[5540]-1001

M.Sc. (Semester - I)
COMPUTER SCIENCE
CS-101 : Principles of Programming Languages
(2013 Pattern)

Time : 3 Hours]   *[Max. Marks :50*

Instructions to the candidates:

1) Attempt any five of the following questions.
2) Neat diagram must be drawn wherever necessary.
3) Figures to the right indicate full marks.
4) Assume suitable data if necessary.
5) All questions carry equal marks.

Q1) Attempt all of the following :

   a)   Explain the layout of the runtime stack.   **[4]**

   b)   Explain why ordering within an expression is important.   **[4]**

   c)   Name any two languages in which a program can write new pieces of itself 'on the fly'.   **[2]**

Q2) Attempt all of the following :

   a)   What is multiway assignment? Give its advantage.   **[4]**

   b)   What is macro? Explain limitations of 'C' macros with suitable example.   **[4]**

   c)   Define virtual and non-virtual methods.   **[2]**

Q3) Attempt all of the following :

   a)   Explain implementation of single inheritance with suitable example.   **[4]**

   b)   Explain in short: various categories of array based on binding to storage.   **[4]**

   c)   What is backtracking in prolog?   **[2]**

Q4) Attempt all of the following :

    a)   Explain scope rules and binding rules with suitable example.   **[4]**

    b)   Write a short note on LISP-defun. Give suitable example.   **[4]**

    c)   What are promises and memorization?   **[2]**

Q5) Attempt all of the following :

    a)   Write a prolog program to find factorial of a number.   **[4]**

    b)   Explain different approaches to dangling reference problem.   **[4]**

    c)   What is subprogram call and subprogram header.   **[2]**

Q6) Attempt all of the following :

    a)   Define :   **[4]**

        i)   Task

        ii)   Heavy weight task

        iii)   Light weight task

        iv)   Disjoint task

    b)   Discuss various issues related to initialization and finalization.   **[4]**

    c)   Define :   **[2]**

        i)   Static link

        ii)   Dynamic link

Q7) Attempt all of the following :

    a)   Write a lisp function for finding intersection of two lists.   **[5]**

    b)   Explain and compare Rectangular and Jagged Arrays.   **[5]**

Q8) Attempt all of the following :

    a)   Explain how cooperation synchronization is accomplished in Java.**[5]**

    b)   Find output of -   **[5]**

        i)   (first (rest (first' ((a b) (c d)))))

        ii)   (cadadr' ((pq) (r s) (t u)))

        iii)   (list' (a b c)' ( ))

        iv)   (append' (a b)' ( ))

        v)   (cons' (a b)'( ))

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[5540]-1002
M.Sc. (Semester - I)
COMPUTER SCIENCE
CS 102 : Advanced Networking
(2013 Pattern)

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 wherever necessary.*

3) *Figures to the right indicate full marks.*

Q1) Attempt all the following :

   a)   Explain the steps of complete video streaming process.   **[4]**

   b)   Explain different security principles.   **[4]**

   c)   List the different connecting devices in network.   **[2]**

Q2) Attempt all of the following :

   a)   Design ceaser cipher scheme to codify the message by replacing each alphabate with an alphabate three places down the line. Obtain the cipher text for given plaintext.   **[4]**

   Plaintext :   CYBER THREAT IS MAINLY REFLECTION OF OUR WEAKNESSES.

   b)   Explain four kinds of digital certificates.   **[4]**

   c)   What is MTU? Give MTU of ethernet protocol.   **[2]**

Q3) Attempt all the following :

   a)   Explain digital signature concept using public key cryptography. **[4]**

   b)   Draw and explain RIP message format.   **[4]**

   c)   What is meant by connection oriented and connection less services and list the protocol that uses above services.   **[2]**

P.T.O.

Q4) Attempt all of the following :

a) Explain how 3-D secure protocol is used to provide security to the credit card on the Internet. **[4]**

b) Given two prime numbers P = 19 and Q = 7. Find out N, E and D in RSA encryption process. **[4]**

c) What is the function of router? **[2]**

Q5) Attempt all of the following :

a) Explain different security threats associated with E-mail. **[4]**

b) Explain broad level steps in DES. **[4]**

c) Give the significance of Time-stamp protocol. **[2]**

Q6) Attempt all of the following :

a) What is algorithm mode? Explain CBC mode in detail. **[4]**

b) Explain fragmention process of IPV4 datagram. **[4]**

c) State the different attacks on IP packet. **[2]**

Q7) Attempt all of the following :

a) Explain three way handshaking process of TCP. **[5]**

b) Explain limitations of IPV4 and features of IPV6. **[5]**

Q8) Attempt all of the following :

a) What is Authentican? Explain characteristics of certificate based Authentication. **[5]**

b) What is PEM? Explain working of PEM with suitable diagram. **[5]**

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[5540]-1003
M.Sc. (Semester - I)
COMPUTER SCIENCE
CS 103 : Distributed Database Concepts
(2013 Pattern)

Time : 3 Hours]   *[Max. Marks :50*

Instructions to the candidates:
1) *Solve any five questions from given eight questions.*
2) *Figures to the right indicate full marks.*
3) *Draw a diagram wherever necessary.*

Q1) Attempt all of the following :
- a) Explain features of distributed Vs centralized database. **[4]**
- b) Describe the difference between top-down approach and bottom-up approach for designing distributed database. **[4]**
- c) State the autonomy models for DDBMS. **[2]**

Q2) Attempt all of the following :
- a) Consider the join graph given below for the relational algebra query PROJ $\bowtie_{pno}$ EMP $\bowtie_{eno}$ ASG. **[4]**
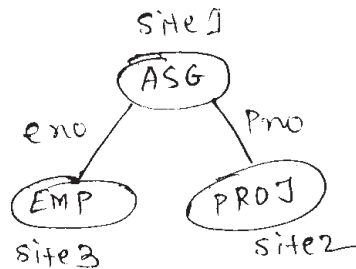
using the information given below, describe a join program which will need minimum data transfer

    size(EMP) = 200
    size(ASG) = 300
    size (PROJ) # 00
    size (EMP $\bowtie$ ASG) = 200
    size (ASG $\bowtie$ PROJ) = 300

- b) Describe important efficiency aspects of transaction management. **[4]**
- c) Write advantage and disadvantage of fragmentation. **[2]**

P.T.O.

