P P SAVANI UNIVERSITY

Fifth Semester of B. Tech. Examination

November 2022

SEIT3032 Design & Analysis of Algorithms

29.11.2022, Tuesday **Time: 10:00 a.m. To 12:30 p.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

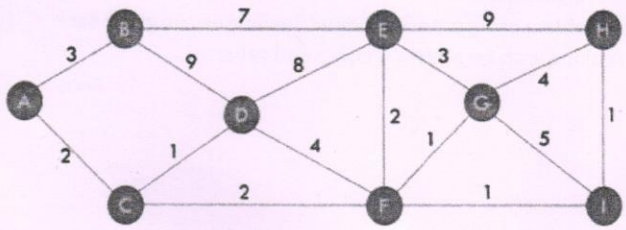
Q - 1	Answer the following (Any Five)	**[05]**	**CO**	**BTL**
(i)	What is algorithm?		**1**	**1**
(ii)	Dijkstra's algorithm can be used to find shortest path for negative edge weight in the graph. TRUE/FALSE		**2**	**2**
(iii)	Write Principle of optimality.		**2**	**1**
(iv)	Define Big – Oh notation.		**1**	**1**
(v)	What is the average case time complexity of sequential search?		**4**	**1**
(vi)	Write basic characteristics of divide and conquer method.		**2**	**2**
(vii)	List out any two problems that can be solved using greedy method.		**2**	**1**
Q - 2 (a)	Explain worst case scenario of binary search algorithm with proper example.	**[05]**	**2**	**4**
Q - 2 (b)	Illustrate the steps to construct minimum heap tree on the following data 8,5,9,7,2,1,6,3,10	**[05]**	**5**	**3**
	OR			
Q - 2 (a)	Apply merge sort on the following data 8,5,9,7,2,1,6,3,10.	**[05]**	**5**	**3**
Q - 2 (b)	Write algorithm for quick sort and its time complexity for worst case.	**[05]**	**4**	**2**
Q - 3 (a)	Explain job sequencing problem with deadlines.	**[05]**	**3**	**2**
Q - 3 (b)	Construct the Huffman code for the following data:	**[05]**	**5**	**6**

Character	A	B	C	D	E	F	G
Frequency	4	8	15	13	7	9	10

Encode DAA and BAG using Huffman encoding.

OR

Q - 3 (a)	Generate the actions of shortest paths for the given graph from vertex 1 to all remaining vertices. 1→2=20, 2→1=2, 1→3=15, 2→5=10, 2→6=30, 3→6=10, 3→4=4, 5→4=15, 6→4=4, 6→5=10.	**[05]**	**3**	**5**
Q - 3 (b)	Illustrate the steps to find Minimum cost spanning tree for the following graph:	**[05]**	**5**	**5**



Q - 4	Attempt any one.	**[05]**		

(i)	Explain Travelling salesman problem using dynamic programming method.		3	3
(ii)	Explain multi stage graph with proper example.		3	3

SECTION – II

Q - 1	MCQ/Short Question/Fill in the Blanks (Any Five)	[05]		
(i)	Define: Backtracking		1	1
(ii)	Hamiltonian path problem is _____? A. NP Problem B. P Class Problem C.NP- Complete Problem D. N Class Problem		1	1
(iii)	Rabin Karp algorithm and naive pattern searching algorithm have the same worst case time complexity. A. True B. False		2	2
(iv)	The problem of placing n queens in a chessboard such that no two queens attack each other is called as? _____		1	2
(v)	Define: State Space Tree		1	1
(vi)	Define: Branch and Bound Method		4	1
(vii)	How many unique colors will be required for proper vertex coloring of an empty graph having n vertices? A. 0 B. 1 C. 2 D. n		2	4
Q - 2 (a)	Explain N-queen Problem with the suitable example.	[05]	2	2
Q - 2 (b)	Draw the state space tree and identify all possible sets using Sum of Subset Problem for the following details: Given Data: Array List {1,2,4,5,6} & Required Sum = {6}	[05]	3	6
	OR			
Q - 2 (a)	Write algorithm of Graph Coloring Problem through suitable example	[05]	1	2
Q - 2 (b)	Apply Naïve string-matching algorithm to identify the given pattern through given data: text *T* a b c a b a a b c a b a c pattern *P* a b a a	[05]	3	3
Q - 3 (a)	Travelling Salesman Problem is NP Hard Problem. (Yes/NO) – Justify your answer with example	[05]	4	5
Q - 3 (b)	What do you mean by Finite Automata? How it can be work for string matching algorithm?	[05]	2	2
	OR			
Q - 3 (a)	Define: Approximation algorithm	[05]	1	1
Q - 3 (b)	Apply 0/1 Knapsack problem using branch & bound Techniques on given data: Consider three items along with respective weights and value as	[05]	3	3

	weight	value	value/weight
I_1	5	6	6/5 = 1.2
I_2	4	5	5/4 = 1.25
I_3	3	4	4/3 = 1.3

Consider: Knapsack Capacity W:7

Q - 4	Attempt any one.	**[05]**		
(i)	Explain Hamiltonian Path with Example of any Real application.		**4**	**6**
(ii)	What is the difference between 'Backtracking' and 'Branch & Bound' algorithm Techniques?		**1**	**1**

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CO : Course Outcome Number BTL : Blooms Taxonomy Level

Level of Bloom's Revised Taxonomy in Assessment

1: Remember	2: Understand	3: Apply
4: Analyze	5: Evaluate	6: Create