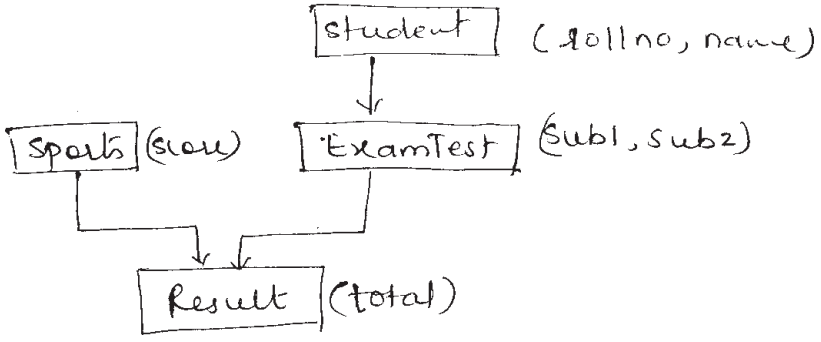
Write member functions for

i) Accepting data of n players.

ii) Display.

iii) Search player record with total score > 1000.

e) Write a C++ program to implement following :



Write appropriate member function in each class.

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

a) Explain concept of constructors in derived class with example.

b) Explain use of get( ) and put( ) functions for handling files with example.

c) Explain Runtime polymorphism with example.

d) Identify the error in the following program

```
Class Human
{     public :   Human ( ) {}
                 virtual ~ Human ( )
                 { cout << " Human : : ~ Human";}
};
Class Student : public Human
{ public : Student ( ) {  }
           ~ Student (  )
           {cout << "Student : : ~ Student ( )";}
};
void main ( )
{     Human *H = new Student ( );
      delete H ;
}
```

e) What is virutal base class? Explain with example.

Total No. of Questions : 5]

SEAT No. : ____

P610

[Total No. of Pages : 4

[4340] - 204

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

COMPUTER SCIENCE

CS - 205 : Database Management Systems

(2008 Pattern)

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 all of the following : **[8 × 2 = 16]**

a) What is deadlock? State any two prevention techniques of deadlock.

b) State the responsibilities of DBA.

c) What is Query language? State any two categories of it.

d) State all properties of transation.

e) Explain :

i) Null value ii) Foreign key

f) Define first normal form.

g) State the purpose and syntax of IN clause in SQL.

h) Explain how to test conflict serializability.

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

a) Explain Database architecture with diagram.

b) What are the disadvantages of file processing.

c) Explain different types of attributes in E-R diagram.

d) What is mapping cardinality? Discuss types of mapping cardinality.

e) The following is the list representing the sequence of events in an interleaved execution of set transaction T_1, T_2, T_3 and T_4 assuming two phase locking protocol (X is exclusive, S is shared).

P.T.O.

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_4	Lock (B, S)
t_5	T_1	Lock (B, X)
t_6	T_2	Lock (C, X)
t_7	T_3	Lock (D, S)
t_8	T_4	Lock (D, X)

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

a) Explain any four aggregate function.

b) Explain Armstrong's axims required to compute F^+.

c) What is transaction? Explain ACID properties of transactions.

d) Explain serializability.

e) Compute X^+ of X where X = BCD
F = {A → BC, CD → E, E → C, D → AEH, ABH → BD, DH → BC}

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

a) Give implementation of Atomicity & durability.

b) Consider the following RDB
dept (dno, dname, loc, mgrcode)
emp (empno, ename, desig)
project (pno, pname, status)
dept and emp are related as 1 to many project and emp are related as 1 to many write following queries.

i) List all employee of 'Inventory' dept of 'Pune' location.

ii) Give the names of employees who are working on 'Blood bank' project.

iii) Give the name of managers from 'Marketing' dept.

iv) List the employees whose desig is 'Manager'.

c)

T_0	T_1
Read (x)	Read (x)
$x = x - M$	$x = x + N$
Write (x)	Write (x)
Read (y)	
$y = y + M$	
Write (y)	

Give at least 2 non serial schedule.

d) Explain various users of DBMS.

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

a) Explain timestamp Based protocol in detail.

b) The log corresponding to a particular schedule for three transaction T_1, T_2, T_3 is as follows :

[Start, T_1]

[Read, T_1, D]

[Write, T_1, D, 20]

[Commit, T_1]

[Checkpoint]

[Start, T_2]

[Read, T_2, B]

[Write, T_2, B, 12]

[Start, T_3]

[Write, T_3, A, 20]

[Read, T_2, D]

[Write, T_2, D, 25] ← System crash If deffered update with checkpoint is used, what will be the recovery procedure?

c) Consider the following relations.

