

Total No. of Questions : 8]

SEAT No. :

P3230

[Total No. of Pages : 3

[5541] - 101

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

COMPUTER SCIENCE

CA-101 : Programming with 'C'
(2013 Pattern)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) Attempt any five questions out of eight.
- 2) All questions carry equal marks.
- 3) Figures to the right indicate full marks.

Q1) Attempt each of the following :

[4 + 4 + 2 = 10]

- a) Write structure of C program.
- b) Write a C program to check whether a matrix is an identity matrix (only diagonal elements are I, others are zero).
- c) Enlist standard library string functions.

Q2) Attempt each of the following :

[4 + 4 + 2 = 10]

- a) What is a function? State the advantages of using functions.
- b) Write a C program to find whether given number is prime number or not.
- c) What are putpixel, getpixel functions.

Q3) Attempt each of the following :

[4 + 4 + 2 = 10]

- a) Explain array of pointers with an example.
- b) Compare structure and union.

P.T.O.

- c) Find and justify the output of the following program :

```
void main ()
{
    int i = 4;
    while (--i)
    {
        if (i <= 1)
            continue;
        printf ("%d\t", i);
    }
}
```

Q4) Attempt each of the following : **[4 + 4 + 2 = 10]**

- Explain break and continue in 'C'.
- Write a program to display a decimal number in binary using bitwise operators.
- Write a C program to check whether given number is odd or even.

Q5) Attempt each of the following : **[4 + 4 + 2 = 10]**

- What is dynamic memory allocation? How is it done in 'C'?
- Write a recursive function to compute m^n . Use this function to display the first 10 powers of 2.
- Explain any two modes of files.

Q6) Attempt each of the following : **[4 + 4 + 2 = 10]**

- Explain pointers with different operations.
- Write a 'C' program using structure to accept name, salary, address, post of teachers and display name and salary with ascending order.
- What is arc function in graphics?

Q7) Attempt each of the following :

[5 + 5 = 10]

- a) Write a C program to find transpose of matrix.
- b) What is the purpose of storage class? Explain the storage classes in 'C'.

Q8) Attempt each of the following :

[5 + 5 = 10]

- a) Write syntax of following functions used in graphics :
 - i) ellipse.
 - ii) rectangle.
- b) Explain do-while with examples.



Total No. of Questions : 8]

SEAT No. :

P3231

[Total No. of Pages : 3

[5541] - 102

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

COMPUTER SCIENCE

CA-102 : Database Management System

(2013 Pattern)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) *Attempt any five questions.*
- 2) *Figures to the right indicate full marks.*
- 3) *Assume appropriate data if necessary.*
- 4) *All questions carry equal marks.*

Q1) Attempt each of the following :

- a) Write a responsibility of DBA. [4]
- b) What is Deadlock handling? [4]
- c) Explain : [2]
 - i) Week entity.
 - ii) Foreign key.

Q2) Attempt each of the following :

- a) Explain RAID technology in details. [4]
- b) What is lossy decomposition? Explain with suitable examples. [4]
- c) What is metadata? [2]

P.T.O.

Q3) Attempt each of the following :

- a) Explain mapping cardinality. Explain types of mapping cardinality. [4]
- b) Compute $(AG)^+$ with the Functional dependencies given below : [4]
A $\rightarrow$ B, A $\rightarrow$ C, CG $\rightarrow$ H, CG $\rightarrow$ I, B $\rightarrow$ H.
- c) Explain lock with its types. [2]

Q4) Attempt each of the following :

- a) What is canonical cover? State the procedure to compute it. [4]
- b) Define the concept of aggregation. Explain with two suitable examples. [4]
- c) Define : commit, rollback. [2]

Q5) Attempt each of the following :

- a) Explain normalization in details. [4]
- b) What are the disadvantages of file-oriented system? [4]
- c) What are advantages of DBMS? [2]

Q6) Attempt each of the following :

- a) What is timestamp ordering protocol? State Thomas' Write rule. [4]
- b) Write short note on : [4]
 - i) BCNF.
 - ii) ACID properties of transaction.
- c) Define : primary key, Data [2]

Q7) Attempt each of the following :

- a) Write a short note on 2 phase locking protocol. [5]
- b) What is query language? Explain its any two categories in details. [5]

Q8) Attempt each of the following :

- a) Consider the following transactions. Find out any two non-serial schedules which are serializable to a serial schedule $\langle T1, T2, T3 \rangle$ [5]

T1	T2	T3
Read(a)	Read(c)	Read(a)
a:=a-100;	c:=c*10;	a:=a+a*0.12;
Write(a)	Write(c)	Write(a)
Read(b)	Read(d)	Read(c)
b:=b+100;	d:=d-1000;	c:=c+1000;
Write(b)	Write(d)	Write(c)

- b) 'Bharat Yatra Company' has branches situated all over Maharashtra. Each branch is treated as an independent travelling agency. Each such agency arranges tours. For each tour they have schedules of buses. Each bus is allocated a team of workers as drivers, cleaners, helper, conductor, who are given wages. Passenger's book the tours by booking a specific schedule and bus. The agency has many employees working as clerks, agents, stenographers who are given monthly salary. Salaried and waged employee record is maintained for one year. Each of the tour can have many schedules based on time of departure and similarly many buses for one tour but each schedule can have only one bus. Draw an ER diagram representing this scenario. [5]



Total No. of Questions : 8]

SEAT No. :

P3232

[Total No. of Pages : 3

[5541] - 103

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

CA-103 : MATHEMATICAL FOUNDATIONS

(2013 Pattern)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) Solve any five questions out of eight questions.
- 2) Figures to the right indicate full marks.
- 3) Use of non-programmable scientific calculator is allowed.

Q1) Attempt each of the following :

- a) For any sets A, B and C Prove that $A - (B \cup C) = (A - B) \cap (A - C)$. [4]
- b) Determine whether the function $f(x) = 3x^3$ from the set of integers Z to Z is onto. [4]
- c) Define the term Poset. [2]

Q2) Attempt each of the following :

- a) Let $f: \mathbb{R} \rightarrow \mathbb{R}, f(x) = 2x^2$ and $g: \mathbb{R} \rightarrow \mathbb{R}, g(x) = 4 + 3x - x^2$. Find $(f \circ g)(x)$ and $(g \circ f)(x)$. [4]
- b) Let $P = \{x \in \mathbb{R}^+ \mid x \leq 4\}$ and $Q = \{x \in \mathbb{R} \mid (x+1)(x-2) = 0\}$. Find $P \times Q$. [4]
- c) Let $X = \{1, 2, 4, 8, 16, 32\}$ and let R be the relation '/', divides on X. Draw the Hasse diagram of R. [2]

Q3) Attempt each of the following :

- a) Compute the truth table of the statement $\sim(p \vee q) \equiv \sim p \wedge \sim q$. [4]
- b) Define the following terms with suitable examples. [4]
 - i) Permutation.
 - ii) Cardinality of set.
- c) What is the negation of $\forall x P(x)$? [2]

P.T.O.

Q4) Attempt each of the following :

- a) Give a proof by contradiction of theorem “If n is an integer and $8n + 2$ is odd then n is odd”. [4]
- b) Prove that $P \rightarrow Q \equiv Q \rightarrow \sim P$. [4]
- c) Let $P(x, y)$ denote ' $x + y = 0$ ' and $U = \mathbb{R}$. Write truth value of $(\exists y \in U)(\forall x \in U)P(x, y)$ with justification. [2]

Q5) Attempt each of the following :

- a) Find G.C.D. of Polynomials $f(x) = x^2 - 6x + 9$ and $g(x) = x^2 - 9$. [4]
- b) Find all roots of $x^4 + 2x^3 - 12x^2 - 22x + 40 = 0$. Where roots are in arithmetic progression. [4]
- c) Use Remainder theorem to find remainder when $2x^4 + x^3 - 3x + 4$ divided by $x - 4$. [2]

Q6) Attempt each of the following :

- a) If $a|b$ and $a|c$ then show that $a|bx - cy$ for any integers x, y . [4]
- b) Write the multiplication table for Z_9 (where Z_9 - addition modulo 9). [4]
- c) Find remainder of 10^9 when divided by 5. [2]

Q7) Attempt each of the following :

- a) Let $\rho = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 \\ 4 & 5 & 3 & 2 & 1 & 7 & 6 & 9 & 8 \end{pmatrix}$ [5]
 - i) Write ρ as a product of disjoint cycles.
 - ii) Write ρ as a product of transpositions.
 - iii) Determine whether ρ is even or odd.
 - iv) Find order of ρ .
- b) Find *g.c.d.* of 8699 and 3392 and express it in linear combinations of 8699 and 3392. [5]

Q8) Attempt each of the following :

- a) Solve the following system of equations by Gauss elimination method [5]

$$\begin{aligned}2x + 3y - z &= 0 \\ -3x + y - 5z &= 0 \\ x + 2y - z &= 0\end{aligned}$$

- b) Find inverse of matrix $A = \begin{bmatrix} -2 & 1 & -1 \\ 4 & 1 & -3 \\ -3 & 2 & 1 \end{bmatrix}$ by adjoint method. (if exist)

[5]



[5541] - 104

M.C.A. - I (Under Science Faculty) (Semester - I)
CA-104 : Concrete Mathematics and Graph Theory
(2013 Pattern)

Time : 3 Hours]

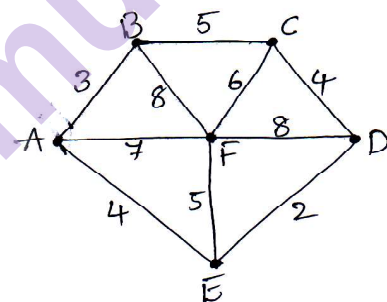
[Max. Marks : 50

Instructions to the candidates:

- 1) Solve any five questions out of eight questions.
- 2) Figures to the right indicate full marks.
- 3) Use of non-programmable scientific calculator is allowed.