Q3) Attempt all of the following :

a) Explain the layers of query processing. **[4]**

b) Relation EMP (eno, ename, title) is fragmented as follows : **[4]**

$$EMP_1 = \sigma_{eno} < = \text{"e}_3\text{"} (EMP)$$

$$EMP_2 = \sigma_{eno} > = \text{"e}_3\text{"} (EMP)$$

Relation proj (Pno, pname, budget, location) is fragmented as follows:

$$Proj_1 = \sigma \text{ budget} < = 500000 \text{ (proj)}$$

$$Proj_2 = \sigma \text{ budget} > = 500000 \text{ (proj)}$$

Relation ASG(eno, pno, resp, dur) is fragmented with respect to PROJ. Write a query to find names of those employees with eno > e_3, who work on project having budget 800000/-. Draw an operator tree feer the query and transform it into reduced operator tree.

c) State the classification criteria of concurrency control approaches. **[2]**

Q4) Attempt all of the following :

a) Write a note on state transition in 3PC protocol. **[4]**

b) Fragmentation permits a number of transactions to execute concurrently. Justify true or false. **[4]**

c) State the restrictions that reduces the size of search space. **[2]**

Q5) Attempt all of the following :

a) Write a note on work flow **[4]**

b) Illustrate the four reasons that causes the failure of DBMS. **[4]**

c) State the complicating factors in DDBMS. **[2]**

Q6) Attempt all of the following :

a) Consider the following relations

EMP(eno, ename, addr, age, dno)

DEPT(dno, dname, budget)

EMP relation is partioned horizontally as

$$EMP_1 = \sigma_{age} < 25 \text{ (EMP)}$$
$$EMP_2 = \sigma_{25} < age < 40 \text{ (EMP)}$$
$$EMP = \sigma_{age} > = 40 \text{ (EMP)}$$

DEPT relation is also partioned horizontally as

$$DEPT_1 = \sigma \text{ budget} < 2,00,000(DEPT)$$

$$DEPT_2 = \sigma \text{ budget} < 2,00,000(DEPT)$$

Draw a join graph of EMP ⋈ DEPT. Is the graph simple or partioned? If it is partioned modify the fragments of EMP and DEPT so that the join graph of EMP, DEPT will be simple. **[4]**

b) Explain deadlock prevention algorithm. **[4]**

c) What are two types of heuristic approaches for vertical partioning. **[2]**

Q7) Attempt all of the following :

a) Discuss how termination of protocols in ZPC when coordinator and participant time out occurs. **[5]**

b) What are the different types of communication failures in distributed database? How to resolve them? **[5]**

Q8) Attempt all of the following :

a) Explain the objectives behind design of data distribution. **[5]**

b) Define query optimization with diagram and state the pre requisite of distributed query optimization. What is INGRES algorithm? **[5]**

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[5540]-1004

M.Sc. (Semester - I)

COMPUTER SCIENCE

CS 104 : Design & Analysis of Algorithms

(2013 Pattern)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) *Attempt any five questions.*

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 questions :

a) Let A[1.....n] be an array of integers, integers can be duplicated. Write an efficient algorithm to find occurrences of given integer in an array A. Find its time complexity. **[4]**

b) Find length of shortest paths from vertex u to vertex v, $\forall u,v \in V(G)$ using Floyd Warshall algorithm. adjacency matrix of G is

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

[4]

c) Justify that partial solution obtained during Kruskal's algorithm are also trees. **[2]**

Q2) Attempt all questions :

a) Write an algorithm for quick sort. **[4]**

b) Find the minimum cost of computing product of chain of matrices having dimension 15×5, 5×10, 10×20, 20×25, using dynamic programming. **[4]**

c) What is satisfiability problem? State cook's theorem. **[2]**

P.T.O.

Q3) Attempt all questions :

a) Find an optimal solution to the knapsack problem instance n = 7 m = 15, & p = (10, 5, 15, 7, 6, 18, 3) W = (2, 3, 5, 7, 1, 4,1) using greedy method. **[4]**

b) What is 8 queen's problem? & explain N-Queen algorithm. **[4]**

c) Define Horner's rule? **[2]**

Q4) Attempt all questions :

a) Find an optimal binary merge pattern for 10 files whose lengths are 15, 2, 12, 35, 28, 11, 23, 5, 20, 3. **[4]**

b) Determine the polynomial of smallest degree that interpolates the points (0, 5), (1, 10) & (2, 21). **[4]**

c) Justify $4n^2 + 3n + 2 = O(n^2)$. **[2]**

Q5) Attempt all questions :

a) Given sequences X = (a, a, b, a, b) and Y = (b, a, b, b) find an edit sequence of minimum cost which transforms X into Y. The cost of each insertion and deletion is 1 and the cost of changing any symbol to any other symbol is 2. **[4]**

b) Explain Strassen's matrix multiplication. Derive the time complexity required by Strassen's matrix multiplication. **[4]**

c) Give the control abstraction for divide and conquer strategy. **[2]**

Q6) Attempt all questions :

a) Define the following terms **[4]**

i) Tree edge

ii) Back edge

iii) Forward edge

iv) Cross edge

b) Order the following function in ascending order of the growth rate.
n^2, e^n, 4^n, n!, $10n + 5\log e^n$ **[4]**

c) Define principle of optimality. **[2]**

Q7) Attempt all questions :

    a) What is m-colorability of graph problem? Give formulation of implicit & explicit constraints in case of m-colorability graph problem with n-nodes? Find all possible solution for 3-coloring of a following graph.

                    [5]
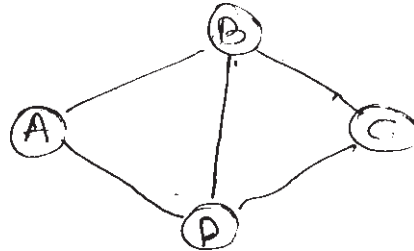
    b) Draw the portion of state space tree generated by LCBB for the knapsack problem instance by W = (2, 4, 6, 9) P = (10, 10, 12, 18) m = 15.**[5]**

Q8) Attempt all questions :

    a) Obtain the reduced cost matrix for TSP using LCBB.   **[5]**

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

    b) Explain BFS, what its time complexity? Illustrate it on the following graph.   **[5]**

