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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Design and Analysis of Algorithms (CSEG-320)   **Semester: V**
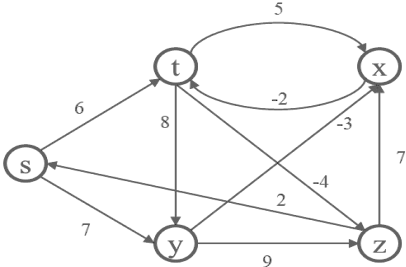**Programme:** B. Tech- Cyber Law
Time: 03 hrs.   **Max. Marks: 100**
Instructions: Attempt all the questions. Assume proper data, if necessary.

SECTION A

S. No.		Marks	CO
Q 1	Discuss the various stages of algorithm design and analysis process using flow chart.	4	CO1
Q 2	Write short note on "Traveling Salesman Problem".	4	CO3
Q 3	State the complexity for merge sort, quick sort an all three cases.	4	CO2
Q 4	Sort the list E, X, A, M, P, L, E in alphabetical order using merge sort.	4	CO4
Q 5	Show one solution of N-queen problem for N=4.	4	CO3

SECTION B

Q 6	Devise an algorithm for finding the maximum and minimum and explain it.	10	CO4
Q 7	Critically analyze the pseudocode of binary search method with proper example. State the complexity of binary search method.	10	CO1
Q 8	State and prove the Master's Theorem.	10	CO2
Q 9	Solve the following Knapsack problem with given capacity W: 5 using dynamic programming.	10	CO3

Item	Weight	Value
1	2	₹12
2	1	₹10
3	3	₹20
4	2	₹15

OR

Apply Bellman-Ford algorithm on following graph.   **10**   **CO2 CO4**

SECTION-C

Q 10	Consider the following set of frequencies, based on the first 8 Fibonacci numbers.	20	CO1 CO2 CO5

| a	b	c	d	e	f	g	h
1	1	2	3	5	8	13	21

a) Draw the Huffman tree for the given data.
b) Obtain the optimal Huffman code for the symbols.
c) Compare the compression ratio, if these characters stored with a fixed length code of length 5.
d) Generalize your answer of part (c) to find the optimal code when the frequencies are the first n Fibonacci numbers, for a general n.
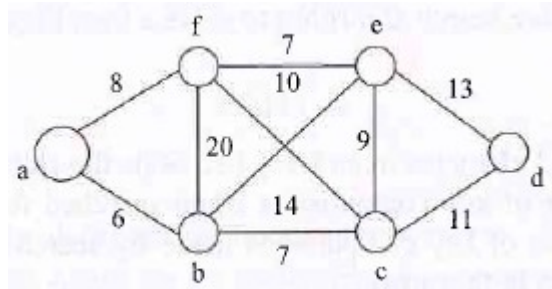
Q 11	Consider the given weighted graph.	20	CO1 CO3
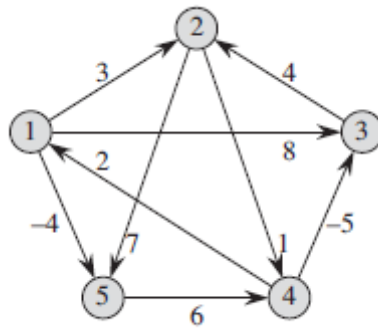
Apply Floyd-Warshall algorithm for all pair shortest path and mention the algorithm.

OR

	Apply Kruskal algorithm to obtain the MST of following graph. Mention each step involves in Kruskal algorithm. State the two applications of MST in real world.	20	CO1 CO2 CO4

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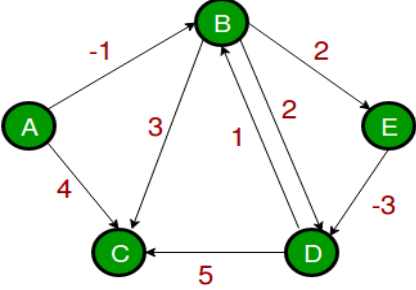**Course: Design and Analysis of Algorithms (CSEG-320)**   **Semester: V**
Programme: B. Tech. –Cyber Law
Time: 03 hrs.   **Max. Marks: 100**
Instructions:

SECTION A

S. No.		Marks	CO
Q 1	What are the features of efficient algorithm? Explain in brief.	4	**CO1**
Q 2	What are the similarities and differences between quicksort and mergesort?	4	**CO2**
Q 3	State Prim's algorithm. Write each step involves in Prim's algorithm.	4	**CO3**
Q 4	Explain 'Big Oh' notation used to measure algorithm time complexity.	4	**CO2**
Q 5	Explain 'Job sequencing with deadlines' with suitable example.	4	**CO3**

SECTION B

Q 6	Devise an algorithm for finding the maximum and minimum and explain it.	10	**CO4**
Q 7	Solve the following Knapsack problem with given capacity W: 15 using greedy method.	10	**CO3**

Item	1	2	3	4	5	6	7
Weight	10	5	15	7	6	18	3
Value	2	3	5	7	1	4	1

Q 8	Apply Bellman-Ford algorithm on following graph.	10	**CO2** **CO4**

Q 9	Briefly explain the concepts of P, NP and NP complete problems.	10	**CO4**
	OR		
	What is "divide and conquer" strategy of problem solving? Mention each step involved in Merge sort with suitable example.	10	**CO1** **CO3**

	SECTION-C		
Q 10	Consider the following character set with their frequency of occurrence in a particular text. 	A	B	C	D	E	F
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20	18	10	12	25	15 |
					
					    a) Draw the Huffman tree for the given data.
					    b) Obtain the optimal Huffman code for the symbols.
					    c) Compare the compression ratio, if these characters stored with a fixed length code of length 5.
						20	**CO1**
							CO2
							CO5
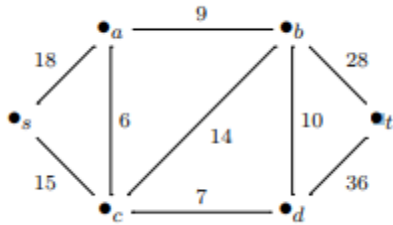
Q 11	Consider the given weighted graph. Apply Dijkstra's algorithm to find shortest path from s. Mention each step involved in Dijkstra's algorithm. OR State and explain the N-Queen problem. Solve N-Queen problem with N=8 and demonstrate all steps.	**20** **20**	**CO2** **CO3** **CO1** **CO3**