Q1) Attempt each of the following :

- a) Solve the following recurrence relation $a_r - 7a_{r-1} + 6a_{r-2} = 0$ with initial condition $a_0 = 8, a_1 = 6$ and $a_2 = 22$. [4]
- b) Using Kruskal's algorithm, find minimal spanning tree of the following connected graph. [4]



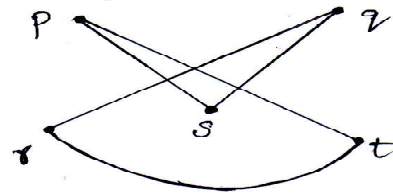
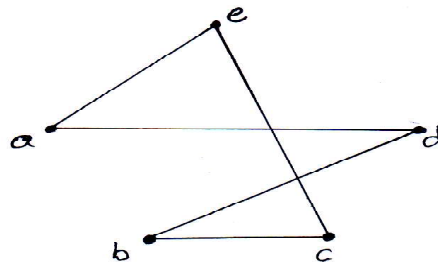
- c) Explain Koenigsberg Seven Bridge Problem. [2]

Q2) Attempt each of the following :

- a) Prove that the edge e of a graph G is an isthmus if and only if e does not belongs to any circuit in G . [4]

P.T.O.

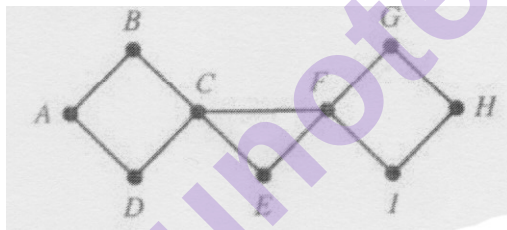
- b) Determine whether the following two graphs are isomorphic or not? [4]



- c) Draw a Peterson Graph. [2]

Q3) Attempt each of the following :

- a) Using Fleury's algorithm find Euler tour in the following connected graph. [4]



- b) Draw the arborescence corresponding to the following expressions and write the polish notation. [4]

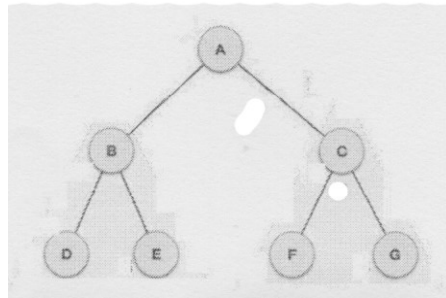
$$((x-2y)^{\uparrow 2}) + ((x-1)^2 / 5)$$

- c) Draw a graph whose adjacency matrix is given below. [2]

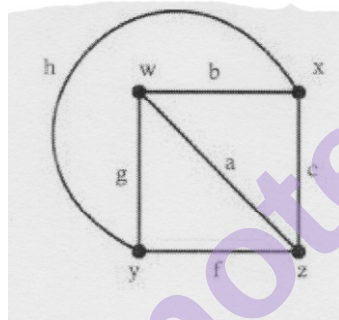
$$A = \begin{bmatrix} 0 & 0 & 2 & 2 & 0 \\ 0 & 0 & 1 & 2 & 1 \\ 2 & 1 & 0 & 1 & 1 \\ 2 & 2 & 1 & 0 & 2 \\ 0 & 1 & 1 & 2 & 0 \end{bmatrix}.$$

Q4) Attempt each of the following :

- a) Prove that tree with n vertices has $n - 1$ edges. [4]
- b) Obtain preorder and postorder traversal for the following binary tree. [4]

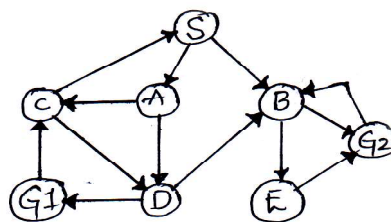


- c) Fuse the vertices 'w' and 'z' at point x. [2]



Q5) Attempt each of the following :

- a) Define : [4]
 - i) Complete Graph.
 - ii) Disconnected Graph and give example of each.
- b) Find the remainder when 5^{133} is divided by 11. [4]
- c) Draw any two directed paths from vertex V1 to V3 in the following graph. [2]

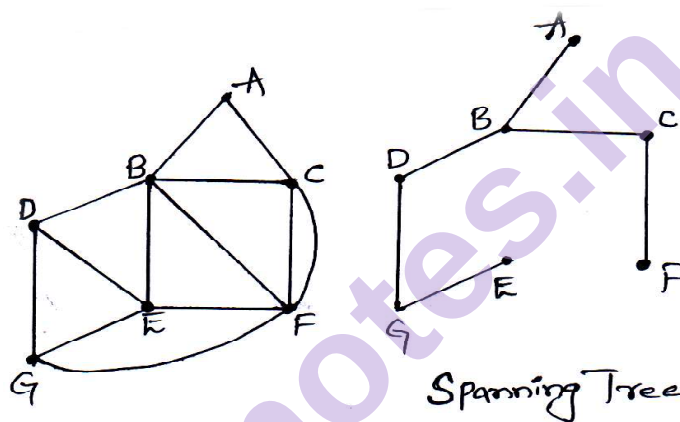


Q6) Attempt each of the following :

- Find particular solution of the following recurrence relation $a_n - 2a_{n-1} = 3^n$ with initial condition $a_1 = 1$. [4]
- Prove that a tree with two or more vertices has atleast 2 pendant vertices. [4]
- Define : Cut vertex with example. [2]

Q7) Attempt each of the following :

- Find the fundamental circuits of graph G with respect to tree T. [5]



- Encrypt the message 'HATE ME' using a Caesar ciphe. [5]

Q8) Attempt each of the following :

- Explain RSA-cryptosystem. [5]
- Prove that $K_{3,3}$ is non-planar graph. [5]



Total No. of Questions : 8]

SEAT No. :

P3235

[Total No. of Pages : 3

[5541] - 201

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

CA-201 : Data Structures

(2013 Pattern)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) Attempt any five of the following eight questions.
- 2) All questions carry equal marks.
- 3) Figures to right indicate full marks.

Q1) Attempt all of the following :

[4 + 4 + 2 = 10]

- a) What is stack? Explain its applications.
- b) What is circular queue? Explain its operations.
- c) Define the terms :
 - i) Spanning tree.
 - ii) Inorder.

Q2) Attempt all of the following :

[4 + 4 + 2 = 10]

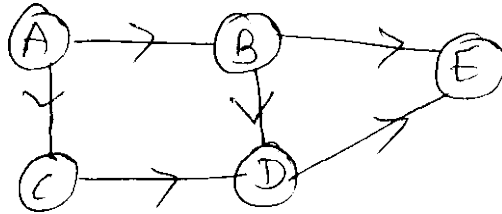
- a) Sort the following data using quick sort.
25, 35, 19, 9, 46, 70, 49, 23, 78, 12, 95
- b) Evaluate following postfix expression using stack :
AB + CD –
Consider A = 7, B = 3, C = 4 & D = 10
- c) Define :
 - i) Data Structure.
 - ii) Linked list.

P.T.O.

Q3) Attempt all of the following :

[4 + 4 + 2 = 10]

- a) Write a 'C' function to implement doubly linked list.
- b) Find Adjacency list for following graph.



- c) Define term :
 - i) Sibling.
 - ii) BFS.

Q4) Attempt all of the following :

[4 + 4 + 2 = 10]

- a) Explain insertion sort with an example.
- b) What is Hashing? Explain it in detail.
- c) Define :
 - i) Prefix.
 - ii) Postfix.

Q5) Attempt all of the following :

[4 + 4 + 2 = 10]

- a) Explain graphically, various situations to insert an item to circular linked list.
- b) Define sorting. Which method is more stable sorting and why?
- c) Define the terms:
 - i) Adjacency List.
 - ii) Adjacency Matrix.

Q6) Attempt all of the following :

[4 + 4 + 2 = 10]

- a) Convert infix expression to postfix expression using stack :

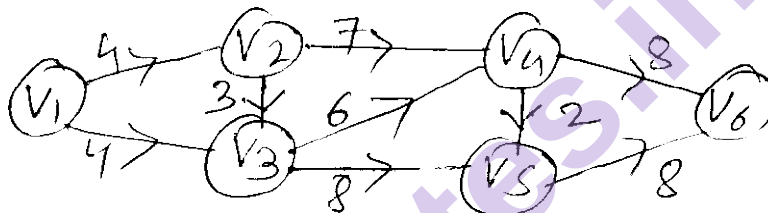
$$A \cap B * C / (D * E - F)$$

- b) Write a 'C' function to display singly linked list and delete last node from singly linked list.
- c) Define the terms :
- Complete binary tree.
 - Degree.

Q7) Attempt all of the following :

[5 + 5 = 10]

- a) Find critical path for following graph.



- b) Construct AVL tree for the following data :

22, 33, 12, 10, 6, 2, 44, 3, 24, 23

Q8) Attempt all of the following :

[5 + 5 = 10]

- a) Construct BST for following data. Show all steps.

Insert (27, 6, 36, 8, 12, 18, 30, 33)

Delete (8, 6)

- b) Compare stack and queue.



Total No. of Questions : 8]

SEAT No. :

P3236

[Total No. of Pages : 3

[5541] - 202

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

CA-202 : Theoretical Computer Science

(2013 Pattern)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) Attempt any five of the following eight questions.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.
- 4) All questions carry equal marks.

Q1) Attempt all :

[4 + 4 + 2 = 10]

- a) Construct DFA to accept all strings over $\{a, b, c\}$ which is having substring 'bca' and ending with 'ab'.
- b) Construct FA from given regular expression $[01 + 10]^* + 0(01^*)^*$.
- c) Define any two types of TM.

Q2) Attempt all :

[4 + 4 + 2 = 10]

- a) Convert the following grammar into GNF :

$S \rightarrow AB|BA$

$A \rightarrow SB|a$

$B \rightarrow aA|b$

- b) Check whether $L : \{0^p \mid p \text{ is prime}\}$ is regular. Justify your answer.
- c) Give the tuples of PDA.