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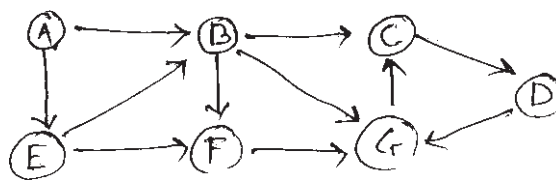
[5540]-2001
M.Sc. (Semester - II)
COMPUTER SCIENCE
CS - 201 : Digital Image Processing
(2013 Pattern)

Time : 3 Hours]   *[Max. Marks :50*

Instructions to the candidates:

1)   *Answer any five questions.*

2)   *Draw a diagram wherever necessary.*

3)   *Figures to the right indicate full marks.*

Q1) a)   How image can be store in image processing application? and Define image acquisition. **[4]**

b)   Explain contrast streching. **[4]**

c)   Write the co-ordinates of the four diagonal neighbors of pixel $p(x,y)$.**[2]**

Q2) a)   What is Gamma correction? Explain. **[4]**

b)   Explain i) illusion ii) simultaneous contrast **[4]**

c)   What is convolution theorem. **[2]**

Q3) a)   One dimensional image strip represented by {125943} is to be convolved with filter kernel given by {−1 0 1}.

Give step by step procedure of finding answer. **[4]**

b)   What do you mean by image restoration and degradation. **[4]**

c)   State the two properties of gray-level images for segmentation. **[2]**

Q4) a)   Explain Reflection and Translation. **[4]**

b)   What are the approaches for describing the boundary of a region. Explain any one of them. **[4]**

c)   Write equation for Harmonic mean filter. To which type of noise it suits? **[2]**

P.T.O.

Q5) a) Consider the following mask is used for line detection. Which orientation of lines will it detect? Why? **[4]**

$$\begin{matrix} -1 & 2 & -1 \\ -1 & 2 & -1 \\ -1 & 2 & -1 \end{matrix}$$

b) Write a note on Erosion and Dilation. **[4]**

c) What is merging technique? **[2]**

Q6) a) Given below is 'X' section of horizontal intensity profile from an image. Illustrate the first and second derivative of 1-D digital functions represented by 'X'. Depict zero crossing if any. **[4]**

| 6 | 6 | 6 | 6 | 6 | 5 | 4 | 3 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 6 | 6 | 6 | 6 | 6 |

b) Write the properties of opening and closing. **[4]**

c) What is the periodicity property of 2D DFT with equation. **[2]**

Q7) a) Explain the fundamental steps in Digital Image processing. **[5]**

b) What is aliasing? Define **[5]**
   i) Zooming
   ii) Shrinking of digital Image

Q8) a) A 32 × 32 pixel image has intensity distribution as shown in the table. The intensity levels are in the range 0-7. Apply histogram equalization technique and find the transfer function that relates output image intensity level S_k with input image intensity level V_k **[5]**

Intensity level	No. of Pixel
$V_0 = 0$	211
$V_1 = 1$	344
$V_2 = 2$	103
$V_3 = 3$	127
$V_4 = 4$	76
$V_5 = 5$	57
$V_6 = 6$	47
$V_7 = 7$	59

b) What is region based segmentation? Explain in detail. **[5]**

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[5540]-2002
M.Sc. (Semester - II)
COMPUTER SCIENCE
CS - 202 : Advanced Operating System
(2013 Pattern)

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 the right indicate full marks.*

Q1) a) Write a C program, which takes two file names as command line arguments and change the owner of the first file using chown( ) and that of the second file using fchown( ).   **[4]**

   b) Which user-ids are stored in process table slot and u-area of a process? Explain the system calls used to change the user ids.   **[4]**

   c) What is an unreliable signal?   **[2]**

Q2) a) What is the use of atexit ( ) function? Explain the function with proper syntax. What is the difference between-exit ( ) and exit ( )?   **[4]**

   b) Distinguish between named and unnammed pipes.   **[4]**

   c) Explain any four fields of incore inode which are not present in disk inode.   **[2]**

Q3) a) Explain readv( ) and writev( ) system calls. How they are different from read( ) and write( ) system calls?   **[4]**

   b) What are different types of page Faults which can arise during paging memory management mechanism? Explain the scenarios under which these page Faults can occur.   **[4]**

   c) What is the use of nice( ) system call? Explain it with proper syntax.
                                                                        [2]

                                                                    P.T.O.

Q4) a) What are the scenarios under which windows operating system increases current priority value of thread? **[4]**

b) Write a C program in which a filename is passed as a command line argument and the program prints the file type and file size attributes of the file. **[4]**

c) If free list of incore inodes is empty, the process requesting a free inode is not allowed to wait, but it returns with an error. Comment. **[2]**

Q5) a) With proper diagram, explain the two scenarios in buffer allocation in which the process, requesting buffer is put to sleep. **[4]**

b) A process has created 4 child processes Explain how process can wait for termination of - any one child

- all four children **[4]**

c) Explain major and minor numbers. **[2]**

Q6) a) Explain the behaviour of the following program. **[4]**

```
main ( )
{
    int i, pid;
    i = fork ( );
    if (i = = 0)
    {
        pid = setpgrp ( );
        printf ("%u", pid);
        pause ( )
    }
    print f ("%u", getpgrp ( ));
    kill (O, SIGINT);
}
```

b) Explain context switching with respect to threads in windows operating system. **[4]**

c) Explain demand fill and demand zero. **[2]**

Q7) a) Explain the behaviour of the following C program. **[5]**

```
main ( )
{
      int fdl, fd2;
      char str [20];
      if ((fdl = open ("input.txt", O_RDONLY))
              == -1
          exit (0);
      if (fork ( ) = = 0)
      {
          fd2 = open ("output1.txt", O_WRONLY);
          if (fd2 = = -1)
              exit (0);
          read (fd1, str, 20);
          write (fd2, str, 20);
      }
      else
      {
          fd2 = open ("output1. txt", O_WRONLY);
          if (fd2 = = -1)
              exit (0);
          read (fd1, str, 20);
          write (fd2, str, 20);
      }
}
```

  b) Write note on **[5]**
       - context of a process

Q8) a) Explain mmap with its advantages and disadvantages. **[5]**

  b) Explain functions/system calls, with their prototypes, for the following operations. **[5]**
    i)   Change read / write offset in a file
    ii) Stop execution of a process
    iii) duplicate the file descriptor
    iv) start execution of a new program
    v)   Find out permissions for the owner of a file.

