Total No. of Questions : 8]

SEAT No. : ____

P2351

[Total No. of Pages : 4

[4937]-1004
M.Sc.
COMPUTER SCIENCE
CS - 104 : Design & Analysis of Algorithms
(2013 Pattern) (Semester - I)

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

Instructions to the candidates:

1) ***Attempt any 5 questions.***
2) ***All questions carry equal marks.***
3) ***Figures to the right indicate full marks.***
4) ***Neat diagrams must be drawn whenever necessary.***

Q1) Attempt the following:

a) What is control abstraction? Write control abstraction for divide and conquer. **[4]**

b) Write an algorithm to check whether given no. is prime or not also find step count. **[4]**

c) Justify true or false

$n^n = O(2^n)$. **[2]**

Q2) Attempt the following:

a) Use strassens algorithm to compute the matrix product of following matrices **[4]**

$$A = \begin{bmatrix} 4 & 3 \\ 5 & 6 \end{bmatrix} \qquad B = \begin{bmatrix} 3 & -2 \\ -4 & 2 \end{bmatrix}$$

b) Using Job Sequencing find profit for given data **[4]**

P = (20, 15, 10, 5, 1)

W = (2, 2, 1, 3, 3)

P.T.O.

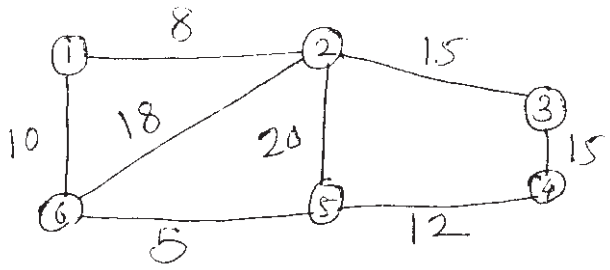
c) Define **[2]**

i) Implicit Constraint.

ii) Explicit Constraint.

Q3) Attempt the following:

a) What is minimum spanning tree? Show step of Kruskal's algorithm to obtain spanning tree **[4]**

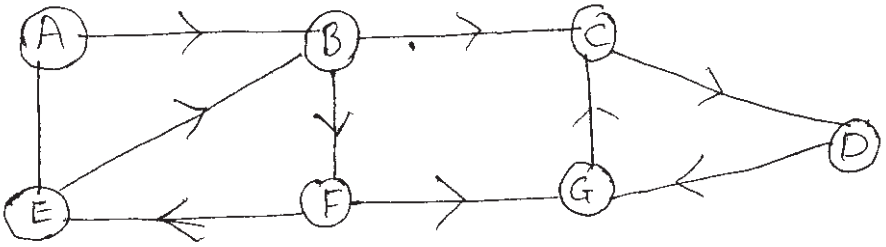


b) What is best way to multiply chain of matrices with dimensions that are 70×5, 5×10, 10×20, 20×5 using dynamic programming. **[4]**

c) Write an Iterative algorithm for Binary Search. **[2]**

Q4) Attempt the following:

a) Define DFS and BFS? Illustrate it on following graph. **[4]**



b) Solve the following 0/1 knapsack problem **[4]**

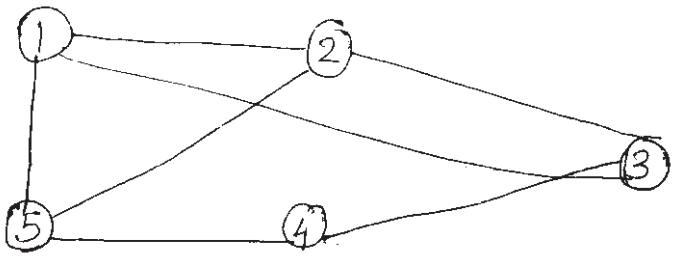
n = 4 M = 18 W = (3, 8, 6, 4)

P = (9, 10, 12, 8)

c) Explain Travelling sales person problem using Dynamic Programming. **[2]**

Q5) Attempt the following:

a) Find Hamiltoniam cycles present in graph [only two solutions]. **[4]**



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

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

Q6) Attempt the following:

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

i) NP - Hard and NP - Complete.

ii) Non deterministic Algorithm.

iii) Decision problem.

iv) Optimization problem.

b) Write non deterministic algorithm to knapsack problem. **[4]**

c) What are Applications of Breadth First tree. **[2]**

Q7) Attempt the following:

a) Find minimum cost to transform X into Y **[4]**

X = a,a,b,a,b

Y = b,a,b,b

b) Write an algorithm to find minimum and maximum element from given list. Also calculate stepcount and complexity. **[4]**

c) Define: i) Back edge **[2]**

ii) Forward edge

Q8) Attempt the following:

a) Sort the following no. using Quick sort **[4]**

65, 70, 75, 85, 60, 55, 50, 45.

b) Explain Branch & Bound strategy. Why least cost search method is prefered over LIFO and FIFO branch and bound method. **[4]**

c) Solve recurrence relation for Merge Sort. **[2]**