Q3) Attempt all :

[4 + 4 + 2 = 10]

- a) Construct NFA for regular expression :

$10 + (0 + 11) * 0 * 1$

- b) Construct PDA for $L : \{0^n 1^m 2^{n+m} \mid n, m \geq 1\}$.
- c) State any '2' properties of regular sets.

P.T.O.

Q4) Attempt all :

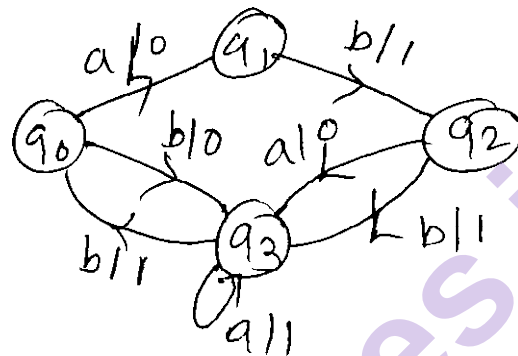
[4 + 4 + 2 = 10]

- a) Construct PDA for given CFG

$S \rightarrow aAA$

$A \rightarrow aS/bS/a$

- b) Construct Moore Machine equivalent to following Mealy Machine.



- c) Define :

- i) Proper suffix.
- ii) Proper prefix.

Q5) Attempt all :

[4 + 4 + 2 = 10]

- a) Construct Turing machine accepting language : $L: \{0^i 12^{i+2} | i \geq 0\}$.

- b) Rewrite following grammar by eliminating

ϵ - productions : $S \rightarrow AB$

$A \rightarrow SA|BB|bB$

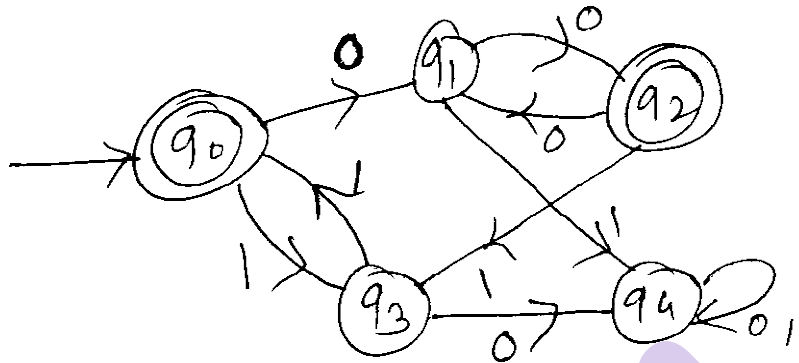
$B \rightarrow aA|b|\epsilon$

- c) Define finite Automata.

Q6) Attempt all :

[4 + 4 + 2 = 10]

- Construct Mealy Machine to convert each occurrence of substring 101 by 100 over alphabet $\{0, 1\}$.
- Minimize the following DFA.



- Rewrite following grammar by eliminating

ϵ – productions : $S \rightarrow PQR | aPbQ$

$P \rightarrow bRS$

$Q \rightarrow PQc | PR$

$R \rightarrow \epsilon$

Q7) Attempt all :

[5 + 5 = 10]

- Write short note on an Chomsky Hierarchy.
- Construct T.M. for $L = \{a^n b^n c^m d^m \mid n, m \geq 0\}$.

Q8) Attempt all :

[5 + 5 = 10]

- Write short note on properties of CFL.
- Write short note on properties of context free languages.



Total No. of Questions : 8]

SEAT No. :

P3237

[Total No. of Pages : 3

[5541] - 203

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

CA-203 : Object Oriented Programming C++

(2013 Pattern)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) Answer any five questions out of eight.
- 2) Figures to right indicate full marks.

Q1) Attempt all :

[4 + 4 + 2 = 10]

- a) Explain compile time polymorphism.
- b) Briefly explain friend function with its characteristics.
- c) List operators which can not be over loaded with friend function.

Q2) Attempt all :

[4 + 4 + 2 = 10]

- a) Define inline function. What are its limitations?
- b) What are different modes of files.
- c) State data types in C++.

Q3) Attempt all :

[4 + 4 + 2 = 10]

- a) Write 'C++' program to accept person's information and display it.
- b) Differentiate between function overloading and over-riding.
- c) State different access specifiers.

P.T.O.

Q4) Attempt all :

[4 + 4 + 2 = 10]

- a) Write a C++ program to overload << and >> for class string.
- b) Write a C++ program which read and write a character from a specified file.
- c) Define : file pointers.

Q5) Attempt all :

[4 + 4 + 2 = 10]

- a) Explain Hierarchical Inheritance with example.
- b) Write a C++ program to print and check given number is prime or not.
- c) What is dynamic memory allocation?

Q6) Attempt all :

[4 + 4 + 2 = 10]

- a) Write short note on template.
- b) Explain concept of Abstract class with an example.
- c) Identify errors in program code -

class B

```
{ int x, y ;  
    public  
    void B (int a = 0, int b)  
    { x = a, y = b; }  
    void display ( )  
    {    Cont << x << y; } };
```

```
void main ( )
```

```
{  
    B * ptr;  
    ptr → display ( );  
}
```

Q7) Attempt all :

[5 + 5 = 10]

- a) What is the purpose of forward declaration of a class.
- b) Write a program to overload function to add two integers, two floats and two arrays.

Q8) Attempt all :

[5 + 5 = 10]

- a) Give any two ways to check the success or failure of a file open operation.
- b) Explain type conversion from basic to class type with example.



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Total No. of Questions : 8]

SEAT No. :

P3238

[Total No. of Pages : 2

[5541] - 204

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

CA-204 : COMPUTER NETWORKS

(2013 Pattern)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) *Attempt any five questions.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*

Q1) Attempt all of the following :

[4 + 4 + 2 = 10]

- a) What are components of LAN? Explain in brief.
- b) Explain two types of multiplexing.
- c) What is flow control? Why it is needed?

Q2) Attempt all of the following :

[4 + 4 + 2 = 10]

- a) What are characteristics of Line coding?
- b) Write short note on framing in data link layer.
- c) Define star and bus topologies.

Q3) Attempt all of the following :

[4 + 4 + 2 = 10]

- a) Compare ISO-OSI and TCP/IP reference models.
- b) Explain CSMA/CD in detail.
- c) State any two uses of bridges.

P.T.O.

Q4) Attempt all of the following : [4 + 4 + 2 = 10]

- a) Define Computer Network. State goals and need of computer network.
- b) What are functionalities of transport layer?
- c) Differentiate between IP address and port number.

Q5) Attempt all of the following : [4 + 4 + 2 = 10]

- a) Construct CRC message for a given bit stream 110010101 and generator polynomial $x^4 + x^2 + 1$.
- b) What is switching? Explain any two types of switching.
- c) Define virtual circuit.

Q6) Attempt all of the following : [4 + 4 + 2 = 10]

- a) Write short note on gateways.
- b) Explain architecture of wireless LAN.
- c) Give structure of WWW.

Q7) Attempt all of the following : [5 + 5 = 10]

- a) Write a short note on simplex stop and wait protocol.
- b) What are properties of routing algorithm?

Q8) Attempt all of the following : [5 + 5 = 10]

- a) What is domain name system?
- b) Explain HTTP and FTP in detail.



Total No. of Questions : 8]

SEAT No. :

P3239

[Total No. of Pages : 2

[5541] - 205

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

CA-205 : ADVANCED DATABASE MANAGEMENT SYSTEM

(2013 Pattern)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) All questions carry equal marks.
- 2) Attempt any five out of eight questions.

Q1) Attempt all :

[4 + 4 + 2 = 10]

- a) Explain ORDBMS with its features.
- b) Explain spatial database model.
- c) What is mean by object attributes?

Q2) Attempt all :

[4 + 4 + 2 = 10]

- a) Explain multimedia queries.
- b) Explain data replication in details.
- c) Define : Class.

Q3) Attempt all :

[4 + 4 + 2 = 10]

- a) Explain parallel database architecture.
- b) What are advantage of OODBMS?
- c) State Authentication.

Q4) Attempt all :

[4 + 4 + 2 = 10]

- a) Explain MAC in details.
- b) Write short note on Firewall.
- c) What is Object Model?

P.T.O.

Q5) Attempt all :

[4 + 4 + 2 = 10]

- What is fragmentation? Explain it.
- What is Inter-query parallelism?
- What are characteristics of Mobile Computing.

Q6) Attempt all :

[4 + 4 + 2 = 10]

- Explain in detail threats of database security.
- Consider relation company (cno, caddress, city, cname, turnover). Following is set of simple predicate defined over company
address = "Nashik", turnover $\geq$ 2,50,000?
perform Horizontal fragmentation.
- Define - time stamping.

Q7) Attempt all :

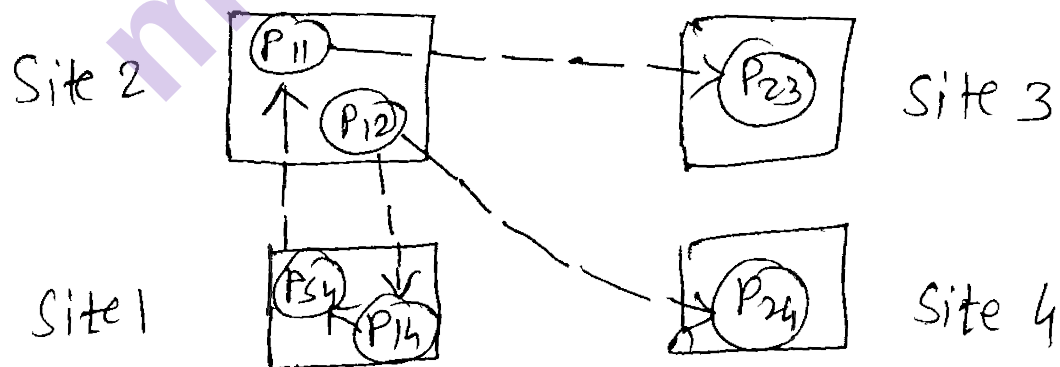
[5 + 5 = 10]

- List and explain key elements of parallel database processing.
- Differential ODL and OQL.