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[5540]-2003

M.Sc. (Part - I) (Semester - II)
COMPUTER SCIENCE
CS : 203 - Data Mining and Data Warehousing
(2013 Pattern)

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 the right side indicate full marks.***

Q1) a) Explain Graph mining in detail.   **[4]**

b) Explain web mining in detail.   **[4]**

c) Difference between linear and non linear regression.   **[2]**

Q2) a) Explain the process of KDD.   **[4]**

b) Explain Naive Bayesian classification.   **[4]**

c) Define frequent itemset.   **[2]**

Q3) a) Write the applications of Association mining   **[4]**

b) Explain Bayesian theorem and solve the following example.   **[4]**

Given two bags each one having red and white balls. Both bags have equal chance of being chosen. If a ball is picked at random and found to be red what is the probability that the ball was chosen from bag A?

7W		5W
3R		5R

Bag A   Bag B

c) Explain the terms   **[2]**

i)   Data cleaning

ii) Data Transformation

Q4) a) Explain the concept of snowflake schema with a neat diagram. **[4]**

b) Define FP tree and construct the following FPtree. **[4]**

Transaction ID	Items bought
T100	{M, O, N, K, E, Y}
T200	{D, O, N, K, E, Y}
T300	{M,A,K,E}
T400	{M,U,C,K,Y}
T500	{C,O,O,K,I,E}

c) Define cross validation **[2]**

Q5) a) Explain classification in detail. **[4]**

b) Difference between OLAP and OLTP. **[4]**

c) Write any G applications of data mining. **[2]**

Q6) a) Explain pattern matching in detail. **[4]**

b) Explain precision and recall with one example each. **[4]**

c) Define correlation clustering **[2]**

Q7) a) Write the application of Text mining **[5]**

b) Briefly outline the major steps of decision tree claffication. **[5]**

Q8) a) Explain Decision Tree Induction. **[5]**

b) Explain Hierrarchical clustering in detail. **[5]**

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[5540]-2004
M.Sc. (Semester - II)
COMPUTER SCIENCE
CS - 205 : Programming with Dot Net
(2013 Pattern)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:

    1)   Answer any five questions.

    2)   Draw a diagram wherever necessary.

    3)   Figures to the right indicate full marks.

Q1) a) Explain Features of .Net. **[4]**

    b) Explain flow control statement in C# with example. **[4]**

    c) Write a program of creating file by using FileStream class. **[2]**

Q2) a) What is the button control? Explain its properties. **[4]**

    b) Describe XML with example. **[4]**

    c) Define Implicit conversion with example. **[2]**

Q3) a) Write a note on checkBox control. **[4]**

    b) Explain Deployment of web application. **[4]**

    c) State any two features of .Net assemblies. **[2]**

Q4) a) Explain classes in C# with program example. **[4]**

    b) What is the ViewState property of webform? Explain its advantages and disadvantages. **[4]**

    c) What is 'anchor' and 'Dock' properties. **[2]**

Q5) a) State and explain characteristics of web serives. **[4]**

    b) What type of controls used by ASP.Net web pages? **[4]**

    c) Define cookies with example. **[2]**

Q6) a)   Write a C# program to read file line by line.   **[4]**

b)   Write a note on HTTP.   **[4]**

c)   Write a string data type with example in C#   **[2]**

Q7) a)   How inter-process communication take place in .Net with example. **[5]**

b)   Define clipping. Write a program for drawing line and for drawing rectangle.   **[5]**

Q8) a)   Explain methods of penclass with example.   **[5]**

b)   Define HTML server control. Explain steps to add HTML server control with example.   **[5]**

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[5540]-2005
M.Sc. (Computer Sicence) (Semester - II)
CS - 206 : ARTIFICIAL INTELLIGENCE
## (2013 Pattern)

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 the right side indicate full marks.*

Q1) a) Write short note on semantic nets. **[4]**
   b) Explain the best first search algorithm comment on the significance of using the or graphs for this type of search. **[4]**
   c) What is artificial Intelligence. **[2]**

Q2) a) Describe any two approaches of representing knowledge. **[4]**
   b) Compare scripts and frames using example. **[4]**
   c) What is a heuristic function. **[2]**

Q3) a) Write short note on learning from examples with any one techniques.**[4]**
   b) Explain the MINIMAX search procedure. **[4]**
   c) Define search strategy. **[2]**

Q4) a) Consider the following game free. **[4]**
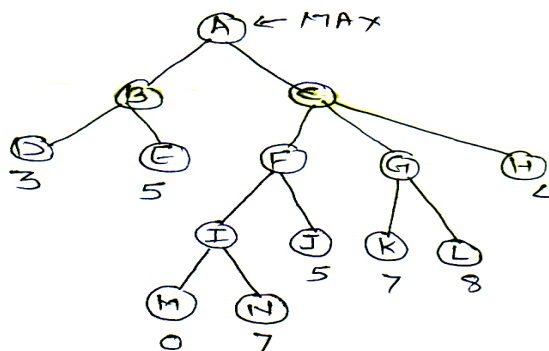
Perform a left to right alpha-beta pruning on the tree. Indicate where the cut. off occur.
   b) Represent the following sentence using an appropriate conceptual dependency diagram "Since smoking can kill you, I stopped". **[4]**

c) Define "Local Maximum" that is reached when you apply hill climbing search. **[2]**

Q5) a) Write a short note on decision tree **[4]**
b) Convert following statements into WFFs **[4]**
   i) Marcus was a man
   ii) Marcus was a pompeian
   iii) All pompeians were roman
   iv) Caesar was a ruler
   v) All romans were either loyal to caesar or hate him.
   vi) Every one is loyal to someone
   vii) People only try to assassinate rulers they are not loyal to.
   viii) Marcus tried to assacinate caeasar.
c) Represent the following using semantic nets "Every batsman hit a ball".**[2]**

Q6) a) Write A* algorithm **[4]**
b) Write a short note on production system. **[4]**
c) What does PTRANs primitive act indicate in a conceptual dependency representation? **[2]**

Q7) a) Consider the following english statements & their WFF's equivalent.**[5]**

English statement	FOPL/WFF's
Jack owns a dog	$\exists x : dog(x) \wedge owns(Jack, x)$
Every dog owner is an animal lover	$\forall x : (\exists y : dog(y) \wedge owns(x, y) \Rightarrow$ Animal Lover $(x))$
No animal Lover kills an animal	$\forall x :$ Animal Lover$(x) \Rightarrow$ $(\forall y :$ Animal$(y) \Rightarrow \sim$ kills $(x,y))$
Either Jack or Curiosity Killed Tuna, the cat	Kills(Jack, Tuna) Kills (curiosity, Tuna) Cat (Tuna) $\forall x :$ Cat$(x) \Rightarrow$ Animal$(x))$

Using Resdution prove that curiosity did not kill Tuna.
b) Write short note on Rote learning. **[5]**

Q8) a) Explain forward and Backward chaining with example. **[5]**
b) Translate the following English statements to FOPL. **[5]**
   i) There is a mushroom that is purple and poisonous.
   ii) There is a bunny who is cute.

