UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2019

Course: Design & Analysis of Algorithm
Semester: 5th
Program: BT-Mechatronics   **Time 03 hrs.**
Course Code: MECH 3014   **Max. Marks: 100**

Instructions: Attempt all questions

SECTION A
NOTE: Attempt all Questions.

S. No.		Marks	CO
Q 1	Describe Algorithm and write all the fundamental steps required to design and analyze an algorithm.	4	CO1
Q2	Give brief concept of Divide & Conquer.	4	CO2
Q3	Describe minimum cost spanning tree algorithm?	4	CO3
Q4	Define dynamic programming? Explain with the help of suitable examples.	4	CO4
Q5	Explain how the Knapsack problem can be solved using branch and bound algorithms.	4	CO5

SECTION B
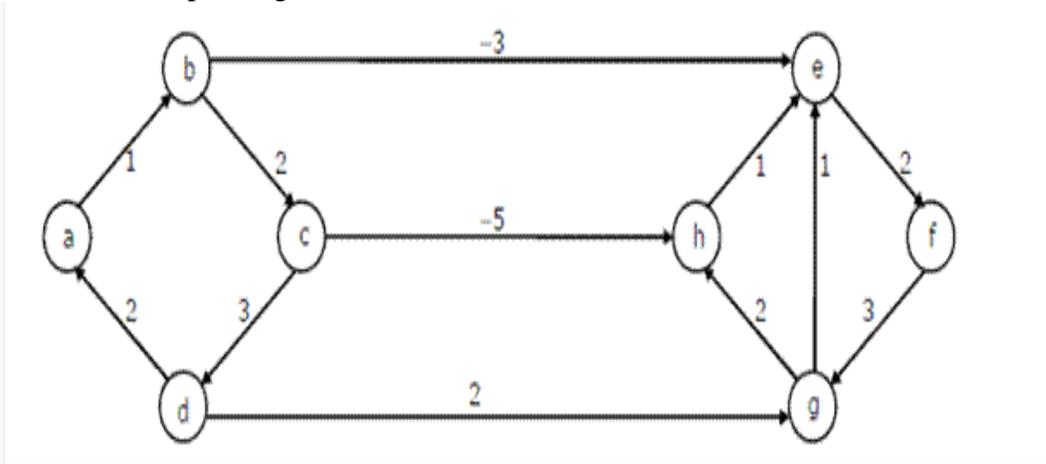### NOTE: Question no. 6, 7, 8 are compulsory.
Anyone can be solved in question 9.

Q 6	Explain travelling salesman problem? Find the solution of following travelling salesman problem using branch and bound method. Cost matrix=	10	CO5

∞	20	30	10	11
15	∞	16	4	2
3	5	∞	2	4
19	6	∞	18	3
16	4	7	16	∞

Q7	Discuss Strassen's matrix multiplication with example.	10	CO2
Q8	Elaborate Backtracking? Explain the technique by solving 8-Queen problem and explain the process in detail.	10	CO5
Q9	Describe binary search tree with three traversal patterns. Give suitable example with neat diagram for all three traversal of binary search trees OR	10	CO4
	Sort the list 415, 213, 700, 515, 712, 715 using Merge sort algorithm. Also explain the time complexity of merge sort algorithm.		CO2

SECTION-C

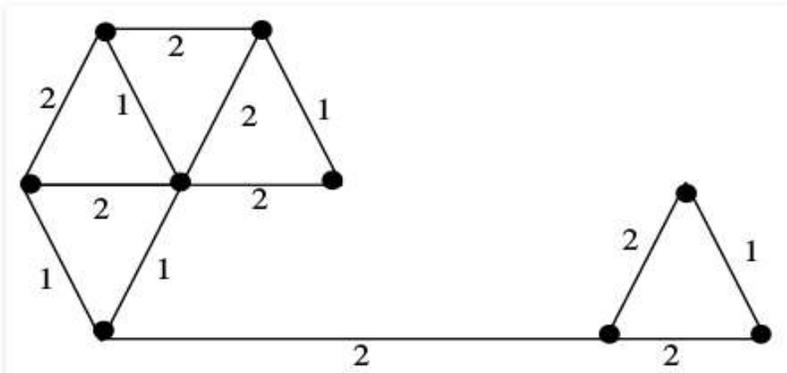| Q 10	a) Compute the shortest path distance from vertex a in below graph using single source shortest path algorithm.		
		20	CO4
	b) Describe how an array of elements can be sorted using Quick Sort algorithm. Show that the running time of Quick Sort is $O(n^2)$ when the array A contains distinct elements and is sorted in decreasing order.		CO2
Q11	Elaborate spanning trees? Find out the number of distinct minimum spanning trees for the weighted graph below: **OR** Consider the following instance of Knapsack problem :	20	CO3

Item	X1	X2	X3	X4	X5
Profit	15	12	9	16	17
Weight	2	5	3	4	6

	The maximum weight of 12 is allowed in the Knapsack. Find the value of maximum profit with the optimal solution of the fractional Knapsack problem.		