Q8) Attempt all :

[5 + 5 = 10]

- Write short note on key elements of Parallel Database Processing.
- Consider following DWFG.



Check if deadlock exists in system. If so, find out sites involved in deadlocks.



[5541]-301

M.C.A. (Under Science Faculty)

COMPUTER SCIENCE

CA-301: Design and Analysis of Algorithm
(2013 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

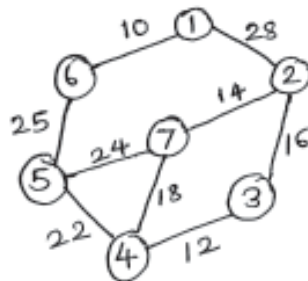
- 1) Neat diagrams must be drawn wherever necessary.
- 2) Solve any 5 (Five) from following.

Q1) Attempt all of the following :

- a) Define Big “oh” notation. Show that $f(n) = O(g(n))$ where $f(n) = n^3$ & $g(n) = n^2$. [4]
- b) Sort the given data using Quick sort. [4]
26 5 37 1 61 11 59 15 48 19 ($n = 10$)
- c) Write the recursive Algorithm for calculating factorial of a given number. [2]

Q2) Attempt all of the following :

- a) Using job sequencing, obtain the sequence of jobs such that profit is maximised. [4]
 $n = 5, p = \{60, 100, 20, 40, 20\} d = \{2, 1, 3, 2, 1\}$
- b) Using Prim's Algorithm, find the minimum spanning tree for a given graph. [4]



- c) 'Binary search can be used with unsorted data'. Justify True or False.[2]

P.T.O.

Q3) Attempt all of the following :

- a) Find an optimal paranthesization of a Matrix chain product whose sequence of dimension is [4]

A: 10×30 , B : 30×5 and C: 5×60

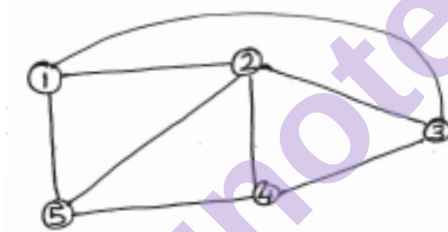
- b) Solve the Travelling Salesman Problem (TSP) for the graph G given by the adjacency Matrix using Dynamic programming. [4]

$$\begin{bmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{bmatrix}$$

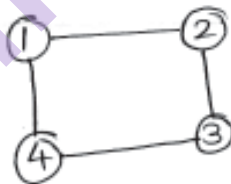
- c) What is Satisfiability? State Cook's Theorem. [2]

Q4) Attempt all of the following :

- a) Find all the Hamiltonian Cycles in the given graph G. [4]



- b) For the following graph, find out the possible solutions with $m = 3$ color using Graph coloring method of Backtracking. [4]



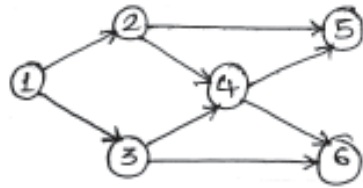
- c) Find the optimal Merge Pattern for merging the file of size 20, 30, 10, 5, 30. [2]

Q5) Attempt all of the following :

- a) Solve the given 0/1 Knapsack instance by LCBB method by drawing Variable type size Space Tree.

$m = 12$ $n = 5$ $w = (4, 6, 3, 4, 2)$ $p = (10, 15, 6, 8, 4)$ [4]

- b) Find the topological order for the following graph G. [4]



- c) State and explain Horner's Rule. [2]

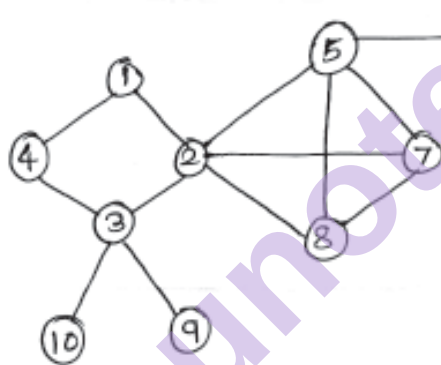
Q6) Attempt all of the following :

- a) What is the strategy of Branch & Bound? [4]

Explain :

- i) FIFOBB
- ii) LIFOBB
- iii) LCBB

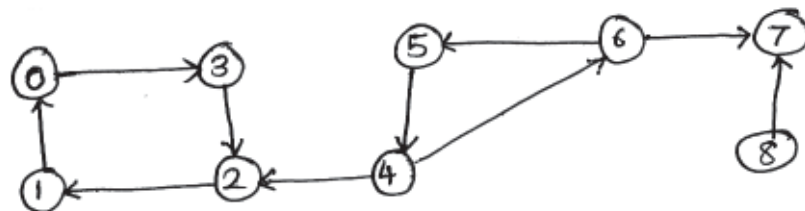
- b) Draw BFS and DFS for the following graph. [4]



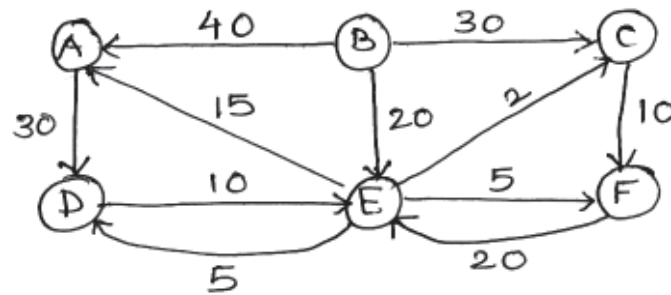
- c) Define NP-Hard and NP-complete problems. [2]

Q7) Attempt the following :

- a) Find the strongly connected components of graph G. [5]

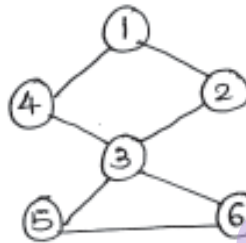


- b) Apply the Dijkstra's Algorithm on directed graph given below where B is the source. [5]



Q8) Attempt the following :

- a) Find Articulation point and Bi-connected components of graph G. [5]



- b) Apply Floyd Warshall algorithm to find the length of Shortest paths from vertex u to vertex v . $\forall u, v \in V(G)$, where adjacency matrix of G is

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

[5]

Total No. of Questions : 8]

SEAT No. :

P3241

[Total No. of Pages : 3

[5541]-302

M.C.A. (Science Faculty)

CA-302: OPERATING SYSTEM CONCEPTS

(2013 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) Answer any five questions.
- 2) Figures to the right indicate full marks.

Q1) Attempt the following :

- a) Explain any two system calls related with system accounting/information. [4]
- b) Explain the reader/writer problem. [4]
- c) What is P-thread. [2]

Q2) Attempt the following :

- a) What is critical section problem? State the condition that must be satisfied while designing solution to critical section problem. [4]
- b) Discuss different types of schedulers. [4]
- c) Define Kernel thread and User thread. [2]

Q3) Attempt the following :

- a) Explain the structure of process control block. [4]
- b) Discuss the various operations on file. [4]
- c) What is dispatch latency? [2]

P.T.O.

Q4) Attempt the following :

- a) Explain the concept of virtual file system. [4]
- b) Explain the deadlock recovery technique. [4]
- c) What is starvation? [2]

Q5) Attempt the following :

- a) Differentiate between preemptive and non preemptive scheduling. [4]
- b) Draw and explain state transition diagram of process. [4]
- c) Define turn around time. [2]

Q6) Attempt the following :

- a) Explain structure of a disk. [4]
- b) State the advantages and disadvantages of Indexed allocation. [4]
- c) What is page fault? [2]

Q7) Attempt the following :

- a) Suppose the head of a moving head disk with 200 tracks numbered 0 to 199 is currently at track 53. If request in queue are 98, 183, 37, 122, 14, 124, 65, 67. What is total head movement to satisfy these request using following scheduling algorithm. [5]
 - i) Look
 - ii) SCAN
- b) Consider the following set of processes with the length of CPU burst time and arrival time in millisecond.

Process	Burst Time	Arrival Time
P1	5	1
P2	3	0
P3	2	2
P4	4	3
P5	8	2

What is the average waiting time and average turn around time for these processes with FCFS and preemptive SJF scheduling. [5]

Q8) Attempt the following :

- a) Consider page reference string.
7, 5, 6, 2, 9, 5, 7, 6, 2, 7, 6, 5, 2, 7, 2, 7, 8
3 frames. Find the number of page faults according to CRU. [5]
- b) Consider the following snapshot of the system and answer the following questions using bankers algorithm. What is the content of need matrix.
Is the system in a safe state. [5]

Process	Allocation					Max				Available			
	A	B	C	D		A	B	C	D	A	B	C	D
P ₀	0	0	1	2	P ₀	0	0	1	2	1	4	2	0
P ₁	1	1	0	0	P ₁	1	7	5	0				
P ₂	1	3	5	4	P ₂	2	3	5	6				
P ₃	0	6	3	2	P ₃	0	6	5	2				
P ₄	1	0	1	4	P ₄	0	6	5	6				

Total No. of Questions : 8]

SEAT No. :

P3242

[Total No. of Pages : 3

[5541]-303

M.C.A. (Science Faculty)

CA-303: SOFTWARE ENGINEERING

(2013 Pattern) (Semester - III) (Credit System)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) Attempt any five of the following.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right indicates full marks.

Q1) Attempt the following :

- a) Explain waterfall model in detail. [4]
- b) Describe various processes of Software Testing [4]
- c) Give the types of Decision Tables. [2]

Q2) Attempt the following :

- a) Explain the concept of Configuration Management. [4]
- b) Discuss different types of coupling. [4]
- c) Define Re-Engineering. [2]

Q3) Attempt the following :

- a) What is System Analysis? Discuss the role of System Analyst. [4]
- b) Explain White Box Testing. [4]
- c) What is a Module. [2]

P.T.O.