Doctor (dno, dname, specialization)

Hospital (hospno, name, address)

Doctor and Hospital are related with many to many relation, with attribute day-of-visit.

Create a RDB for above and solve the following Queries.

i) List the name of Doctors visiting

‘Joshi Hospital’ on Monday.

ii) List the names of the Hospitals in ‘Pune’ city, which has more than 10 doctors of ‘surgeon’ specially, visiting it.

iii) Delete all Doctors with specialization ‘gynaec’.

d) ‘Star’ is an agency for flat booking and it has number of builders and agents who are jointly working. A customer can get a flat for residential or commercial purpose. If customer is approached through an agent, the agency and builders are giving some commission to the agent. Agent shows various flats and sites within various location. Study the above case and do the following.

i) Design an E-R diagram.

ii) Identify all entities.

e) The following is, list of events in an interleaved execution of set of transactions T_1, T_2, T_3, T_4 with two phase locking protocol.

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)

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

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Total No. of Questions : 4]

SEAT No. :

P611

[Total No. of Pages : 3

[4340] - 301

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

CS - 301: Design & Analysis of Algorithms

(2008 Pattern)

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 : **[8 × 2 = 16]**

a) How many average number of comparisons are made by binary search in the given array for successful search? Assume that each key is searched for with the same probability.

(4, 20, 25, 30, 40, 42, 50, 52, 60, 70, 80, 90, 95, 98, 100)

b) Write control abstraction for divide-and - conquer.

c) What do you mean by edge relaxation? Give one example.

d) State two conditions under which a search path at the current node in a state-space tree of branch-and-bound algorithms is terminated.

e) Draw diagram which reflects the relationship among P, NP, NP - complete, and NP - hard.

f) Define space and time complexity of an algorithm.

g) What do you mean by maximum bipartite matching?

h) What do you mean by m-colorability optimization problem?

Q2) Attempt any four : **[4 × 5 = 20]**

a) Consider the following string and perform encoding and draw decode tree.

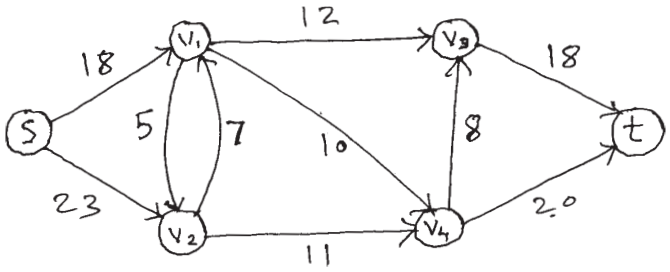
"beep boop beer".

P.T.O.

b) Consider the following TSP instance defined by the following cost matrix. Obtain reduced cost matrix. Which node will be selected in LCBB method?

$$\begin{bmatrix} \infty & 20 & 30 & 10 \\ 15 & \infty & 16 & 4 \\ 3 & 5 & \infty & 2 \\ 19 & 6 & 18 & \infty \end{bmatrix}$$

c) Illustrate Ford-Fulkerson algorithm on the following network to find maximum flow where 's' is the source and 't' is the sink.



d) If 2 queens are placed at positions (i, j) and (k, l) then how do you test whether they are on the same diagonal or not? Does solution exist for n-queens problem if n = 3? Justify.

e) What is string transformation problem? Find minimum cost edit sequence that transforms X into Y.

X = babb, Y = aabab.

Q3) Attempt any four : **[4 × 8 = 32]**

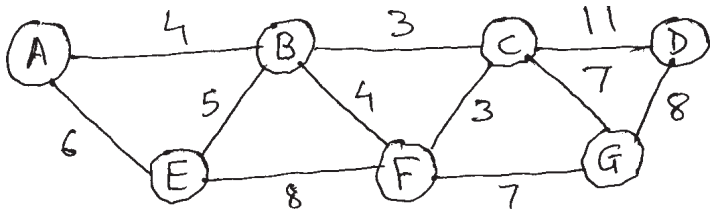
a) i) Prove that count sort is stable. Use the following data for proof.

[6, 4, 5, 4, 3, 6, 5, 2, 1]

ii) Apply Heap sort on the following data.