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[5540]-2006
M.Sc. (Semester - II)
COMPUTER SCIENCE
CS - 207 : Advance Design & Analysis of Algorithms
(2013 Pattern)

*Time : 3 Hours]*

[Max. Marks : 50

Instructions to the candidates:

    1)   *Answer any 5 questions.*

    2)   *All questions carry equal marks.*

    3)   *Figures to the right indicate full marks.*

Q1) a)   Write a note on simplex method.   **[4]**

    b)   Illustrate how TSP can be solved using primal-dual method.   **[4]**

    c)   What is heuristic optimization.   **[2]**

Q2) a)   Where do we use ellipsoid method? Explain in detail.   **[4]**

    b)   Illustrate with example how suffix tress are used.   **[4]**

    c)   Write application of fibonacci Heaps.   **[2]**

Q3) a)   Write a note on splay trees.   **[4]**

    b)   Discuss any significant use of approximation algorithm.   **[4]**

    c)   What is optimization problem?   **[2]**

Q4) a)   What are dynamic trees? Explain their significance.   **[4]**

    b)   Write a note on K-median on a cycle.   **[4]**

    c)   Explain in brief cutting plane method.   **[2]**

Q5) a)   What are universal steiner trees? What is their use?   **[4]**

    b)   Formulate 0/1 knapsack problem as integer linear programming problem**[4]**

    c)   Define Maxflow and minflow.   **[2]**

Q6) a) Explain knuth-morris-pratt algorithm. **[4]**

b) Find out maximum flow through the following network. **[4]**
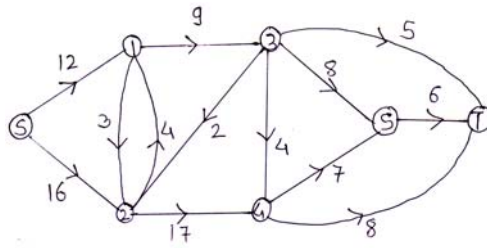
c) Compare and contrast decision problems and optimization problem.**[2]**

Q7) a) What is principle behind Rabin-karp algorithm? Explain its working(Algorithm not necessary) **[5]**

b) How is TSP solved using complete enumeration? **[5]**

Q8) a) Write a note on convex optimization **[5]**

b) Explain steiner forest problem **[5]**

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[5540]-3001

M.Sc. (Computer Science) (Semester - III)
CS - 301 : SOFTWARE METRICS AND PROJECT MANAGEMENT
(2013 Pattern)

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 wherever necessary.*
 3) *Figures to the right side indicate full marks.*
 4) *Use of simple calculator is allowed.*

Q1) Attempt the following :
 a) Explain the reasons of failure of IT projects.   **[4]**
 b) What do you mean by analysing software data in software metrics? **[4]**
 c) Define   **[2]**
   i) Profit
   ii) sunk cost

Q2) Attempt the following :
 a) Write short note of CMM.   **[4]**
 b) Differentiate between softaware reliability and Hardware reliability. **[4]**
 c) Define project.   **[2]**

Q3) Attempt the following :
 a) Explain the overview of project in detail.   **[4]**
 b) What is project cost management? Explain types of cost estimates. **[4]**
 c) List the different aspects of size in software management.   **[2]**

Q4) Attempt the following :
 a) Design WBS for library management system.   **[4]**
 b) Explain different factors affects the quality of IT projects.   **[4]**
 c) List the processes include in project time management.   **[2]**
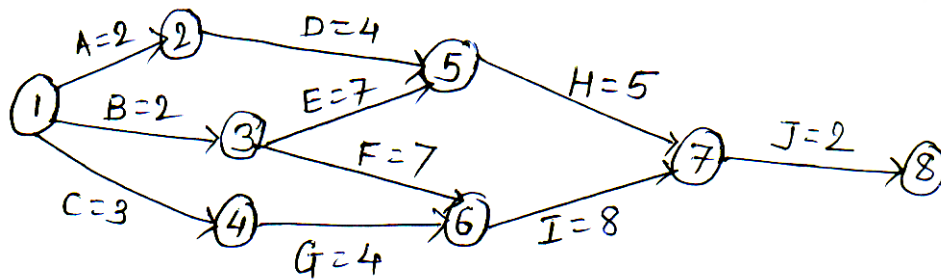
Q5) Atttempt the following :

    a)   Explain performance reporting.   **[4]**

    b)   Explain simulation in detail.   **[4]**

    c)   Define   **[2]**

        i) Fault

        ii) Software bug

Q6) Attempt the following :

    a)   What are the different types of contracts?   **[4]**

    b)   Write short note on metric plan.   **[4]**

    c)   Define staff acquisition.   **[2]**

Q7) Attempt the following :

    a)   Define critical path analysis. And find critical path for the following dig.**[5]**

    b)   Write short note on overall change control.   **[5]**

Q8) Attempt the following

    a)   What do you mean by analyzing software data in software metrics. **[5]**

    b)   What is project management? Explain the qualities of project manager.**[5]**

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[5540]-3002

M.S.C. - II (Computer Science)
CS - 302 : MOBILE COMPUTING
(2013 Pattern) (Semester - III)