Q4) Attempt the following :

- a) Write a note on the fact finding techniques. [4]
- b) Discuss Programming in small Vs Programming in large. [4]
- c) What is Software Engineering. [2]

Q5) Attempt the following :

- a) Write a note on maintenance side effects. [4]
- b) Explain types of feasibility study. [4]
- c) Define testing and Debugging. [2]

Q6) Attempt the following :

- a) Explain Software crisis in detail. [4]
- b) Which are the processes of Project Risk Management? Explain any one in detail. [4]
- c) Define characteristics of a Software. [2]

Q7) Attempt the following :

- a) A Gymnasium started recently provides facilities like latest equipments under guidance of trainers, special diet preparations, weight loss programs, Sona bath etc. They are having 25 machineries, 15 trainers and more than 500 customers. The admission is given on monthly, half yearly and yearly basis. Organization wants an automated system to maintain all data and reports.
For above - Draw context level and first level DFD. [5]
- b) Draw a structure chart for “Reservation Cancellation” module of Railway Reservation System. [5]

Q8) Attempt the following :

- a) Indian Airlines decided to give discount to customers on following rules:

If customer is regular flyer and travelling 5000 km distance in one year, discount is 10%, more than 5000 km discount is 20%.

If customer is non-regular Flyer and travelling 5000 km distance in one year, discount is 5%, more than 5000 km discount is 10%. Draw a Decision Table for above. [5]

- b) Differentiate between verification and validation. [5]

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Total No. of Questions : 8]

SEAT No. :

P3243

[Total No. of Pages : 3

[5541]-304

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

CA-304: JAVA

(2013 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) Attempt any five questions.
- 2) Neat diagram must be drawn wherever necessary.
- 3) Figures to the right indicate full marks.

Q1) Attempt all of the following :

- a) Explain wrapper class concept in detail. [4]
- b) What is AWT? Explain various components used in AWT. [4]
- c) Write different Layout Managers. [2]

Q2) Attempt all of the following :

- a) Explain primitive data types in detail. [4]
- b) Explain abstract class with the help of example. [4]
- c) What is inheritance? [2]

Q3) Attempt all of the following :

- a) What is exception? Explain exception handling with the help of example. [4]
- b) Explain methods of Input stream class. [4]
- c) What is isAlive () and join () method. [2]

P.T.O.

Q4) Attempt all of the following :

- a) Explain in detail string Tokenizer class. [4]
- b) Write a Java program to accept details of cricket player (Name, Total runs, Not out, Innings played). Store it in array. Write a function to calculate average of all and display it. [4]
- c) Write any two swing features. [2]

Q5) Attempt all of the following :

- a) Explain applet architecture in detail. [4]
- b) Write a Java program to accept two 2*2 matrices from the user and display multiplication of two matrices. [4]
- c) Write any two methods of string Buffer class. [2]

Q6) Attempt all of the following :

- a) Explain different access specifiers in Java. [4]
- b) Write a Java program to create an applet to accept a number in a textbox and on click of Ok button, it displays if given number is even or odd. [4]
- c) What is type casting? [2]

Q7) Attempt all of the following :

- a) Explain different types of constructors. [5]
- b) Write a Java program to accept a number from user, if number is zero then throw user defined exception “Number is zero”. Otherwise calculate the sum of first and last digit of a given number. [5]

Q8) Attempt all of the following :

- a) Explain interface with the help of example. **[5]**
- b) Write a Java program to design three text boxes and one button using swing. Enter different strings in first and second text box. On clicking command button, concatenation of two strings should be displayed in third text box. **[5]**

* * *

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Total No. of Questions : 8]

SEAT No. :

P3244

[Total No. of Pages : 3

[5541]-305

M.C.A. (Science Faculty)

CA-307: NUMERICAL METHODS

(2013 Pattern) (Semester - III)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates:

- 1) Attempt any five questions.
- 2) All questions carry equal marks.
- 3) Use of scientific, non programmable calculator is allowed.
- 4) Figures to the right indicate full marks.

Q1) Attempt the following :

a) Find square root of 35 corrected upto 3 decimal places by false position method. [4]

b) Estimate the missing term of following data. [4]

x	-1	0	1	2	3
y	1	0	—	8	81

c) Find the relative error of the number 1.64476. [2]

Q2) Attempt the following :

a) Evaluate $\Delta \left[\frac{2^x}{x+n} \right]$ take $h = 1$ [4]

b) Prove that n^{th} differences of n degree polynomial is constant. [4]

c) Differentiate between Lagranges Interpolation and Newtons forward interpolation. [2]

P.T.O.

Q3) Attempt the following :

a) Prove that $f(4) = f(3) + \Delta f(2) + \Delta^2 f(1) + \Delta^3 f(1)$ [4]

b) Using Newtons forward difference formula find the value of $f(1.65)$ from the following data. [4]

x	1	1.25	1.5	1.75
$f(x)$	0.3679	0.2865	0.2231	0.1738

c) With usual notation prove that $E\nabla \equiv \Delta$ [2]

Q4) Attempt the following :

a) The population of a town in the year are given below.

Year	1931	1941	1951	1961	1971
Population (in thousands)	15	20	27	39	52

Find the population of the town in 1946 by using Gauss backward formula. [4]

b) If $f(1.1) = 2.8039$, $f(1.3) = 2.9865$ and $f(1.7) = 2.9516$, then find $f(1.4)$, by using Lagrange's interpolation formula. [4]

c) Define absolute error of a number. [2]

Q5) Attempt the following :

a) Using Newton's backward difference formula, find $y(9)$ from the following table. [4]

x	2	4	6	8	10
y	1.455	3.622	8.861	16.494	24.728

b) Using Milne's formula find $y(0.8)$ given that $\frac{dy}{dx} = x - y^2$, $y(0) = 0$, $y(0.2) = 0.02$, $y(0.4) = 0.079$, and $y(0.6) = 0.1762$. [4]

c) If $f(x) = x^2$ then find $\Delta^2 f(x)$. [2]

Q6) Attempt the following :

a) Given $\frac{dy}{dx} = 1 - y$ with $y(0) = 0$ find $y(0.1)$ using Euler's Modified Method. (take $h = 0.1$). [4]

b) The velocities of a car at intervals of 2 minutes are given below : [4]

Time in minutes	0	2	4	6	8	10	12
Velocity in km/hr	0	22	30	27	18	7	10

Find distance covered by the car, by using Simpson's $(3/8)^{\text{th}}$ rule.

c) Use Euler's Method to determine $y(0.05)$, given that $\left(\frac{dy}{dx}\right) = y - x$ where $y(0) = 1.2$. [2]

Q7) Attempt the following :

a) Find the missing term in the following table. [5]

x	1	2	3	4	5	6
$f(x)$	-1	-2	?	2	7	14

b) Use Gauss-forward difference formula to determine $f(0.25)$ where the function $y=f(x)$ is given by the following table. [5]

x	0.1	0.2	0.3	0.4
$f(x)$	3.1051	3.2214	3.3498	3.4918

Q8) Attempt the following :

a) Derive Simpson's $1/3$ rule of integration. [5]

b) Solve $\frac{dy}{dx} = y - x$ where $y(0) = 2$, by using Runge Kutta fourth order method for $x = 0.2$ take $h = 0.2$. [5]



Total No. of Questions : 8]
P3247

SEAT No. :

[Total No. of Pages : 3

[5541]-401
M.C.A. (Science)
CA - 401 : Computer Graphics
(2013 Pattern) (Semester - IV)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates :

- 1) Answer any five questions from following.*
- 2) Neat diagrams must be drawn whenever necessary.*
- 3) Figures to the right indicate full marks.*
- 4) All questions carry equal marks.*

Q1) Attempt the following :

- a) Differentiate between Raster scan and Random scan display. **[4]**
- b) Generate a line from (10, 12) to (20, 18) on a raster screen using Bresenham's line drawing algorithm. **[4]**
- c) List any two computer graphics applications. **[2]**

Q2) Attempt the following :

- a) Write a short note on midpoint circle algorithm with an example. **[4]**
- b) Explain any one polygon - filling method with the concept of 8 - connectivity. **[4]**
- c) What is Locator? **[2]**

P.T.O.

Q3) Attempt the following :

- a) Plot a circle centered at (5, 5) having radius of 10 units using Bresenham's algorithm. [4]
- b) Explain 2D reflection in detail with an example. [4]
- c) What is viewpoint? [2]

Q4) Attempt the following :

- a) Explain Cohen - sutherland line clipping algorithm in detail. [4]
- b) Calculate coordinates for point P(2, 3, 4) w.r.t. following 3D transformations. [4]
 - i) Rotate with 90° along X - axis.
 - ii) Reflect along XY Plane.
- c) State any one difference between line clipping and polygon clipping. [2]

Q5) Attempt the following :

- a) What is parallel projection in 3D? Explain in detail. [4]
- b) Explain Bezier curve with all its properties. [4]
- c) What is convex polygon? [2]

Q6) Attempt the following :

- a) Differentiate between object space method and image space method. [4]
- b) Explain Depth sorting method and how it is used in painter's algorithm in detail. [4]
- c) Define BSP Tree. [2]

Q7) Attempt the following :

- a) Write short notes **[5]**
 - i) Keyboard
 - ii) Trackball
- b) Explain window to viewport coordinate transformation. **[5]**

Q8) Attempt the following :

- a) Explain components of computer graphics in detail. **[5]**
- b) If a triangle A(1, 1), B(2, 1), C(1, 3) is scaled by a factor 2 in X and Y directions, find the new coordinates of the triangle. **[5]**



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Total No. of Questions : 8]
P3248

SEAT No. :
[Total No. of Pages : 3

[5541]-402
M.C.A. (Science Faculty)
CA - 402 : SDK
(2013 Pattern) (Semester - IV) (Credit System)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates :

- 1) Attempt any five questions.*
- 2) Figures to the right indicate full marks.*
- 3) Neat diagrams must be drawn wherever necessary.*

Q1) Answer the following :

- a) Explain WM - DESTROY and WM - PAINT messages in detail. **[4]**
- b) Define GDI primitives. Which are the different GDI primitives. **[4]**
- c) Justify “we cannot use print f() in windows”. **[2]**

Q2) Answer the following.

