

“Please check whether you have got the right question paper.”

- i) Q. 1 & Q.6 are compulsory.
- ii) Attempt any two from remaining questions from each section.

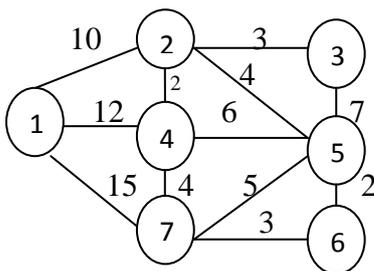
SECTION-A

- Q.1 Attempt any five 10
- a) Define an algorithm & write an algorithm for linear search.
 - b) What is performance measurement of an algorithm?
 - c) An algorithm requires zero or more input (T/F) justify.
 - d) Explain any one tree traversal technique with an example.
 - e) Explain any two algorithm design techniques.
 - f) Define divide & conquer method.
 - g) Write any two characteristics of greedy algorithm.
 - h) Define feasible & optimal solution.

- Q.2 a) Write an algorithm using divide & conquer method for finding the smallest & largest elements in an array of ‘n’ numbers. Comment on the time complexity. 08
- b) Explain binary search method. Taking a list of elements calculate time complexity for successful & unsuccessful searches. 07

- Q.3 a) Construct heap tree for following list of numbers. 08
 20,10,30,50,60,20,35,40,50,25,80 & perform heap sort.
- b) Solve the following instance of knapsack problem using DnC. N=7(objects) M=15 (capacity) 07
 $(P_1, P_2, P_3, P_4, P_5, P_6, P_7) = (10, 5, 15, 7, 6, 18, 3)$
 $(W_1, W_2, W_3, W_4, W_5, W_6, W_7) = (2, 3, 5, 7, 1, 4, 1)$

- Q.4 a) Compute the minimum cost spanning tree for following graph 07



- b) Explain job sequencing with deadlines by taking suitable example. 08
- Q.5 a) What is optimal merge pattern? Find optimal merge pattern for 10 files whose record lengths are (28,32,12,5,84,53,91,35,3,11) find total record movements & draw binary merge tree. 08
- b) Explain matrix multiplication using divide & conquer. 07

SECTION-B

- Q.6 Attempt any 5 questions. 10
- a) Define dynamic programming.
 - b) What are the drawbacks of dynamic programming method.
 - c) Explain implicit & explicit constraints of backtracking.
 - d) Define answer states taking example of 4- Queen's
 - e) Compare dynamic programming with greedy method.
 - f) What are the searching techniques commonly used in branch & Bound.
 - g) State m-colorability decision problem.
 - h) What is travelling salesperson problem.
- Q.7 a) Determine optimal binary search tree for [END,GOTO,PRINT, STOP] with given probabilities as 10
 $P(1:4)=(3,3,1,1)$
 $Q(0:4)=(2,3,1,1,1)$
- b) Explain biconnected component of a graph with example. 05
- Q.8 a) Write algorithm for single source shortest path. 07
- b) Solve 4-Queeries problem using backtracting method. 08
- Q.9 a) Find hamiltonian cycle using backtracking for the given cost materials. 08
- $$\begin{bmatrix} \infty & 10 & 15 & 20 \\ 5 & \infty & 9 & 10 \\ 6 & 13 & \infty & 12 \\ 8 & 8 & 9 & \infty \end{bmatrix}$$
- b) Write algorithm for tree traversals. 07
- Q.10 a) Explain FIFO branch & bound with suitable example. 07
- b) Solve 15-puzzle problem using branch & bound. 08
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|----|----|----|----|
| 1 | 2 | 3 | 4 |
| 5 | 6 | | 8 |
| 9 | 10 | 7 | 11 |
| 13 | 14 | 15 | 12 |