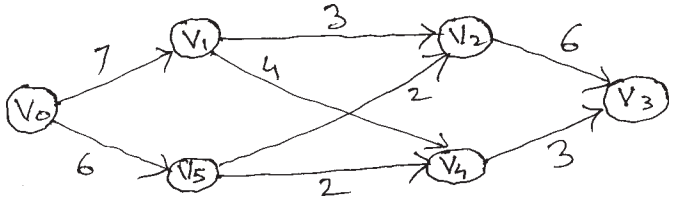
[89, 58, 64, 49, 51, 57, 59, 62, 58]

b) Apply Prim's & Kruskal's algorithm for constructing minimum spanning tree on the following graph.



c) State and solve recurrence relation for strassen's matrix multiplication.

d) Can a shortest path contain a cycle? Justify. What is zero-weight cycle? Can we remove it? Apply Dijkstra's algorithm on the following graph.



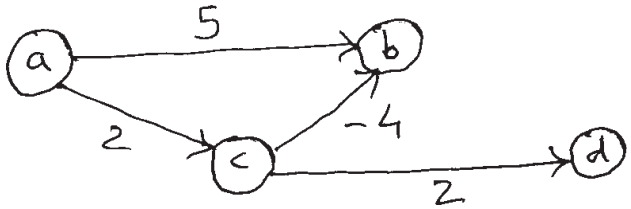
e) i) Find an optimal merge pattern for five sorted files (x_1, ..., x_5) with sizes (45, 48, 51, 39, 53).

ii) Let m = 22, w = {5, 7, 10, 12}. Find all possible subsets of w that sum to m using state space tree and fixed tuple formulation.

Q4) Attempt any three : **[3 × 4 = 12]**

a) Consider 0/1 Knapsack problem with n = 3, w = (3, 2, 5), p = (6, 7, 4). Obtain solution vector and determine optimal profit for the Knapsack of capacity 8 using merge and purge method.

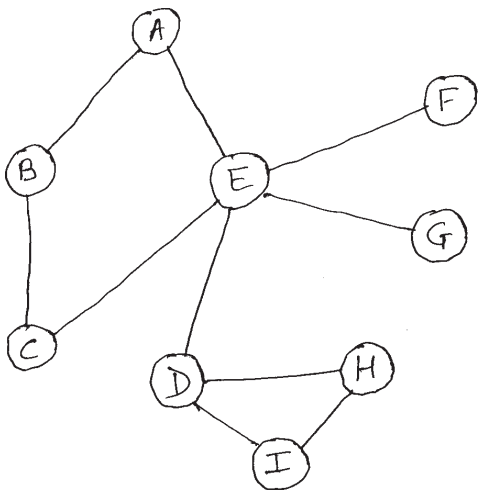
b) Apply Bellman Ford algorithm on the following graph. Assume source is 'a'.



c) Differentiate between brute force search and backtracking algorithm. Explain with example given below. "Find 3 - bit binary numbers having at least 2 1's in it.

d) What do you mean by asymptotic notations? State why asymptotic notations can be "somewhat" misleading.

e) Apply BFS on the following graph. Assume starting vertex is H.



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Total No. of Questions : 5] **SEAT No. :**

P612 **[Total No. of Pages : 2**

[4340] - 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) ***Neat diagrams must be drawn wherever necessary.***
2) ***All questions carry equal marks.***
3) ***Assume suitable data, if necessary.***
4) ***All questions are compulsory.***

Q1) Attempt all of the following : **[8 × 2 = 16]**

a) Define protocol stack.

b) A network with bandwidth of 10 Mbps can pass only an average of 12,000 frames per minute with each frame carrying an average of 10,000 bits. What is the throughput of this network?

c) What is piggybacking? When it is useful?

d) What is token management?

e) What is classful addressing?

f) Show the NRZ-L and manchester encoding for the bit stream - 00101101.

g) Draw and explain mesh and star topology.

h) Draw TCP/IP protocol suite.

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

a) Define protocol. What are its key elements?

b) Explain the access method of wired LAN.

c) Construct CRC message for the given polynomial.
$x^7 + x^5 + x^2 + x$ and generator polynomial $x^3 + x^2 + 1$.

d) Compare copper wire with fiber optic.

e) What is NAT? Why it is required?

P.T.O.

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

a) What are the functions of data link layer and network layer?

b) What is pipelining? Explain any one protocol used for pipelining.

c) Compare circuit switching and message switching with timing diagram.

d) Discuss different properties of routing algorithm.

e) What is congestion? Discuss data link layer policies to avoid congestion.

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

a) Draw and explain provider based unicast addressing of IPV6.

b) What is the difference between frequency and time division multiplexing?

c) Compare datagram subnet and virtual circuit subnet.

d) Explain Hamming code method to correct burst errors.

e) What is computer Network? What are its goals?

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

a) Compare and contrast OSI and TCP/IP reference model.

b) Why preamble field is required in ethernet?

c) Which factors affect network performance?

d) Explain VLAN with its advantages.

e) What is binary exponential back off algorithm? Why it is used in CSMA/CD and CSMA/CA?

