

Internal Assessment Question Paper – 2

Ramaiah Institute of Technology
(Autonomous Institute, Affiliated to VTU)
Department of CSE

Programme: B.E

Term: Jan-May 2021

CIE: II

Course: Design and Analysis of Algorithms Course Code: CS42

Date: 13/07/2021

Credits: 3:1:0

Sem: IV

Section: A, B & C

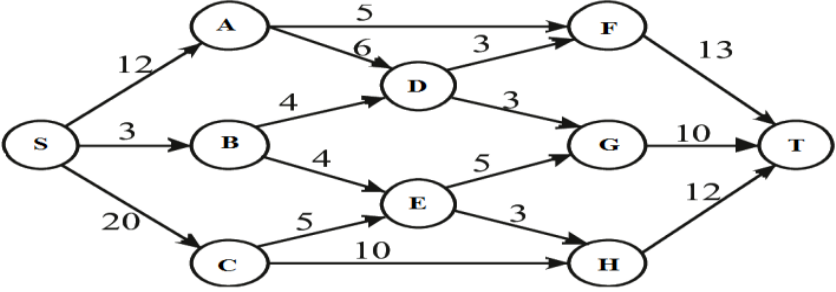
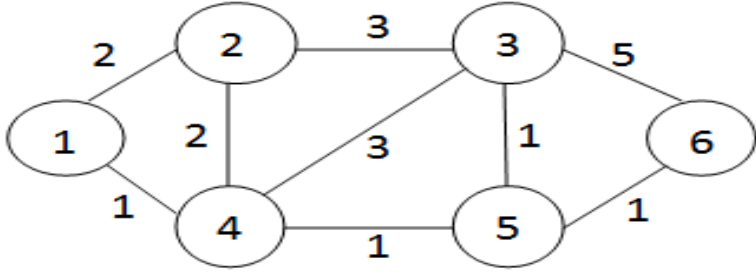
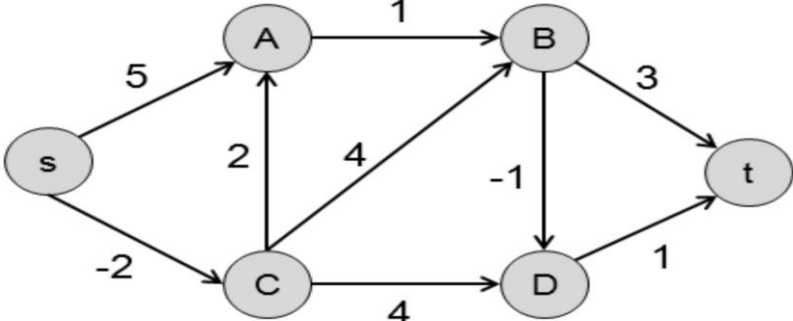
Max Marks: 30

Time: 1Hr

Portions for Test: Units 3, 4 & 5

Instructions to Candidates: **Question 1 is compulsory. Answer any one from 2nd and 3rd question.**

Sl #	Question	Marks	Bloom's Level	CO																							
1	a. Explain the concept Polynomial Time Reduction.	3	Understand	CO5																							
	b. Construct the Huffman Tree for the following symbols and write the respective code words. Find the average code word length. <table><tr><td>Symbol</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>F</td></tr><tr><td>Frequency</td><td>4</td><td>5</td><td>3</td><td>6</td><td>8</td><td>10</td></tr></table>	Symbol	A	B	C	D	E	F	Frequency	4	5	3	6	8	10	6	Apply	CO3									
	Symbol	A	B	C	D	E	F																				
Frequency	4	5	3	6	8	10																					
c. Apply the Memoization algorithm for the following problem to find the optimal set of intervals. <table><tr><td>Interval</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>Start</td><td>13</td><td>19</td><td>16</td><td>10</td><td>3</td></tr><tr><td>Finish</td><td>20</td><td>25</td><td>17</td><td>15</td><td>11</td></tr><tr><td>Weight</td><td>1</td><td>1</td><td>3</td><td>4</td><td>5</td></tr></table>	Interval	1	2	3	4	5	Start	13	19	16	10	3	Finish	20	25	17	15	11	Weight	1	1	3	4	5	6	Apply	CO4
Interval	1	2	3	4	5																						
Start	13	19	16	10	3																						
Finish	20	25	17	15	11																						
Weight	1	1	3	4	5																						
2	a. Describe the optimization version of the Independent Set problem.	3	Understand	CO5																							
	b. Calculate the lateness for each of the following task with greedy approach. T_i is Time length for Task "i". D_i is the deadline for that task. <table><tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>T_i</td><td>6</td><td>4</td><td>2</td><td>8</td><td>6</td><td>4</td></tr><tr><td>D_i</td><td>12</td><td>16</td><td>18</td><td>18</td><td>28</td><td>30</td></tr></table>		1	2	3	4	5	6	T_i	6	4	2	8	6	4	D_i	12	16	18	18	28	30	5	Apply	CO3		
		1	2	3	4	5	6																				
T_i	6	4	2	8	6	4																					
D_i	12	16	18	18	28	30																					
c. Apply the Ford Fulkerson algorithm to find the maximum flow path from S to T in the given flow network.	7	Apply	CO4																								

				
OR				
3	a. Describe the decision version of the Independent Set problem.	3	Understand	CO5
	b. Apply the single source shortest path algorithm to the following graph. 	6	Apply	CO3
	c. Apply the Bellman ford algorithm for the following graph to find the shortest path. Assume node "S" as the starting vertex. 	6	Apply	CO4

Course Outcomes meant to be assessed by the IA Test:

CO3: Illustrate the design techniques for divide, conquer algorithms, and analyze their complexity by solving recurrence relations.

CO4: Illustrate Greedy paradigm and Dynamic programming paradigm using representative algorithms.

CO5: Describe the classes P, NP, and NP-Complete and be able to prove that a certain problem is NP-Complete and examine the techniques of proof by contradiction, mathematical induction and recurrence relation, and apply them to prove the correctness of the running time of algorithms.