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 indicate full marks.*

Q1) Attempt all of the following

  a)   What is cellular system? Explain advantages and disadvantages.   **[4]**

  b)   Explain Mobile Application.   **[4]**

  c)   What is DVM in Android?   **[2]**

Q2) Attempt all of the following

  a)   What is difference between FDMA & TDMA   **[4]**

  b)   Explain cellular IP micro mobility support.   **[4]**

  c)   What is hidden terminal problem?   **[2]**

Q3) Attempt all of the following

  a)   What is spread spectrum? Give advantages of FHSS.   **[4]**

  b)   What is Activity? Explain Activity life cycle.   **[4]**

  c)   What is Soft Handover?   **[2]**

Q4) Attempt all of the following

  a)   Explain GPRS architecture.   **[4]**

  b)   Explain IP packet delivery.   **[4]**

  c)   Give any two features of android.   **[2]**

Q5) Attempt all of the following

    a)   Explain GSM architecture   **[4]**

    b)   What is mobile services? Explain different types of mobile services. **[4]**

    c)   What is reverse tunneling?   **[2]**

Q6) Attempt all of the following:

    a)   Write a short note on IPV6.   **[4]**

    b)   Explain mobile originated call in GSM   **[4]**

    c)   Define mobility   **[2]**

Q7) Attempt all of the following

    a)   Explain wireless transactional protocol.   **[5]**

    b)   What is UMTS? Explain Hard and Soft Handover.   **[5]**

Q8) Attempt all of the following

    a)   What is Handover? Explain with example.   **[5]**

    b)   Explain SMS architecture.   **[5]**

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[5540]-3003

M.Sc. (Computer Science)
CS - 303 : SOFT COMPUTING
(2013 Pattern) (Semester - III)

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.*

Q1) Attempt the following
  a) Define artificial neural network. Explain component of ANN.   **[4]**
  b) For the following two fuzzy sets find its union and intersection.   **[4]**

$$A = \left\{ \frac{1}{0} + \frac{0.8}{20} + \frac{0.65}{40} + \frac{0.45}{60} + \frac{0.3}{80} + \frac{0.1}{100} \right\}$$

$$B = \left\{ \frac{0}{0} + \frac{0.45}{20} + \frac{0.7}{40} + \frac{0.8}{60} + \frac{0.95}{80} + \frac{1.0}{100} \right\}$$

  c) What is genetic algorithm? List any two advantages of Genetic algorithm.**[2]**

Q2) Attempt the following.
  a) Explain Neuron signal function.   **[4]**
  b) Using Genetic Algorithm maximize $f(x)=x^2+1$ with initial values of (12,25,5,19). Show one crossover & mutation operation.   **[4]**
  c) State any two reasons how genetic algorithms are different from traditional algorithm.   **[2]**

Q3) Attempt the following.
  a) What are linguistic hedges? Explain operations of linguistic hedges. **[4]**
  b) Consider two fuzzy sets A and B both defined on universe X are as follows.   **[4]**

μ_{xi}	X_1	X_2	X_3	X_4	X_5	X_6
A	0.1	0.7	0.8	1.0	0.7	0.1
B	1.0	0.9	0.5	0.2	0.1	0

Express the following λ-cut sets using Zadeh's notation.

  i) $\left(A \cup \bar{A} \right)_{0.7}$ ii) $\left(A \cap B \right)_{0.8}$ iii) $\left(A \cup B \right)_{0.7}$ iv) $\left(B \cap B \right)_{0.6}$

  c) Explain any two features of membership function.   **[2]**

Q4) Attempt the following.

a) The membership function for linguistic variables "Large" and "Small" as given below. **[4]**

$$\text{"Large"} = \left\{ \frac{0}{0} + \frac{0.1}{10} + \frac{0.3}{20} + \frac{0.5}{30} + \frac{0.8}{40} + \frac{1.0}{50} \right\}$$

$$\text{"Small"} = \left\{ \frac{1}{0} + \frac{0.9}{10} + \frac{0.5}{20} + \frac{0.3}{30} + \frac{0.1}{40} + \frac{0}{50} \right\}$$

Find membership for the following phrases
a) Very Small
b) Very small or very large
c) Not very small
d) Not very small and not very large

b) Explain properties of TLNS. **[4]**

c) What is fuzzy equivalence relation. **[2]**

Q5) Attempt the following.

a) Define Defuzzification. Explain any three methods of defuzzification. **[4]**

b) Let $X=(x_1,x_2,x_3)$,$Y = (y_1,y_2,y_3)$ and $Z = (z_1,z_2,z_3)$ be the universe of discourse on which the following fuzzy sets be defined respectively. **[4]**

$$A = \left\{ \frac{0.9}{x_1} + \frac{0.4}{x_2} + \frac{0.0}{x_3} \right\}$$

$$B = \left\{ \frac{0.1}{y_1} + \frac{0.7}{y_2} + \frac{1}{y_3} \right\}$$

$$C = \left\{ \frac{0.3}{z_1} + \frac{1.0}{z_2} + \frac{0.2}{z_3} \right\}$$

Find
i) R = A X B
ii) S = B X C
iii) T = R o S using max-min composition.
iv) U = R o S using max-product composition.

c) Define **[2]**
i) Convex hulls
ii) Convex set

Q6) Attempt the following fuzzy sets

a) $A = \left\{ \dfrac{0.1}{x_1} + \dfrac{0.9}{x_2} + \dfrac{0.0}{x_3} \right\}$

$B = \left\{ \dfrac{0}{y_1} + \dfrac{1}{y_2} + \dfrac{0}{y_3} \right\}$

Determine the implication relation "IF A THEN B". **[4]**

b) Let a fuzzy set $A = $ "approximate 2" $= \left\{ \dfrac{0.6}{1} + \dfrac{1}{2} + \dfrac{0.8}{3} \right\}$

$B = $ "approximate 6" $= \left\{ \dfrac{0.8}{5} + \dfrac{1}{6} + \dfrac{0.7}{7} \right\}$

Find fuzzy set "approximate 12" using Zadeh's extension principle. **[4]**
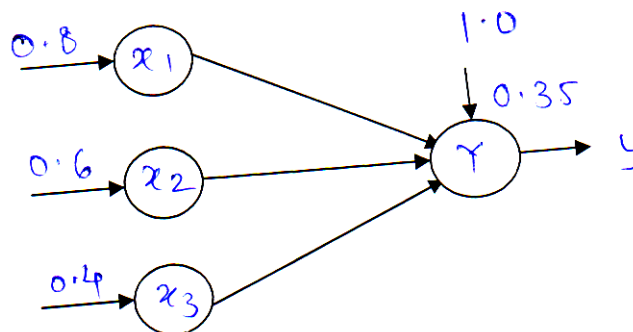
c) What is an epoch? **[2]**

Q7) Attempt the following.

a) Explain operators in GA. **[5]**

b) Explain Supervised Learning and Unsupervised Learning. **[5]**

Q8) Attempt the following.

a) Differentiate between fuzzy sets and crisp sets. Explain properties and operations of both. **[5]**

b) Obtain the output of the neuron Y for the network shown in following figure using activation functions as: **[5]**