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Total No. of Questions : 5]

SEAT No. :

P613

[Total No. of Pages : 3

[4340] - 303

M.C.A. - II (Science Faculty) (Semester - III)

COMPUTER SCIENCE

CS - 303 : Introduction to System Programming and Operating System Concepts

(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) Define force ( ) system call.

b) What is compiler?

c) What is the role of the medium term scheduler?

d) What is the role of the dispatcher?

e) Define content switch time.

f) What are pre-emptive scheduling algorithm.

g) What is aging?

h) What is the sob queue?

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

a) Explain in brief different techniques of memory allocation.

b) Explain the structure of process control block.

c) Define the following terms :

i) Waiting time ii) Response time

iii) Throughput iv) Turn around time

d) Write a short note on thread libraries.

e) Explain the directory structure.

P.T.O.

Q3) Attempt <u>any four</u> 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
P_1	0	7
P_2	2	4
P_3	4	1
P_4	5	4

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

b) Consider the following reference string

1, 3, 3, 2, 5, 4, 5, 4, 1, 4, 2, 2, 5

How many page fault will occur for the following algorithm with 4 page frames.

i) LRU ii) Optimum page replacement

c) Suppose the head of a moving head with 300 tracks numbered 0 to 299 is currently at 10. If a request in queue are

98, 250, 150, 14, 50, 100, 65, 75.

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

i) C-SCAN ii) C-Look

d) Explain any four components of the system programs.

e) Consider the following snapshot of a system. A system has 4 processes with P_0 through P_3 and three resource types A, B, C.

Resource type has 10 instances, 'B' has 5 & 'C' has 7 instances

Process Name	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P_0	0	1	0	7	5	3	3	3	2
P_1	2	0	0	3	2	2			
P_2	3	0	2	9	0	2			
P_3	2	1	1	2	2	2			

Answer the following questions using Banker's algorithm.

i) What is the content of matrix need?

ii) Is the system in a safe state.

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

a) What is critical section?

b) Write a short note on Process synchronization.

c) Explain different file allocation methods.

d) Explain the concept of device driver.

e) Explain multilevel queue.

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

a) Explain dinning philosophers problem.

b) Explain the deadlock detection and recovery.

c) What are page faults? Describe the actions taken by operating system when a page fault occur.

d) Explain logical and physical addresses. How logical address is converted into physical address in paging.

e) Write a short note on Interrupt Handler.

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Total No. of Questions : 5]

SEAT No. :

P614

[Total No. of Pages : 3

[4340] - 304

M.C.A. (Science Faculty)

CS - 305 : Event Driven Programming (Win32 SDK)

(2008 Pattern) (Semester - III)

Time : 3 Hours] ***[Max. Marks :80***

Instructions to the candidates:

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

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 movies along with their release date.
- Accept-opens a dialog box to accept movie info (name, director name, release date). The record gets stored in the database When OK button is clicked.
- On selecting a movie name, entire record of that movie is displayed.

[12]

Q2) Write program statements using Win32 APIs for any four of the following: (WinMain Not required) **[4 × 5 = 20]**

a) Define a list box on left side of the client area to display all files and sub-directories. When any file name is double clicked, then it shows the contents of that file on the right side of the client area.

b) Divide the client area into a 5-by-5 array of 25 rectangles. If you click on one of the rectangles using mouse, the rectangle is filled with an 'X'. If you click there again, the 'X' is removed.

P.T.O.

c) Displays the current time on the client area using a simulated LED-like 7-segment display.

d) Create and display "About" dialog box showing the name & icon of the program, a copyright notice, & a push button labeled 'OK'.

e) Create elliptical push buttons labeled 'OK' and 'Cancel' on the dialog box.

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

a) What will happen if Wndproc contains the following code :

Case WM_SYSKEY DOWN : Case WM_SYSKEYUP :

Case WM_SYSCHAR : return 0;

b) How child talks to its parent?

c) What is metafile? How enhanced metafiles differ from old metafiles?

d) How application can determine whether a child window is enabled or not?

e) Which sections are part of a memory-based DIB in the packed-DIB format?

f) How static child windows are different from non-static child windows?

g) What needs to be done for recognizing mouse double-click messages by the application?

h) What do you mean by fixed-pitch font? Variable-Pitch font?

i) What is 1/10-second rule?

j) What is the difference between object library and import library?

