Department of Computer Science and Engineering
M.Tech in Computer Science and Engineering (CSE)

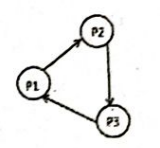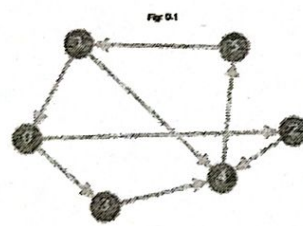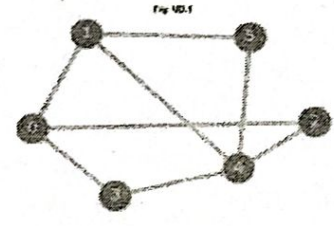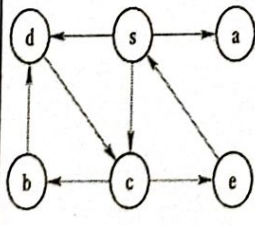| Course	Advanced Data Structures and Algorithms	Course Code: 22MCE12TL (MCE201I)	Semester: 01
18.03.2024	Duration : 90 minutes	Max Marks: 50	Staff: RS

Continuous Internal Evaluation (CIE-I)- Question Paper

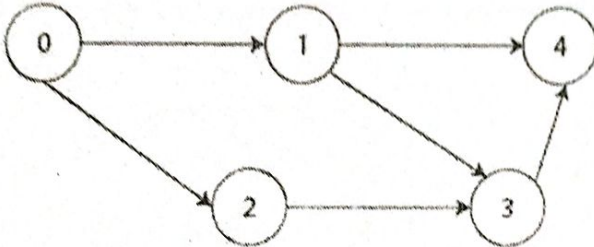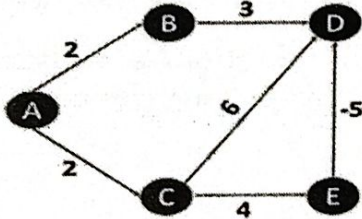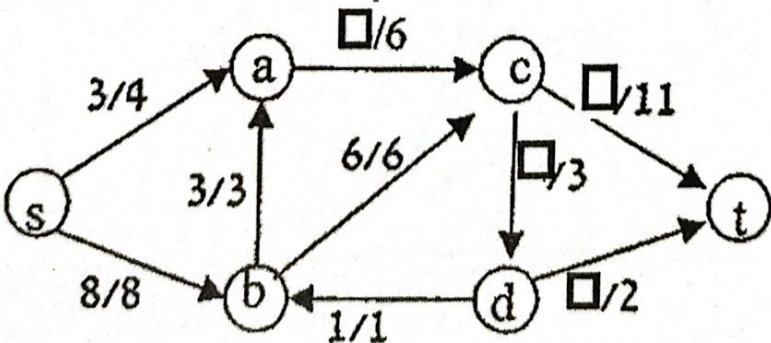| Sl. No.	Answer all questions	M	* L1-L6	**CO
1a.	Solve the following recurrence relation to find the time complexity, by using iterative method: $T(n) = \Theta(1)$ if $n = 1$ $T(n) = c + 2(T(n-1))$ if $n > 1$, where, c is a constant	6	L3	CO1

1b.	(i) Consider the following doubly linked list. There are two references next, prev in both directions.
	
	Write the code to insert the element x immediately after the element a in the above doubly linked list.
	
	(ii) What is written to the screen for the input "carpets"?
	declare a stack of characters
	while (there are more characters in the word to read) {
	read a character
	push the character on the stack }
	while (the stack is not empty) {
	write the stack's top character to the screen
	pop a character off the stack }
	
	(iii) What would be the Big–O value of the below polynomial?
	f (n) = n2 + 100n + Log10 n +1000
	
	(iv) The knowledge of which of the above is needed to calculate the exact running time of a program by considering the following characteristics of a program.
	(a) The input to the program
	(b) The time complexity of the algorithm underlying the program
	(c) The quality of the Compiler
	(d) The nature and speed of the machine
		4	L3	CO1