[5540]-3004

M.S.C. (Computer Science)
CS - 305 : Web Services
(2013 Pattern) (Semester - III)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:

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

Q1) a) Explain the difference between web services and web applications. **[4]**

b) Draw and explain the architecture of web services. **[4]**

c) List advantages of SOAP message. **[2]**

Q2) a) What is Restfull Services? List its advantages. **[4]**

b) Interoperability is primary goal of web services? Explain. **[4]**

c) What is RPC? Explain. **[2]**

Q3) a) What are the steps involved in doing the data exchange between the client and the server. **[4]**

b) Explain the structure of WSDL documentation with proper description. **[4]**

c) Explain multitenancy. **[2]**

Q4) a) What is SOAP? Explain structure of a SOAP message. **[4]**

b) Explain publishing API of UDDI **[4]**

c) What is Hypervisor? Explain. **[2]**

Q5) a) What is cloud computing? Explain **[4]**

b) Explain KVM and Xen. **[4]**

c) Explain concept of Saas. **[2]**

Q6) a) Explain limitations of UDDI. **[4]**

b) Enlist and give explanation about potential risks of cloud computing.**[4]**

c) Give the use of SOAP must understand attribute. **[2]**

Q7) a) Explain concepts of Iaas along with Amazon EC2 **[5]**

b) Write client side and server side code in Java to calculate current age if date of Birth (DOB) is inputed. **[5]**

Q8) a) Explain searching information of UDDI registry **[5]**

b) Write short note on error handling in SOAP. **[5]**

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Total No. of Questions : 8]

P3205

SEAT No. :

[Total No. of Pages : 2]

[5540]-3007
M.Sc. (Semester - III)
COMPUTER SCIENCE
CS-308: Business Intelligence
(2013 Pattern)

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 all of the following:

    a)   Explain different tools of Business Intelligence.   **[4]**

    b)   Write a short note on six sigma.   **[4]**

    c)   What is Data mart?   **[2]**

Q2) Attempt all of the following:

    a)   Explain Data ware house architecture.   **[4]**

    b)   Explain Data mining process.   **[4]**

    c)   Define Web Content.   **[2]**

Q3) Attempt all of the following:

    a)   Explain Business Intelligence life cycle.   **[4]**

    b)   Write a short note on Text mining.   **[4]**

    c)   What is on demand system?   **[2]**

Q4) Attempt all of the following:

    a)   Explain any one Data mining method with example.   **[4]**

    b)   What are the different issues of legality.   **[4]**

    c)   Define metadata.   **[2]**

P.T.O.

Q5) Attempt all of the following:

    a)   What is difference between social Networking and BI?   **[4]**

    b)   Write a short note on ANN.   **[4]**

    c)   What is BPM?   **[2]**

Q6) Attempt all of the following:

    a)   Explain Balanced Scorecard.   **[4]**

    b)   Write a short note on CRISP-DM process.   **[4]**

    c)   Give any two advantages of data warehouse.   **[2]**

Q7) Attempt all of the following:

    a)   Explain decision making process in BI implementation.   **[5]**

    b)   Write a short note on OLAP.   **[5]**

Q8) Attempt all of the following:

    a)   Explain different types of data warehouse.   **[5]**

    b)   What is CDM? Explain advantages & disadvantages of CDM.   **[5]**

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[5540]-4001
M.Sc.(CS) (Semester - IV)
CS-402: PARALLEL COMPUTING
(2013 Pattern) (Elective)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:

   1)   *All questions carry equal marks.*

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

   3)   *Figures to the right indicate full marks.*

   4)   *You are advised to attempt not more than 5 questions.*

   5)   *Assume suitable data, if necessary.*

Q1) Attempt ALL: **[4+4+2]**

   a)   How can one ensure mutual exclusion without locks?

   b)   How long does the parallel version of Prim's minimum spanning tree finding algorithm require for a graph with n nodes using p processors?

   c)   What is a collective communication call?

Q2) Attempt ALL: **[4+4+2]**

   a)   How can two GPU threads communicate through shared memory?

   b)   Differentiate UMA vs. NUMA.

   c)   When can an MPI send call return?

Q3) Attempt ALL: **[4+4+2]**

   a)   Differentiate SIMD vs. MIMD.

   b)   What are the protocols used in Cache Coherence System?

   c)   Differentiate between deterministic routing and adaptive routing.

Q4) Attempt ALL: **[4+4+2]**

   a)   Define granularity, fine-grained and coarse-grained of a decomposition.

   b)   What is critical path and critical path length?

   c)   What is Owner-Computes rule?

Q5) Attempt ALL: **[4+4+2]**

   a) What is PRAM Model? What are the subclasses of PRAM?

   b) What is the significance of work complexity analysis?

   c) What is the difference between processor and FIFO consistency?

Q6) Attempt ALL: **[4+4+2]**

   a) When stealing load from a random loaded processor, what type of synchronization is needed? Why?

   b) What are the criteria that are used to evaluate the cost and performance of static interconnection networks?

   c) How should we structure the computation on the grid if we want to overlap computation and communication as much as possible?

Q7) Attempt ALL: **[5+5]**

   a) Explain store-and forward and cut-through routing.

   b) Which part of the multigrid cycle is most difficult to parallelize on a shared memory multiprocessor? How would you suggest parallelizing it?

Q8) Attempt ALL: **[5+5]**

   a) Discuss the process of embedding a linear array into a hypercube?

   b) Critical design issues in parallel systems often arise at several levels - at the machine level, at the level of programming primitives, at the application logic level - perhaps in subtly different forms. Let's take one issue, say deadlock. Give examples of how deadlock arises in each of these three levels, in a shared-address space framework and also in a message passing framework. What about race conditions?