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

a) DLLs can have extension. exe.

b) 32-bit versions of windows have a serialized message queue.

c) The metafile must be a memory-based metafile.

d) Textout is more efficient than Draw Text.

e) The 'Set DIBits To Device' function can stretch or shrink a DIB before display.

f) 'Select object' can only work with monochrome bitmaps.

g) Clipboard can only work with locked memory handles.

h) In MDI, frame window is child of client window.

Q5) Attempt <u>any four</u> : **[4 × 5 = 20]**

a) Explain mouse capture in detail.

b) Discuss various methods to obtain device context handle.

c) Give APIs for building a better scroll bar.

d) What are the contents of lparam & wparam for WM_COMMAND message?

e) Give differences between modal and modeless dialog box.

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Total No. of Questions : 5]

SEAT No. : ____

P615

[Total No. of Pages : 3

[4340] - 401

M.C.A. (Under Science Faculty) (Semester - IV)

CS - 401 : Introduction To Unix And Unix Internals

(2008 Pattern)

Time : 3 Hours] ***[Max. Marks :80***

Instructions to the candidates:

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

Q1) Attempt all of the following : **[8 × 2 = 16]**

a) What do you mean by processor execution level?

b) What is boot block?

c) What are the two parts of Buffer?

d) List any four fields of Superblock.

e) What is difference between named and unnamed pipe?

f) What are the contents of region table entry?

g) Write syntax and usage of kill().

h) What is environment variable? Write its syntax.

Q2) State whether the following statements are true or false. **[4 × 4 = 16]**
Justify your answer.(Any Four)

a) The kernel is sometimes said to be non-preemptive.

b) A disk block can never map into more than one buffer at a time.

c) An inode is never locked across the system call.

d) In a link system call,a single process could also deadlock.

e) Growreg() is never called by the kernel for text region.

P.T.O.

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

a) Explain the block diagram of system kernel.

b) Explain race condition in assigning inodes.

c) What are the two anomalies in sleep system call.

d) What are the four cases for reading and writing pipes?

e) Calculate Block number and Byte Offset into Block for inode number 400.Assuming that Block 3 is beginning of the inode list. Each inode is of 128 bytes and one disk block is of 1kB.

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

a) Explain the behaviour of the following program.

```
#include <fcntl.h>
main()
{
        int fd1,fd2;
        char buf1[512],buf2[512];
        fd1=open("/etc/passwd",O_RDONLY);
        fd2=open("/etc/passwd",O_RDONLY);
        read(fd 1,buf1,sizeof(buf1));
        read(fd2,buf2 ,sizeof(buf2));
}
```

b) Write C program for demonstrating race condition in catching Signal.

c) Write a shell script to print the information of all files in current directory in the following format

Name of the File

Directory Yes or No

Date of last modification

Size

d) Explain the behaviour of the following program.

```
#include<fcntl.h>
main()
{
int i,j;
char bufl[512],buf2[512];
i=open("/etc/passwd",O_RDONLY);
j=dup(i);
read(i,bufl,sizeof(buf1));
read (j,buf2,sizeof(buf2));
close(i);
read (j,buf2,sizeof(buf2));
```

e) Explain the behaviour of the following program

```
int global;
main()
{
int local;
local=2;
if (vfork()== 0)
{
      /*child* /
      global=4;     /*Write parent data space*/
      local= 5;     /*Write parent stack*/
      _exit();
}
printf("global %d local %d\n" ,global,local);
}
```

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

a) Explain the working of page stealer process with neat diagram.

b) What are the functions of clock interrupt handler?

c) How process responds to "death of child signal"?

d) Explain four circumstances in which kernel can do context switch.

e) What is context of a process? Explain its three types.

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Total No. of Questions : 5]

SEAT No. : ____

P616

[Total No. of Pages : 2

[4340] - 402

M.C.A. - II (Science Faculty) (Semester - IV)

CS - 402 : Advanced Networking and Mobile Computing

(2008 Pattern)

Time : 3 Hours] ***[Max. Marks :80***

Instructions to the candidates:

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

Q1) Attempt all : **[8 × 2 = 16]**

a) What is spread spectrum and give its main advantage.

b) Define : Cluster, cell breathing.

c) What role is played by HLR and VLR?

d) What 3 criteria must be met by the system equipped with transparent bridge?

e) Suppose a TCP connection is transferring a file of 5000 bytes. The first byte is numbered 10,001. What are the sequence numbers for each segment if data are sent in five segments, each carrying 1000 bytes?

f) What is difference between primary server and secondary server?

g) What are hidden and exposed terminals?

h) What is URL? What are its components?

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

a) What are the issues to be considered while connecting different LANs using bridges?

b) What are requirements for mobile IP?

c) What are the uses of UDP (user datagram protocol)?

d) Explain architecture of GSM?

e) What is multicarrier modulation? Explain with example.