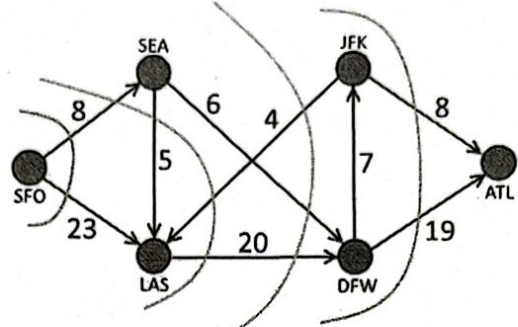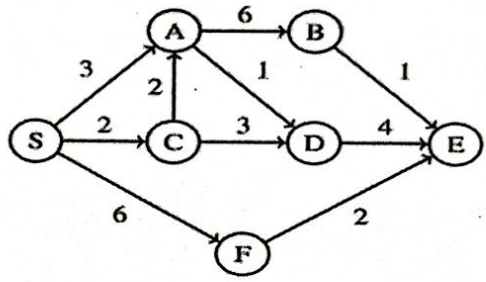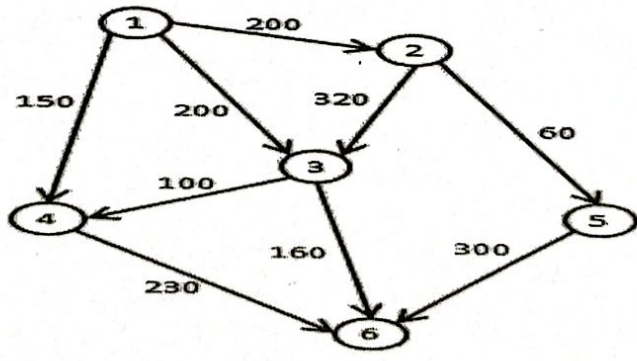|			7	L3	CO2
2a.	Apply an appropriate suitable sorting algorithm to sort in ascending order, the below given numbers and also discuss the time and space complexity taken by the algorithm (i) Input Data: sat | can | cat | sip | cot | sap (ii) Input Data: cat | coot | at | it				
2b.	Apply appropriate shortest distance algorithm to find the shortest path from the source node 'A' to all other nodes for the Graph given below: 	3	L4	CO2	
3a.	Consider an array [29, 25, 3, 49, 9, 37, 21, 43]. Consider having 4 Buckets with each Bucket representing a range of 10 numbers (Eg: 0-9). Sort the elements using Bucket Sort. Mention the time complexity taken by the algotithm.	6	L4	CO3	
3b	Write the pseudocode choosing appropriate ADT functions to perform the following operations: (a) Reversing the contents of a Stack using another Stack (b) To check for Palindrome using a Queue and a Stack	4	L4	CO4	
4a.	Deadlock is a state in which a process in a waiting state and another waiting process is holding the demanded resource as shown in the figure below. If the wait-for graph has a cycle, then there is deadlock. Apply appropriate algorithm to identify if a cycle exists or not. 	6	L4	CO4	
4b.	Write the Adjacent List for the graph given in Fig D.1 and Fig. UD.1 given beside. 	4	L4	CO3	
5.	Give the visited node order for BFS and DFS graph search, starting with s, given the following adjacency lists and accompanying figure. adj(s) = [a, c, d] adj(a) = [ ] adj(c) = [e, b] adj(b) = [d] adj(d) = [c] adj(e) = [s] 	10	L4	CO2	

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Course	Advanced Data Structures and Algorithms	Course Code: 22MCE12TL (MCE2011)	Sem: 01
29.04.2024	Duration : 90 minutes	Max Marks: 50	Staff: RS

Continuous Internal Evaluation (CIE-II)- Question Paper

Sl. No.	Answer all questions	M	*L1-L6	**CO
1a.	Solve by applying the Shortest Path algorithm by finding Toplogical Sort on the graph given below. All distances are of unit length. Compute the time complexity for the same. 	7	L3	CO1
1b.	Compare the working of Bellman Ford algorithm with Dijkstra's algorithm.	3	L3	CO1
2a.	Apply suitable algorithm and find the shortest path between source node 'A' and destination node 'D'. Calculate the time complexity for the algorithm. 	7	L4	CO2
2b.	Fill up the flow values in the graph given below: 	3	L3	CO2

3a.	For the network given below, solve by applying Maxflow-Mincut theorem find the minimum cut and find the maximum flow 	10	L4		CO3
4a.	Apply Dijkstra's algorithm on the following graph. What is the order in which vertices get removed from the priority queue? What is the resulting shortest-path tree? 	6	L4		CO4
4b.	Answer the following questions with respect to Flow Networks : (i) Given a flow network, let f be any flow and let (A,B) be any cut. Then, the net flow across (A,B) is _____ the value of f. (ii) When does the Ford-Fulkerson know, when to terminate?	4	L4		CO3
5.	Find the Max-Flow for the network graph given below, either by applying Ford-Fulkerson algorithm or by applying the max-flow min-cut theorem or otherwise. 	10	L5		CO2