- a) Explain the use of following functions in getting handle to device context.**[4]**
 - i) Get DC ()
 - ii) Release DC ()
 - iii) Begin paint ()
 - iv) End Paint ()
- b) What are system keystroke and non - system keystroke messages? **[4]**
- c) Define socket. What does a socket specify when used with TCP/IP?**[2]**

P.T.O.

Q3) Answer the following :

- a) What is common dialog box? Explain it with example. [4]
- b) What are keyboard Accelerators? Explain its use. [4]
- c) Define DLL. Name any three DLLS. [2]

Q4) Answer the following

- a) Define MDI (Multiple Document Interface) Explain in detail. [4]
- b) What is Race condition? Also explain critical section. [4]
- c) What is static linking and dynamic linking? [2]

Q5) Answer the following :

- a) What is ODBC? Explain any 3 ODBC APIs. [4]
- b) Define :
 - i) Client Area mouse messages.
 - ii) Non - client Area mouse messages.

Give one example of each. [4]
- c) Explain any one method to use timer with windows. [2]

Q6) Answer the following : [4]

- a) i) What is wndproc ()? Which messages does it processes?
ii) Mention any two uses of using timer.
- b) Why is it necessary to capture the mouse? Which functions are used to do this? [4]
- c) Give any four functions that draws different types of lines. [2]

Q7) Answer the following :

a) Write a window procedure to create menu like this : File, Edit, View.
Display proper messages on clicking particular menu item. **[5]**

b) What is a Dialog Box? Explain two types of Dialog Box in detail. **[5]**

Q8) Write a SDK program to create Listbox. Add on textbox to take input from user & Add it to list box. Use 2 buttons ADD & DELETE to add & delete items from list. **[10]**



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Total No. of Questions : 8]
P3249

SEAT No. :

[Total No. of Pages : 2

[5541]-403
M.C.A. (Science Faculty)
CA - 403 : Advanced JAVA
(2013 Pattern) (Semester - IV) (Credit System)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates :

- 1) Attempt any five questions.*
- 2) Figures to the right side indicate full marks.*
- 3) Neat diagrams must be drawn wherever necessary.*

Q1) Attempt the following :

- a) List types of JDBC drivers. Explain 2 types in detail. **[4]**
- b) Explain TreeSet with an example. **[4]**
- c) Explain doGet() and doPost() methods. **[2]**

Q2) Attempt the following :

- a) Explain commit() and rollback() methods. **[4]**
- b) What is JSP? Explain JSP lifecycle. **[4]**
- c) Define the term socket. State any two methods of socket class. **[2]**

Q3) Attempt the following :

- a) Describe Iterator and List Iterator with example. **[4]**
- b) Write a note on Prepared Statement with example. **[4]**
- c) What are the advantages of using Java Beans. **[2]**

P.T.O.

Q4) Attempt the following :

- a) Explain Enumeration with example. [4]
- b) Write and explain the steps for Java database connectivity. [4]
- c) What is Metadata? How it is obtained? [2]

Q5) Attempt the following :

- a) What is Inet Address class? Explain any two method of Inet Address class. [4]
- b) What is vector? Define the working of class vector. How it is different from an array? [4]
- c) What is Jar? [2]

Q6) Attempt the following :

- a) What is session? How to create session using get session? [4]
- b) List and explain types of servlets. [4]
- c) Explain different types of EJB. [2]

Q7) Attempt the following :

- a) Write session servlet program to create form which accepts user information & find number of visits to pages. [5]
- b) Write a Java Program to connect the Database using JDBC to find employee with highest salary. Consider the table : emp (eid, ename, designation, dept, sal) [5]

Q8) Attempt the following :

- a) Write a program to store Employee information (eid, ename) using Hashtable, search a employee using eid, and print all employee information in proper form. [5]
- b) Write a JSP program to accept username and password from html and display it on another page. [5]



Total No. of Questions : 8]
P3250

SEAT No. :
[Total No. of Pages : 2

[5541]-404
M.C.A. (Science Faculty)
CA - 404 : Object Oriented Software Engineering
(2013 Pattern) (Credit System) (Semester - IV)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates :

- 1) Attempt any five of the following.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to the right indicates full marks.*

Q1) Attempt the following :

- a) Write a note on overview of UML. **[4]**
- b) Describe abstract classes in detail. **[4]**
- c) Specify Testing Types. **[2]**

Q2) Attempt the following :

- a) Prepare object diagram showing atleast 6 relationships among the following. Object classes show multiplicity. File system, file directory, ASCII file, Disk, ordinary file. **[4]**
- b) Explain up phases in detail. **[4]**
- c) What is object orientation. **[2]**

Q3) Attempt the following :

- a) Describe object oriented Analysis in detail. **[4]**
- b) Discuss relationship in UML. **[4]**
- c) What is forward Engineering. **[2]**

P.T.O.

Q4) Attempt the following :

- a) Draw component and deployment diagram for E- mail system. [4]
- b) Explain the use of include and extend relationship in use case diagram.[4]
- c) What is realization? [2]

Q5) Attempt the following :

- a) Explain any five artifacts and issues considered during Inception. [4]
- b) Draw an Activity diagram for the different operations supported by “Coffee making machine”. [4]
- c) Explain any two principles of modeling. [2]

Q6) Attempt the following :

- a) Draw a sequence diagram for issuing college I - card. [4]
- b) Explain generic components of object oriented design model. [4]
- c) Define Actor. [2]

Q7) Attempt the following :

- a) Draw class diagram and use case diagram for library management system.[5]
- b) What is an Iterative development life cycle? Explain its advantages and disadvantages. [5]

Q8) Attempt the following :

- a) Discuss the use of class diagram and prepare a class diagram for “Hospital Management System”. [5]
- b) Discuss Inter class test case design. [5]



Total No. of Questions : 8]
P3251

SEAT No. :

[Total No. of Pages : 2

[5541]-405
M.C.A. (Science Faculty)
CA - 407 : Cyber Law
(2013 Pattern) (Semester - IV) (Credit System)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates :

- 1) Attempt any five questions.*
- 2) Neat diagram must be drawn wherever necessary.*
- 3) Figures to the right indicates full marks.*

Q1) Attempt the following :

- a) State the objectives and scope of cyber law. **[4]**
- b) Discuss three types of remedies for violation of copyrights. **[4]**
- c) What is Patent. **[2]**

Q2) Attempt the following :

- a) Explain the terms :- **[4]**
 - i) Hacking
 - ii) Tampering
 - iii) Denial of service
 - iv) Trojan horse
- b) Write a short note on Domain Name Dispute. **[4]**
- c) What is copyright. **[2]**

P.T.O.

Q3) Attempt the following :

- a) Explain provision relating to time and place of dispatch and receipt of electronic record. [4]
- b) Explain framing. [4]
- c) What is computer database. [2]

Q4) Attempt the following :

- a) What is cyber squatting and type squatting differentiate between them. [4]
- b) Explain intellectual property with its classification. [4]
- c) Define :- [2]
 - i) Public Key
 - ii) Private Key

Q5) Attempt the following.

- a) Distinguish between trademark and property mark. [4]
- b) Give the details of griffis case. [4]
- c) List the advantages of electronic mail and also state its disadvantages. [2]

Q6) Attempt the following.

- a) What is the procedure for suspension of license. [4]
- b) Explain in short revocation of digital signature certificate. [4]
- c) Define the term intermediary [2]

Q7) Attempt the following

- a) Write a short note on delivery of services provided by service providers. [5]
- b) Explain rules and regulations of electronic gazette. [5]

Q8) Attempt the following.

- a) Discuss legal issues involved in yahoo case. [5]
- b) Explain why there is need of Banker's book evidence Act. [5]



Total No. of Questions : 8]
P3252

SEAT No. :
[Total No. of Pages : 3

[5541]-406
M.C.A. (Science Faculty)
CA - 408 : SOFT COMPUTING
(2013 Pattern) (Semester - IV) (Credit System)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates :

- 1) Attempt any five questions.*
- 2) Figures to the right indicates full marks.*
- 3) Neat diagrams must be drawn wherever necessary.*
- 4) Assume suitable data if necessary.*

Q1) Attempt the following :

- a) What is fuzzy relation? Find the $A \times B$ for following fuzzy sets **[4]**

$$\underset{\sim}{A} = \left\{ \frac{0.2}{a} + \frac{0.5}{b} + \frac{1}{c} \right\}$$

$$\underset{\sim}{B} = \left\{ \frac{0.3}{p} + \frac{0.9}{q} \right\}$$

- b) Explain special properties of classical sets. **[4]**

- c) What is an epoch? **[2]**

Q2) Attempt the following :

- a) Differentiate between crisp set & Fuzzy set. **[4]**

- b) Differentiate between supervised and unsupervised learning. **[4]**

- c) What is weight space? **[2]**

P.T.O.

Q3) Attempt the following :

- a) Membership function for linguistic variables ‘small’ and ‘large’ as given below. [4]

$$\text{small} = \left\{ \frac{1}{1} + \frac{0.8}{2} + \frac{0.6}{3} + \frac{0.4}{4} + \frac{0.2}{5} \right\}$$

$$\text{large} = \left\{ \frac{0.2}{1} + \frac{0.4}{2} + \frac{0.6}{3} + \frac{0.8}{4} + \frac{1}{5} \right\}$$

Develop membership function for following linguistic phrases.

- i) Very small
 - ii) Not very small
 - iii) Not very very large
 - iv) Not very small and Not very very large
- b) Explain any four components of ANN [4]
- c) What is Intensification? [2]

Q4) Attempt the following.

- a) Determine the preposition “If A THEN B” for the fuzzy sets given below [4]

$$\underset{\sim}{A} = \left\{ \frac{0}{a} + \frac{0.2}{b} + \frac{1}{c} + \frac{1}{d} \right\} \quad \underset{\sim}{B} = \left[\frac{0}{p} + \frac{0.3}{q} + \frac{0.8}{r} + \frac{1}{s} \right]$$

- b) A neuron has two input weights : 0.5 and 0.75, for an input $x = \{-1, 0.5\}$. Find the value of bias weight such that the neuron output is 0.8 for linear threshold signal function with $a = 1$. [4]
- c) Define : [2]
- i) Fuzzy number
 - ii) fuzzy set

Q5) Attempt the following.

