

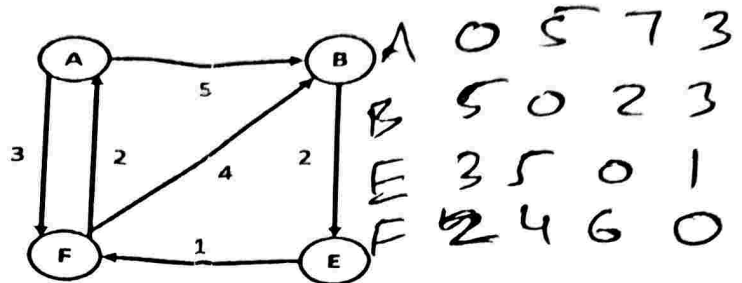
**VIT**

Vellore Institute of Technology

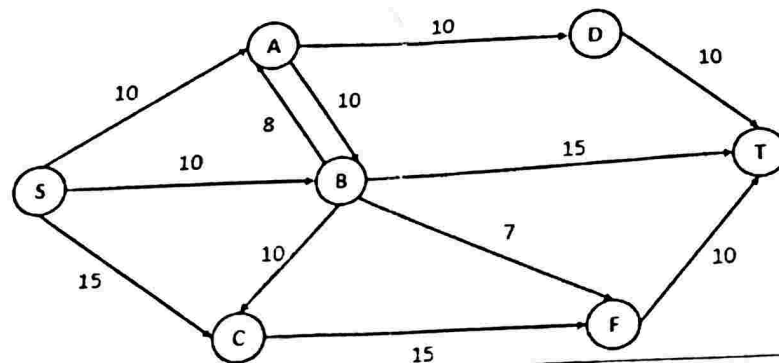
School of Computer Science and Engineering**Winter Semester 2023-2024****Continuous Assessment Test – II****Programme Name & Branch : B.Tech – (BCB/BCE/BCI/BCT/BDS/BKT) SLOT : A1+TA1****Course Name & code : BCSE204L – Design and Analysis of Algorithms****Class Number (s) : ALL****Faculty Name : ALL****Exam Duration : 90 Min.****Maximum Marks: 50****ANSWER ALL THE QUESTIONS(5X10=50 Marks)**

Q.No	Question	Max Mark															
1	<p>Solve the Knapsack Problem using FIFOB, assume knapsack capacity is $W = 8$. Show how queue is used for node creation in the state space tree.</p> <table><tr><th>Item</th><th>Profit</th><th>Weight</th></tr><tr><td>1</td><td>13</td><td>4</td></tr><tr><td>2</td><td>15</td><td>2</td></tr><tr><td>3</td><td>14</td><td>4</td></tr><tr><td>4</td><td>16</td><td>6</td></tr></table> <p>$P = 31$ $W = 8$</p>	Item	Profit	Weight	1	13	4	2	15	2	3	14	4	4	16	6	10
Item	Profit	Weight															
1	13	4															
2	15	2															
3	14	4															
4	16	6															
2	<p>Find the existence of a pattern P in the given string S (assign digits A-C as 0-2), using Rabin Karp algorithm. For hash function use Mod 13. Find out how many spurious hits does the algorithm encounter in the Text = <u>ABC</u><u>BBC</u><u>ABC</u><u>BAA</u><u>ABCC</u><u>AACB</u> when looking for the pattern Pattern = CCA?</p> <p>no spurious hits no spurious hits</p>	10															
3	<p>Consider a logistics manager tasked with optimizing transportation routes for a delivery company that operates in a city with a complex network of roads. Your goal is to minimize the distance for packages to reach their destinations by finding the shortest paths between all pairs</p>	10															

of locations. The transportation route is represented as weighted directed graph given below. Find the shortest paths between all pairs of locations, considering the varying distance, which helps company to delivery operation.



- 4 In water distribution systems, we need to find the maximum amount of water that can be supplied from source S to destination T through a network pipes with capacity limitations. Given a directed graph $G=(V,E)$ representing a water distribution system, where V is set of vertices and E is the set of edges, each edge (u,v) has a capacity $c(u,v)$ representing the maximum water flow that can be supplied through the network pipe. Use Push Relabel algorithm to find the maximum water flow that can be supplied from node S to node T using given graph.



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- 5 Find whether the following line segments intersect or not using cross product.

- $L1 : \{(1,23) \& (10,15)\}$ and $L2 : \{(4,10) \& (6,20)\}$ ✓
- $L3 : \{(4,5) \& (7,10)\}$ and $L4 : \{(1,1) \& (5,5)\}$ ✓
- $L5 : \{(1,1) \& (10,10)\}$ and $L6 : \{(3,3) \& (5,5)\}$ ✓ ON
- $L7 : \{(1,1) \& (10,10)\}$ and $L8 : \{(5,8) \& (3,3)\}$ ✓ P_3 ON

ALL THE BEST