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[5540]-4002
M.Sc.
COMPUTER SCIENCE
CS-403: Embedded System
(2013 Pattern) (Semester - IV)

Time : 3 Hours]   *[Max. Marks : 50*
Instructions to the candidates:
    1)   *Answer any five questions.*
    2)   *Neat diagram must be drawn wherever necessary.*
    3)   *Figures to right indicate full marks.*

Q1) a)   Explain linked list technique for combining buffers.   **[4]**

    b)   Define critical section of task. Waht are the ways by which the critical section runs by blocking other process?   **[4]**

    c)   Define embedded system Give any two examples of embedded system.**[2]**

Q2) a)   Explain on board debugger.   **[4]**

    b)   Define maskable and non maskable interrupts.   **[4]**

    c)   Define page and segment.   **[2]**

Q3) a)   Explain different steps in creating alternative library.   **[4]**

    b)   Define Emulation. Explain symbolic debugger.   **[4]**

    c)   Give alterntive functions of part 0 and part 2 in 8051.   **[2]**

Q4) a)   Write a short note on real time operating system.   **[4]**

    b)   Briefly explain the time slice mechanism for multitasking operating system.   **[4]**

    c)   What is flash memory?   **[2]**

Q5) a)   Write a short note on RISC architecture.   **[4]**

    b)   How can a real time performance be derived from a non real time system.   **[4]**

    c)   Define Real Time Clock (RTC)   **[2]**

Q6) a) What is system on chip? Explain. **[4]**

b) Explain segmented memory management scheme. **[4]**

c) What is context switching? Explain. **[2]**

Q7) a) Draw a simple parrallel I/O port and explain its basic operation. **[5]**

b) Explain priority levels of Real Time operating System architecture. **[5]**

Q8) a) What are the advantages & disadvantages of buffer exchange. **[5]**

b) Explain how joystick can be used as external switch for an embedded system. **[5]**

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[5540]-4003
M.Sc. (Computer Science) (Semester - IV)
CS-404: SOFTWARE QUALITY ASSURANCE
(2013 Pattern)

Time : 3 Hours]   *[Max. Marks : 50*
Instructions to the candidates:
1) *Attempt any five questions.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*

Q1) Answer the following:

   a)   Explain software quality assurance. Explain objectives of it. **[4]**

   b)   Explain in detail 'walk through' and differentiate between ' inspections' and 'walkthrough' are the types of Reviews. **[4]**

   c)   Define configuration management. **[2]**

Q2) Answer the following:

   a)   Explain in detail verification and validation model. **[4]**

   b)   Define software testing and discuss types of testing in detail. **[4]**

   c)   Short note on McCall's quality factor. **[2]**

Q3) Answer the following:

   a)   Explain in detail FTR- formal technical Reviews. **[4]**

   b)   Explain use of 'CASE TOOLS'. **[4]**

   c)   Define 'Project vs product'. **[2]**

Q4) Answer the following:

   a)   Write a short note on SEI-CMM. **[4]**

   b)   Write a note on process metrics. **[4]**

   c)   Define / Explain features of ISO 9001. **[2]**

Q5) Answer the following:

    a)   Explain qualities of Good tester.   **[4]**

    b)   What are the sources of corrective and preventive actions?   **[4]**

    c)   Define version control.   **[2]**

Q6) Answer the following:

    a)   Discuss unit testing and integration Testing.   **[4]**

    b)   Explain documentation control.   **[4]**

    c)   Define Templates.   **[2]**

Q7) Answer the following:

    a)   Discuss scatter diagram with example.   **[5]**

    b)   Explain software quality control.   **[5]**

Q8) Answer the following:

    a)   Explain pareto analysis.   **[5]**

    b)   Explain utilization of quality cost for decision making.   **[5]**

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[5540]-4004

M.Sc. (Computer Science)
CS-405: MODELING & SIMULATION
(2013 Pattern) (New) (Semester - IV)

Time : 3 Hours]   *[Max. Marks : 50*

Instructions to the candidates:
1) Attempt any five questions.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.
4) Assume suitable data if necessary.

Q1) Attempt the following:

    a)   Write a note on 'Need for Modeling and Simulation'.   **[4]**

    b)   Discuss the importance of output Analysis.   **[4]**

    c)   What is stepped and event based time?   **[2]**

Q2) Attempt the following:

    a)   Explain the concept of sources and propagation of error.   **[4]**

    b)   Write a short note on sensitivity analysis.   **[3]**

    c)   Explain the types of simulations.   **[3]**

Q3) Attempt the following:

    a)   Write a short note on hybrid systems and their Simulators.   **[4]**

    b)   Describe the need of computing alternative systems.   **[4]**

    c)   What do you mean by testing of hypothesis?   **[2]**

Q4) Attempt the following:

    a)   Explain the entities for Modeling & Simulation.   **[4]**

    b)   Explain the process of verification and validation of a model.   **[4]**

    c)   What is validation at the behavioral level?   **[2]**

Q5) Attempt the following:

    a)   Write a short note on Actor based simulations.   **[4]**

    b)   Explain the components found in most discrete event simulation models.   **[4]**

    c)   Define transient behavior.   **[2]**

Q6) Attempt the following:
 a) Explain Graph or network based simulations. **[5]**
 b) Discuss Qualitative and Quantitative comparison of a model and source system behavior. **[3]**
 c) What is the importance of simulation clock? **[2]**

Q7) Attempt the following:
 a) Write a short note on process based simulators. **[5]**
 b) Explain Probability distributions and estimation. **[5]**

Q8) Attempt the case study and answer the following questions.
 "Multi-Teller Bank with Jockeying"
A bank with five tellers opens its doors at 9 AM. and closes its doors at 5 PM., but operates until all customers in the bank by 5 P.M. have been served. Assume that the inter arrival times of customers are IID exponential random variables with mean 1 minute and that service times of customers are IID exponential random variables with mean 4.5 minutes.

Each teller has a separate queue. An arriving customer joins the shortest queue, choosing the leftmost shortest queue in case of ties. Let n_i be the total number of customers in front of teller 'i' (including customers in queue as well as the customer in service, if any) at a particular instant. If the completion of a customer's service at teller 'i' causes $n_j > n_i + 1$ for some other teller 'j', then the customer from the tail of queue 'j' jockeys to the tail of queue 'i'. (If there are two or more such customers, the one from the closest, leftmost queue jockeys). If teller 'i' is idle, the jockeying customer begins service at teller 'i'.

The Bank's management is concerned with operating costs as well as the quality of service currently being provided to customers, and is thinking of changing the number of tellers. For each of the cases n = 4, 5, 6 and 7 tellers, we use 'simlib' function to simulate the bank and estimate the expected time-average total number of customers in queue, the expected average delay in queue, and the expected maximum delay in queue. In all cases we assume that no customers are present when the bank opens.

Questions
 a) Define Discrete & Continuous system. Identify whether the system is discrete or continuous system and justify your answer. **[5]**
 b) Identify the following components for the System-System State, Simulation Clock, Event List, Initialization routine and Report Generation. **[5]**

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