- a) Describe any two neuron signal function with suitable diagram. [4]
- b) For the following fuzzy relation R, find λ - cut relation for $\lambda = 0.7$ and $\lambda = 0.4$ [4]

$$R = \begin{vmatrix} 1 & 0.8 & 0.4 & 0.2 \\ 0.8 & 1 & 0.3 & 0.1 \\ 0.4 & 0.3 & 1 & 0.2 \\ 0.2 & 0.1 & 0.2 & 1 \end{vmatrix}$$

- c) What is supervised learning? [2]

Q6) Attempt the following.

- a) Explain learning parameters of back - propagation network. [4]
- b) Explain α - LMS learning algorithm. [4]
- c) Define convex set. [2]

Q7) Attempt the following.

- a) Briefly outline the procedure of gradient descent based learning. [5]
- b) Explain basic genetic algorithm. [5]

Q8) Attempt the following

- a) What is single layer & multilayer feed - forward network. [5]
- b) Implement the 'AND' function with bipolar inputs and bipolar targets using perceptron training algorithm. Assume initial weights and bias to be zero, learning rate $h = 1$ and the activation function as follows : [5]

$$S(u_j) = \begin{matrix} 1 & , & \text{if } u_j > 0 \\ 0 & , & \text{if } u_j = 0 \\ -1 & , & \text{if } u_j < 0 \end{matrix}$$



Total No. of Questions : 8]
P3253

SEAT No. :

[Total No. of Pages : 3

[5541]-407
M.C.A. (Science Faculty) (Semester - IV)
CA - 409 : ARTIFICIAL INTELLIGENCE
(2013 Pattern) (Credit System)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates :

- 1) Attempt any five of the following.*
- 2) Neat diagram must be drawn wherever necessary.*
- 3) Figures to the right indicate full marks.*

Q1) Attempt the following :

- a) Explain with examples problem spaces, search and control strategies in AI? **[4]**
- b) Explain cut and fail predicates in prolog. **[4]**
- c) Define AI. **[2]**

Q2) Attempt the following :

- a) Write a note on “Learning from examples (Induction)”. **[4]**
- b) Write the algorithm for generate and test search. **[4]**
- c) What is Turing Test. **[2]**

Q3) Attempt the following :

- a) What is Hill climbing? Explain the phenomenon of local maxima, plateau and ridge. **[4]**
- b) Explain AO* algorithm. **[4]**
- c) What is Goal stack planning? **[2]**

P.T.O.

Q4) Attempt the following.

- a) Write a note on “Conceptual dependency”. [4]
- b) Convert the following into facts. [4]
 - i) Sunny likes food if it is fresh.
 - ii) Tom relishes coffee.
- c) Define AI Technique. [2]

Q5) Attempt the following :

- a) Explain backtracking using prolog with example. [4]
- b) What is semantic net? Explain how it is used to represent Inheritance. [4]
- c) What is Means - Ends Analysis? [2]

Q6) Attempt the following.

- a) Explain type of knowledge representation. [4]
- b) Give the components of planning system. [4]
- c) Define forward and backward chaining. [2]

Q7) Attempt the following

- a) Explain rule, facts predicates used in prolog. [5]
- b) Describe the advantages of predicate logic over propositional logic. Represent each of the following sentences in first-order logic. [5]
 - i) Ram likes all kinds of food.
 - ii) Apples and Grapes are food.
 - iii) Ravi eats apple and is still alive.

Q8) Attempt the following.

a) Write a note on “Decision Tree”. Give an examples. **[5]**

b) Convert the following sentence in first order logic. **[5]**

i) Ram has atleast two umbrellas.

ii) Every one has umbrella.

iii) Ram has an umbrellas.

iv) Anything that has an umbrella is not wet.

v) No one likes wet umbrella.



Total No. of Questions : 8]
P3254

SEAT No. :
[Total No. of Pages : 2

[5541]-501
MCA (Science) - III
CA - 501 : Internet Programming
(Semester - V) (2013 Pattern)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates :

- 1) Answer any five questions.*
- 2) Assume suitable data if necessary.*

Q1) Attempt all of the following. **[4]**

- a) Explain inheritance with example in PHP.
- b) Which are different class methods and object methods available in Pear DB? **[4]**
- c) What are the features of PHP? **[2]**

Q2) Attempt all of the following :

- a) Write a short note on PEAR DB. **[4]**
- b) Write an example to create a XML file in PHP. **[4]**
- c) Write note on server sockets layer. **[2]**

Q3) Attempt all of the following.

- a) Explain the function used for approximate string equality. **[4]**
- b) Write a script to create an XML parser. **[4]**
- c) Explain the concept of “default parameters”. **[2]**

P.T.O.

Q4) Attempt all of the following :

- a) Explain Client - Server model in PHP. [4]
- b) Compare GET and POST methods of PHP. [4]
- c) Explain mail() function of PHP. [2]

Q5) Attempt all of the following.

- a) Explain function fread(), fwrite(), fgetc(), fgets() [4]
- b) Write php script to send an email message. [4]
- c) What is XML? [2]

Q6) Attempt all of the following.

- a) Explain constructor and destructor with example. [4]
- b) Define an array find the elements from the array that matches the given value using appropriate search function. [4]
- c) Explain un - serialize and wakeup methods. [2]

Q7) Attempt all of the following.

- a) Write PHP script to validate E - mail id with regular expression. [5]
- b) Write anonymous function for addition of 2 numbers in PHP. [5]

Q8) Attempt all of the following.

- a) Explain how actually HTTP works in PHP. [5]
- b) Explain file uploads in PHP in detail. [5]



Total No. of Questions : 8]
P3255

SEAT No. :
[Total No. of Pages : 3

[5541]-502
MCA - III (Under Science Faculty)
CA - 502 : Principles of Programming Languages
(2013 Pattern) (Semester - V)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates :

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

Q1) Answer the following :

- a) Write a short note on Semaphores. **[4]**
- b) Describe the difference between static and dynamic scope. **[4]**
- c) Define following : **[2]**
 - i) Binding Time
 - ii) Dangling reference

Q2) Answer the following :

- a) Explain CONS, CAR, CDR primitives in LISP. **[4]**
- b) Explain the functional and object oriented languages. **[4]**
- c) What is the difference between type equivalence and type compatibility? **[2]**

Q3) Answer the following :

- a) Write LISP function “remove” which takes a list and an element and returns the original list with the first occurrence of the element removed. **[4]**
- b) Explain the difference between a thread and a co-routine. **[4]**
- c) What is I - value and r - value? **[2]**

P.T.O.

Q4) Answer the following :

- a) Implement the factorial function in LISP. [4]
- b) Why do imperative languages commonly provide a 'case' statement in addition to 'if....then.....else'? [4]
- c) What is the use of cactus stack? [2]

Q5) Answer the following :

- a) Write a short note on FAIL predicate. [4]
- b) Consider the following program segment in C++ [4]
try {.....
// protected block of code
....}
catch (end - of - file) {....}
catch (io-error e) { // handler for io - error other than end - of - file}
catch(....)
{ //handler for any exception not previously named.}
Show how this exception can be handled using exception handler in C++.
- c) Name two real life applications of multithreading. [2]

Q6) Answer the following

- a) What is type inheritance? What is type clash? [4]
- b) Describe how to maintain the static chain during a subroutine call. [4]
- c) Indicate the binding time for each of the following decisions (Consider C language). [2]
 - i) The number of built in functions.
 - ii) The total amount of space occupied by program code and data.

Q7) Answer the following

- a) Write Prolog Program to find nP_r . [5]
- b) Explain the difference between virtual and non - virtual methods? Why does C++ use static method binding by default? Why java makes all methods virtual? [5]

Q8) Answer the following :

- a) Write Prolog Program to find the n^{th} element of the list. [5]
- b) Write a LISP function called “distance”, which take two points and returns the Euclidean distance between them. Use : distance” to rewrite “get - side”. [5]



Total No. of Questions : 8]

SEAT No. :

P3256

[Total No. of Pages : 3

[5541]-503

MCA (Under Science Faculty) (Semester - V)

CA 503 : Data Mining & Data Warehousing

(2013 Pattern)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates :

- 1) Attempt any Five questions.
- 2) Figures to right indicate full marks.
- 3) Assume suitable data wherever necessary.
- 4) Draw neat diagram wherever required.

Q1) Attempt the following :

- a) Discuss the different types of data attribute with suitable example. [4]
- b) What are the social implications of data mining? [4]
- c) Define market basket analysis. [2]

Q2) Attempt the Following :

- a) List and explain the distance measure to compute to distance between two objects. [4]
- b) What is decision tree? Why is decision tree induction popular? [4]
- c) What is metadata? Why it is important? [2]

Q3) Attempt the following :

- a) Construct an F - P Tree for the following data. [4]

TID	Items Bought
1	f, a, c, d, g, i, m, p
2	a, b, c, f, l, m, o
3	b, f, h, j, o
4	b, c, k, s, p
5	a, f, c, e, l, p, m, n

- b) Explain overfitting with example. [4]
- c) Explain : Data mart. [2]

P.T.O.

Q4) Attempt the following :

a) Consider the following dataset;

$D = \{2, 4, 10, 12, 3, 20, 30, 11, 25\}$ No. of clusters = 02

By using above data set apply K - means clustering algorithm and find two clusters. [4]

b) Explain hierarchical clustering with example. [4]

c) What is outlier? [2]

Q5) Attempt the following :

[4]

a) Define the following :

i) Precision.

ii) Recall

b) What is regression? Explain how it is different from prediction. [4]

c) Define : data cube. [2]

Q6) Attempt the following :

a) Differentiate : supervised learning and unsupervised learning. [4]

b) Compare : Agglomerative and Divisive Hierarchical Clustering. [4]

c) Write a note on : bagging. [2]

Q7) Attempt the following :

a) Consider the following transaction table and generate the candidate item sets and frequent item sets, where the minimum support count = 3 [5]

ID	Items
1	Bread, Milk
2	Bread, Diaper, Beer, Eggs
3	Milk, Diaper, Beer, Coke
4	Bread, Milk, Diaper, Beer
5	Bread, Milk, Diaper, Coke

Apply Apriori algorithm to find frequent item set.

