U.G. 3rd Semester Examination-2020
COMPUTER SCIENCE
[HONOURS]
Course Code : COM.SC-H-CC-L-306
(Design and Analysis of Algorithms)

Full Marks : 60   Time : $2\frac{1}{2}$ Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP-A

1. Answer any **ten** of the following questions :

                                        2×10=20

a) What do you mean by dynamic programming?

b) State the best case time complexity of bubble sort and quick sort.

c) What is the basic principle of divide and conquer method?

d) Differentiate between top-down and bottom-up approach.

e) What is 0/1 knapsack problem?

f) Briefly explain the 4 queen problem.

g) What is meant by graph coloring?

h) What do you mean by backtracking?

i) Does greedy method always give an optimal solution? Justify.

j) What is the difference between pseudo code and algorithm?

k) What is the difference between algorithm and program?

l) Define Big-O notation.

GROUP-B

2. Answer any **four** of the following questions:

                                        5×4=20

a) Solve the 8 queen's problem using backtracking.
                                        5

b) Write down the algorithm of insertion sort. 5

c) Write down the Kruskal algorithm.   5

d) Define P-class, NP-class, NP-complete class, NP-hard class of problems. What is the relation between them?   4+1=5

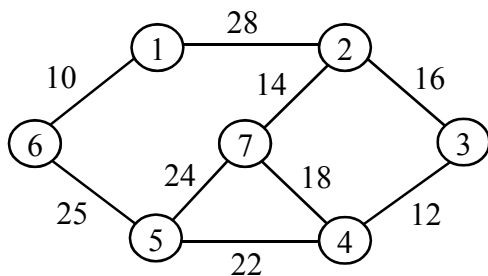e) Consider the following table that consists of some items with weight and cost values:

items	I_1	I_2	I_3	I_4	I_5
weight	2	4	5	5	9
profit	3	5	6	8	10

If the knapsack capacity W=20, find the maximum profit by using Knapsack algorithm.

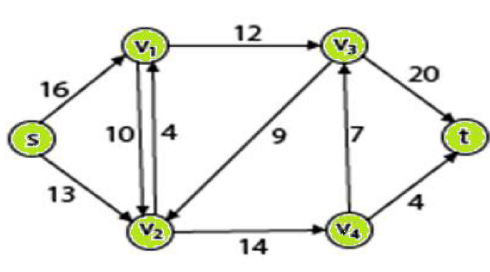### GROUP-C

Answer any **two** of the following questions: 10×2=20

3. a) Construct a minimum spanning tree (MST) for the given graph using Prims' Algorithm.   10

b) Each directed edge is labelled with capacity. Use the Ford-Fulkerson algorithm to find the maximum flow.   10

c) Define the matrix chain multiplication problem. Given the four matrices $P_{8\times10}$, $Q_{10\times20}$, $R_{20\times1}$, $S_{1\times50}$. Find the minimum number of scalar multiplication required for the above chain of matrices using matrix chain multiplication algorithm.   2+8=10

d) Write short notes on following (any **two**):

5×2=10

   i) Dijkstra algorithm

   ii) Travelling salesman problem

   iii) Amortized analysis

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