P.T.O.

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

a) What are the services of user agent in SMTP?

b Explain process of delivery of IP packet to mobile node.

c) What are advantages and disadvantages of wireless networking?

d) What is the reaction of standard TCP in case of packet loss? Why is it quite often problematic?

e) What are the drawbacks of DAMA? How to overcome it?

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

a) Explain system architecture of IEEE 802.11.

b) What are the main benefits of spread spectrum system? What are the advantages of DSSS over FHSS?

c) How mobile TCP can be used to solve disconnection problems?

d) What are the services offered by SCTP to application layer processes?

e) Explain security issues in WAP.

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

a) Explain Path loss of radio signals with free space loss.

b) What is reservation TDMA? Explain its advantages and disadvantages?

c) How does indirect-TCP isolate problems on wireless link? What are the main drawback of this solution?

d) Write a note on Pop3.

e) What is WSP? What features offered by WSP for content exchange between client and server?

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Total No. of Questions : 4]

SEAT No. :

P617

[Total No. of Pages : 3

[4340] - 403

M.C.A. (Science Faculty) (Semester - IV)

CS - 403 : Distributed Database Systems

(2008 Pattern)

Time : 3 Hours] ***[Max. Marks :80***

Instructions to the candidates:

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

Q1) Attempt the following : **[8 × 2 = 16]**

a) Differentiate between tightly coupled & loosly coupled multiprocessor system.

b) What are the 3 characteristics on which the DDBMS architectural models are based.

c) Define
   i) Simple Predicates.
   ii) Minterm Predicates.

d) What are Dirty Read? Non repeatable read.

e) What is ROW A-A protocol?

f) Consider the following relations.
   emp(eno, ename, title)
   proj(pno, pname, budget, location)
   asg(eno, pno,resp,duration)
   Give the query graph for the following query
   Select ename, pname
   From emp,asg,proj
   Where budget≤40000
   And dur <15
   And asg.eno=emp.eno
   And proj.pno=asg.pno

g) Define
   i) WAIT-DIE
   ii) WOUND-WAIT

h) State types of failures in DDBMS.

P.T.O.

Q2) Attempt any four : **[4 × 5 = 20]**

a) Discuss the different types of transferences addressed by DDBMS?

b) Explain components of DDBMS.

c) Explain the rules which ensures that the database does not undergo semantic change during fragmentation.

d) Discuss the characteristics of query processor which are common for both centralized & distributed database environment.

e) What is workflow? Explain types of workflows.

Q3) Attempt any four : **[4 × 6 = 24]**

a) Let Q = {q1,.....,q5} be the set of queries

A = {A1,.....,A5} be the set of Attributes

S = {S1,.....,S3} be the set of sites

Matrix A represent the attribute usage Matrix & Matrix B represents access frequencies. Find the attribute affinity Matrix. Assume that ref : (qk) = 1 □ qk & si & A1 is the key attribute.

Matrix A

	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

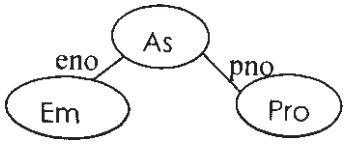
Matrix B

	S1	S2	S3
q1	10	20	0
q2	5	0	10
q3	0	35	5
q4	0	10	0
q5	0	15	0

b) Transformation the following query into optimized operators tree.

```
Select ename
From proj,emp,asg
Where asg.eno=emp.eno
and asg.pno=proj.pno
and (dur=12 OR dur=48)
and pname="project1" and budget<100000
and location="Pune"
```

c) Consider the following join graph for the relational algebra query proj*pno asg eno emp



Size (Emp) =1000 size(Asg*Emp)=3000
Size(Asg)=2000 size(Asg*Proj)=2000
Size(Proj)=3000
Using above information describe a join program that will need minimum data transfer.

d) Which of the following schedules are conflict equivalent (ignore the commit(C) and abort (A)commands)
S1={W2(x),W1(x),R1(x),C1,W2(y),R3(y),R3(z),C3,R2(x),C2}
S2={R3(z),R3(y),R2(z),W1(x),R3(x),W2(x),R1(x),C1,C2,C3}
S3={R3(z),W2(x)W2(y),R1(x),R3(x),R2(z),R3(y)C3,W1(x),C2,C1}

e) Consider the following relation schema
Asg(eno,pno,rep,dur)
Proj (pno,pname, bud,loc)
Assume that relation Proj is horizontally fragmented as
Proj 1 =6pno≤"p2"(Proj)
Proj2=6pno≥"p2"(Proj)
And the relation Asg is horizontally fragmented as
Asg1 = □ pno≤"p2"(Asg)
Asg2= □ pno≥"p2"(Asg)
Transform the following query into a reduced query on fragments.
Select Resp,Bud from Asg,Proj
Where Asg.pno= Proj.pno
And pname="CAD/CAM"

Q4) Attempt any four : **[4 × 5 = 20]**

a) Explain communication structure of Distributed 2PL with help of diagram.
b) How INQRES Algorithm works?
c) Write a note on conservative To algorithm.
d) What are LRM commands? Explain.
e) What is the difference between centralized deadlock detection & Hierarchical deadlock detection?