- b) How is a data warehouse different from a database? How are they similar to each other? [5]

Q8) Attempt the following :

- a) Explain the process of knowledge discovery in database. [5]
- b) Suppose that a data ware house for university consist of the following four dimensions: (Student, Course, semester and teacher) and two measure count and avg-grade. When the lower conceptual level (for example, given student, course and semester teacher combination), the avg-grade measure stores the actual course grade of the student at the higher conceptual levels, avg-grade stores the average grade for given combination. Draw a snowflake diagram for the data ware house. [5]



Total No. of Questions : 8]
P3257

SEAT No. :
[Total No. of Pages : 2

[5541]-504
M.C.A. (Science Faculty)
CA - 504 : SOFTWARE PROJECT MANAGEMENT
(2013 Pattern) (Semester - V)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates :

- 1) Attempt any five questions from given eight questions.*
- 2) Neat diagrams must be drawn whenever necessary.*
- 3) Figures to the right side indicate full marks.*

Q1) Attempt the following :

- a) Which factors affect the quality of IT project? [4]
- b) Write note on schedule control. [4]
- c) List the process of project procurement management. [2]

Q2) Attempt the following :

- a) State and explain the processes of project communication management.[4]
- b) Define cost estimates. Explain types of cost estimate. [4]
- c) Define term “Deliverables”. [2]

Q3) Attempt the following :

- a) Summarize the process involved in human resource management. [4]
- b) Write a note on PDM Method. [4]
- c) Define earned value management. [2]

P.T.O.

Q4) Attempt the following :

- a) Write a note on scope verification. [4]
- b) Which are the processes of Project Risk Management? Explain in detail. [4]
- c) What is scope statement? [2]

Q5) Attempt the following :

- a) List all tools and technique used for cost estimation. Explain any one in detail. [4]
- b) Define Risk Identification? Explain various risk categories. [4]
- c) List the phases of project life cycle. [2]

Q6) Attempt the following :

- a) Write short note on project charter. [4]
- b) What is Project Management? Explain the qualities of Project Manager. [4]
- c) What is Quality Assurance? [2]

Q7) Attempt the following :

- a) Write a note on COST of quality in Project Quality Management. [5]
- b) What is project? Explain triple constraint on project. [5]

Q8) Attempt the following :

- a) Create work Breakdown Structure for website development Project. [5]
- b) What is Project Management Framework, explain with diagram. [5]



Total No. of Questions : 8]
P3261

SEAT No. :
[Total No. of Pages : 2

[5541]-601
M.C.A. (Science Faculty) (Semester - VI)
CA - 602 : Software Testing & Quality Assurance
(2013 Pattern)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates :

- 1) Attempt any five questions.*
- 2) Figures to the right indicate full marks.*
- 3) Neat diagrams must be drawn wherever necessary.*

Q1) Attempt all of the following : **[4 + 4 + 2 = 10]**

- a) Define test cases. What are attributes of test cases?
- b) What are principles of software testing?
- c) Give principle & use of Pareto diagram.

Q2) Attempt all of the following : **[4 + 4 + 2 = 10]**

- a) What are formal technique reviews?
- b) What is validation testing?
- c) Define SQA.

Q3) Attempt all of the following : **[4 + 4 + 2 = 10]**

- a) What is brain storming in Pareto Diagram?
- b) Write short note on SQA plan.
- c) What is the use of run chart?

P.T.O.

Q4) Attempt all of the following : **[4 + 4 + 2 = 10]**

- a) Write short note on six sigma
- b) Explain top down integration testing.
- c) What is the use of cause effect diagram?

Q5) Attempt all of the following : **[4 + 4 + 2 = 10]**

- a) Explain attributes of effective software metrics.
- b) What are the steps for deriving test cases?
- c) What is nature of error?

Q6) Attempt all of the following : **[4 + 4 + 2 = 10]**

- a) Write short note on inspection and walkthrough.
- b) Explain scatter diagram with example.
- c) What is real - time system testing?

Q7) Attempt all of the following : **[5 + 5 = 10]**

- a) Write short note on Statistical Quality Assurance.
- b) Explain Winrunner and Loadrunner in brief.

Q8) Attempt all of the following : **[5 + 5 = 10]**

- a) Write a short note on ISO 9001 Quality standards.
- b) Explain defect management process in detail.



Total No. of Questions : 8]
P3262

SEAT No. :
[Total No. of Pages : 2

[5541]-602
M.C.A. (Science)
CA - 603 : Embedded System
(2013 Pattern) (Semester - VI)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates :

- 1) Answer any five questions.*
- 2) Neat diagrams must be drawn wherever necessary.*
- 3) Figures to right indicate full marks.*

- Q1)** a) Define Embedded system & List components of Embedded system. **[4]**
b) Explain Harvard Architecture in details. **[4]**
c) What is Size of Address and data bus of 8086 microprocessor? **[2]**
- Q2)** a) Define foreground and background system. **[4]**
b) What is dynamic allocation in modular programming? **[4]**
c) Define complier. **[2]**
- Q3)** a) Explain software design cycle in details. **[4]**
b) Write short note on porting kernels. **[4]**
c) Define event flags. **[2]**
- Q4)** a) Write short note on timers of 8051. **[4]**
b) Explain Round - robin scheduling technique in details. **[4]**
c) Define logic analyzer. **[2]**

P.T.O.

- Q5)** a) Explain intertask communication in RTOS. [4]
b) Write short note on Run - time libraries. [4]
c) What is IDE? [2]
- Q6)** a) Explain critical section of code in RTOS. [4]
b) Discuss the operating system fundamentals. [4]
c) What is function of following instructions. [2]
i) MOV a, # 40 h
ii) MOV a, 40 h.
- Q7)** a) Differentiate between microprocessor and microcontroller. [5]
b) Explain multiuser multitasking operating system. [5]
- Q8)** a) Explain the following : [5]
i) Task priority
ii) Static priority
b) Which parameters have to be consider for designing of target board? [5]



Total No. of Questions : 8]
P3263

SEAT No. :
[Total No. of Pages : 2

[5541]-603
M.C.A. (Under Science Faculty)
CA - 604 : Information Security and Audit
(2013 Pattern) (Semester - VI)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates :

- 1) Attempt any five questions.*
- 2) All questions carry equal marks.*

- Q1)** a) Explain Legal, Ethical and Professional issues related to information security. [4]
b) Discuss any two cryptography tools in details. [4]
c) Define Risk management. [2]
- Q2)** a) Write note on fire wall. [4]
b) With suitable sketches, explain the working of DES algorithm. [4]
c) Write advantages of intrusion detection system. [2]
- Q3)** a) What is information security blueprint? Identify its major components and formulate a cost benefit analysis. [4]
b) Explain Flooding Attacks. [4]
c) Define virus and its types. [2]
- Q4)** a) Describe the different ways in which smoke detectors are operating. [4]
b) Explain 'Denial - of - service - Attacks'. [4]
c) Define 'Threats' in Information Security. [2]

P.T.O.

- Q5)** a) What is malicious software? Explain how to prevent malicious software. **[4]**
b) Write a short note on Honey pots, Honey nets. **[4]**
c) Differentiate between authentication and authorization. **[2]**
- Q6)** a) Write short note on trap and trace systems. **[4]**
b) Define Steganography. What is the importance in using Steganography tools? **[4]**
c) Define intellectual property. **[2]**
- Q7)** a) Write a short note on Active intrusion prevention. **[5]**
b) Explain general computer crime laws. **[5]**
- Q8)** a) Describe the four categories of locks. In which situations these locks are preferred. **[5]**
b) What are the different steps for operating system hardening? **[5]**



Total No. of Questions : 8]
P3264

SEAT No. :
[Total No. of Pages : 2

[5541]-604
M.C.A. (Under Science Faculty)
CA - 605 : Cloud Computing
(2013 Pattern) (Semester - VI)

Time : 3 Hours]

[Max. Marks : 50

Instructions to the candidates :

- 1) Answer any five questions.***
- 2) All questions carry equal marks.***

- Q1)*** a) Discuss some security concerns that should be considered for cloud deployment. **[4]**
b) Enlist and explain essential characteristics of cloud computing. **[4]**
c) Which cloud computing characteristic enables consumers to grow and shrink the demand for resources dynamically? **[2]**
- Q2)*** a) Describe the various cloud applications. **[4]**
b) Explain cloud computing reference model. **[4]**
c) Mention the services that are provided by window Azure Operating System? **[2]**
- Q3)*** a) Give some examples of cloud computing services. **[4]**
b) What are Hybrid clouds. Give services in hybrid clouds. **[4]**
c) What are the three key components of Virtual Desktop Infrastructure (VDI) **[2]**
- Q4)*** a) What are cloud deployment models? Explain private cloud. **[4]**
b) Explain storage and network virtualization with example. **[4]**
c) Give two benefits of virtualization. **[2]**

P.T.O.

- Q5)** a) What is mobile cloud computing? Why do we need mobile cloud computing? [4]
b) Write brief note on Big Table. [4]
c) Mention platforms which are used for large scale cloud computing? [2]
- Q6)** a) Discuss the architecture of hyper - V and discuss its use in cloud computing. [4]
b) Explain the cloud computing security architecture. [4]
c) What is the difference in cloud computing and computing for mobiles?[2]
- Q7)** a) Write note on Hadoop. [5]
b) What is secure execution environment and communication in cloud?[5]
- Q8)** a) Explain the architecture of cloud file systems (GFS) [5]
b) Write note on Microsoft Azure. [5]

