

Internal Assessment Test - II

Sub: DESIGN & ANALYSIS of ALGORITHMS

Code: 15CS43

Date: 17/04/2018

Duration: 90 mins

Max Marks: 50

Sem: IV

Branch: ISE

Answer Any FIVE Complete Questions.

- 1 Write the complete algorithm for HeapSort. Build the heap for the following elements that are inserted in sequence into a maxheap: 4, 1, 3, 2, 16, 9, 10, 14, 8, 7 [10]

CO RBT

CO2 L3

OR

Write the algorithm for QuickSort and discuss its complexity in the average case. Is it a stable algorithm? [5+4+1]

CO4 L3

Item	1	2	3
Weight	18	15	10
Profit	25	24	15

Table-1

- 2 (a) Solve the following instance of knapsack problem using greedy algorithm. Knapsack weight  $M=20$  given in Table-1 [05]
- (b) Solve the above problem for the 0/1 Knapsack using Dynamic Programming [05]
- 3 (a) (i) Using Prim's algorithm, determine the minimum cost spanning tree for the graph given in Fig.1: [05]
- (ii) What do you mean by relaxation of an edge? Explain with example. What is the need to relax an edge? Where does this concept find its utility? [3+1+1]

CO4 L3

CO4 L3

CO4 L3

Fig. 1

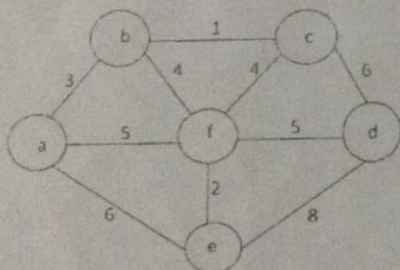
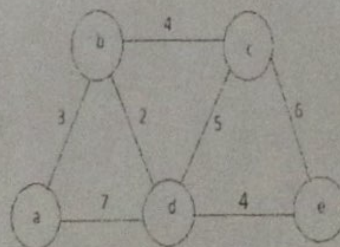


Fig.2



OR

- (b) (i) What is Kruskal's technique to find the Minimum cost spanning tree? Write the algorithm. What will be your strategy to implement his technique? [05+05]
- (ii) Frame a real life application for which you would depict the problem using negative weight edges for graphs.? What does the Bellman Ford Algorithm

CO3 L4

achieve? How is it different from Dijkstra's algorithm?

- 4 Define the transitive closure of a graph. Describe the Warshall's algorithm to find it. Apply the same on the graph defined by the adjacency matrix in **Table 3**.

[10] CO4 L3

Table 3.

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

- 5 What is the concept of the dynamic programming (DP) approach to solve problems? Take an example of your choice and discuss the Multistage Graph problem solved using dynamic programming. Justify why you would choose DP over the greedy technique and the brute force.

[10] CO4 L2

OR

Explain what you understand by the term 'prefix codes'. State the Huffman's algorithm for designing the optimal prefix code.

[10] CO2 L1

- 6 Describe the Dijkstra's algorithm and apply the same to find the single source shortest paths problem for the graph in the **Fig. 2** taking vertex 'a' as source.

[10] CO2 L3

- 7(a) Solve the problem of Job Sequencing with deadlines, given  $n=7$  jobs with profit  $(P_1, P_2, P_3, P_4, P_5, P_6, P_7) = (3, 5, 18, 20, 6, 1, 38)$  and deadline  $(d_1, d_2, d_3, d_4, d_5, d_6, d_7) = (1, 3, 3, 4, 1, 2, 1)$

[05] CO4 L3

- (b) Explain the Greedy Technique with the help of the Coin Change Problem.

[05] CO4 L3

*Ref*