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Total No. of Questions : 5]

SEAT No. :

P618

[Total No. of Pages : 2

[4340] - 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) Define SHTTP.

b) What is the need of DMZ network?

c) What is IPV4?

d) Explain s-box substitution of DES algorithm.

e) Explain packet spoofing.

f) What are requirements of a message Digest?

g) List password policies.

h) What are advantages of IPSec?

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

a) Comment :

i) Modification causes loss of message integrity.

ii) Access control specifies and controls who can access what.

b) Explain working of Time Based Token.

c) Write functionalies of S/MIME.

d) Explain Broad level steps of IDEA.

e) Explain Blowfish decryption process.

P.T.O.

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

a) What is Biometric authentication? How it works?

b How encapsulating security payload (ESP) protocol works in Tunnel mode?

c) Write a short note on Triple DES.

d) Explain working of MD5.

e) Explain the Record Protocol of SSL.

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

a) Explain key transformation and expansion permutation steps in DES.

b) List and explain SET participants.

c) How RSA can be used for performing digital signatures?

d) Explain in detail one round of RC5.

e) What are limitations of Firewall?

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

a) Apply play fair technique and convert the following plain text into cipher text.

Plain Text : "MCA SEM FIVE"

Keyword : "JACK AND JILL".

b) Consider the plain text "5", Let P = 5, Q = 7 find out cipher text using RSA algorithm.

c) Consider the plain text "PUNE MARATHON" one time pad in "UVWP QMNRYTSA" use vername cipher to construct the cipher text.

d) Consider the values n = 7, g = 11, x = 5, y = 4. Apply Diffie-Hellman algorithm to generate keys k_1 & k_2.

e) Apply single columnar Transposition Technique with multiple rounds and convert the following plain text into cipher text.

Plain text : "Wish you good Luck".

No. of columns : 5.

order of columns : 2, 4, 3, 5, 1.

❖ ❖ ❖ ❖

Total No. of Questions : 5]

SEAT No. : ____

P619

[Total No. of Pages : 2

[4340] - 502

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

COMPUTER SCIENCE

CS - 502 : Internet Programming Using PHP

(2008 Pattern) (Semester - V)

Time : 3 Hours] ***[Max. Marks :80***

Instructions to the candidates:

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

Q1) Attempt all of the following : **[8 × 2 = 16]**

a) Explain array-count-values ( ).

b) Explain GET method.

c) What is cookies?

d) What is JSON response?

e) What are features of php?

f) What do you mean by XML-DOM?

g) State the types and examples of array in php?

h) What is difference between ‘include” and “require”?

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

a) What is serialization? Explain it with different builtin function?

b) Write a php script to accept three numbers and find maximum of these using self processing form.

c) Write any four sort functions of array.

d) Explain alert box of Java script?

e) Write short note on ereg ( ) builtin construct.

P.T.O.

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

a) Write a php script to accept two strings and concatenate these strings and count number of upper & lower characters.

b) Write php script to find common elements of two array.

c) Write php program to accept customer details on first page, items purchased on second page & display bill on same page.

d) Write short note on $-ENV?

e) Write short note on self processing form.

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

a) Explain variable scope in function.

b) Explain following functions with example.

i) Str-replace ii) Ucwords ( )

iii) Shuffle iv) Chunk-split ( )

c) What are the differences between free ( ) & disconnect ( ) methods?

d) What is file upload? Give maximum size of file that can be uploaded using php.

e) Write a php script to count number of times a user has accessed page on a web sites since start of session. Write php script using session.

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

a) Write a php script to create a base class student, derive class and then apply introspection builtin constructs to find methods & properties of both.

b) Write a php script to accept string from user & write it to a file?

c) Write short note on abstract class and interfaces.

d) How to send email from php script?

e) Explain control structures in php.

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Total No. of Questions : 5]

SEAT No. : ____

P620

[Total No. of Pages : 2

[4340] - 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) Define design pattern.

b) Define any two advantages of pipe and filter architectural pattern.

c) What is intent of abstract factory design pattern?

d) What are advantages of layered architectural pattern?

e) State collaboration of observer design pattern.

f) State the participants of adapter design pattern.

g) “Style guides that contains collected idioms work better” Justify.

h) What is an Idiom?

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

a) What is design pattern? Describe what makes design pattern.

b) Explain step to describe a step wise refinement approach for layered architectural pattern.

c) Explain the steps to implement black board architectural pattern.

d) What are benefits and liabilities of broker architectural pattern?

e) What are consequence of model-view-controller architectural pattern?

P.T.O.

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

a) Explain how and when to use abstract factory design pattern.

b State motivation and applicability of singletone design pattern.

c) Explain structure, participant and implementation of proto type design pattern.

d) What is difference between creational and structural design pattern?

e) How the catalog of design pattern is organized?

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

a) Give structure and participant of proxy design pattern.

b) What are benefits and liabilities of decorator design pattern?

c) How to use adapter design pattern? What are the known use of it?

d) Explain consequence of abstract factory design pattern.

e) What are difference between adapter and proxy design pattern?

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

a) Explain structure and collabration of observer design pattern.

b) What are benefits and liabilites of command design pattern.

c) Explain consequence of strategy design pattern.

d) Write a note on counted pointer Idioms.

e) Explain indented control flow style guide Idioms.

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Total No. of Questions : 5]

SEAT No. : ____

P621

[Total No. of Pages : 2

[4340] - 504

M.C.A. - III (Science Faculty) (Semester - V)

COMPUTER SCIENCE

CS - 505 : Software Testing & Quality Assurance

(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.***

Q1) Attempt all of the following : **[8 × 2 = 16]**

a) Define Beta Testing

b) What is acceptance testing?

c) Explain software reviews.

d) Explain nature of errors.

e) What do you mean by real time testing?

f) Define security testing.

g) Explain software safety.

h) Explain role of user in quality assurance.

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

a) State and explain fundamental characteristic for testing.

b) What are benefits of smoke testing?

c) Differentiate between manual and automated testing.

d) How to document integration testing?

e) Explain run charts.

P.T.O.

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

a) What is SQA plan?

b Distinguish between static Vs dynamic testing.

c) What are the steps to design test case.

d) What do you mean by usability testing and installation testing.

e) Explain quality movement.

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

a) Differentiate between validation and varification.

b) What is brainstorming in Pareto analysis.

c) Explain basic software testing principle.

d) Explain white box testing in detail.

e) What is quality control?

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

a) Win runner.

b) Quality cost measurement.

c) Complexity matrics.

d) Software reliability.

e) Building blocks of SQA.

Total No. of Questions : 4]

SEAT No. :

[Total No. of Pages :2

P771

[4340] - 404

M.C.A. (Science Faculty) (Semester - IV)

CS - 405 : Object Oriented Software Engineering

(2008 Pattern)

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 an Inception?

b) What is role name?

c) Define actor.

d) What is an object orientation?

e) What is Realization?

f) What do you mean by recursive aggregation?

g) List different types of components.

h) What is an association?

Q2) Attempt any four of the following : **[4 × 8 = 32]**

a) A system is to be designed for scheduling and scoring of common wealth competition such as shooting, swimming, weight lifting etc. There are several events and competitions. Each competitor may enter several events and each event has many competitors. Each event has several judges who subjectively rate the performance of competitors in that event. A judge rates every competitor for an event.

Draw the following diagrams.

i) Sequence Diagram

ii) Use Case Diagram

b) Draw a collaboration diagram for Tata Sky' which want to launch the DTH system. Numbers of distributors have been appointed. It has facilities like complete guide, menu, sports and movies scanned and displayed on the screen, audio-channels etc.

P.T.O.

c) A DVD player has on/off, stop/eject, play, rewind and fast forward buttons. First two allow buttons toggling between the two states. Draw the state transition diagram.

d) Draw a class diagram and Use Case diagram for Hospital management System.

e) Draw Sequence diagram and Collaboration diagram for search engine (google.com) for searching a specified text, site or document over a Internet.

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

a) Explain the building blocks of UML.

b) Explain generalization with example.

c) People use elevators to move from one floor to another. Discuss different scenarios and prepare a sequence diagram.

d) Explain the use of include and extend relationship in Use case diagram?

e) Explain the concept of Resource Management Component.

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

a) Draw a collaboration diagram for E-purchasing.

b) Describe the components of sequence diagram.

c) Draw a component diagram for placement consultancy.

d) What is object? Explain characteristics of objects with example.

e) Write a note on Generic Components of object oriented design model.