No. of Printed Pages – **3** **CA308**

Roll No. | | | | | | | | | | |

B.C.A.

FIFTH SEMESTER EXAMINATION, 2019-20

ALGORITHM ANALYSIS AND DESIGN

Time : **3 Hours** Max. Marks : **60**

Note : (i) Attempt **ALL** questions.
(ii) Choices are given in each question set.

1. Attempt any **Four** of the following questions: **3 x 4 = 12**

(a) Define Algorithm. List the characteristics of an algorithm.

(b) Solve the Recurrence: T(n)=2T(n/2)+nlogn using Master Method.

(c) Define time complexity. Describe different notations used to represent these complexities.

(d) What are best case, average case, and worst-case performance? Explain.

(e) Prove $n^2/2 – 2n = \Theta(n^2)$.

(f) What is a recurrence equation? List the ways to solve a recurrence equation.

2. Attempt any **Four** of the following questions: **3 x 4 = 12**

(a) Write Linear Search algorithm and analyze its complexity.

(b) Illustrate the operation of HEAP-SORT on the array .

(d) What is quick sort? Explain its Partition procedure.

(e) Define Hashing. How do collisions happen during hashing?

(f) Explain the run time of Build-Max-Heap algorithm.

3. Attempt any **Two** of the following questions: **6 x 2 = 12**

(a) Compare Divide and Conquer with Dynamic Programming and Dynamic Programming with Greedy approach.

(b) What are the different Greedy Criterion? Explain. Consider

(c) The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using linear probing method with hash function h(k) = k mod 10 . What is the resultant hash table?

5. Attempt any **Two** of the following questions: **6 x 2 = 12**

(a) Discuss KMP string matching algorithm and also find the prefix function for the following pattern: a b a b b b a b a a.

(b) Discuss class P, NP, NP hard and NP complete problems with examples.

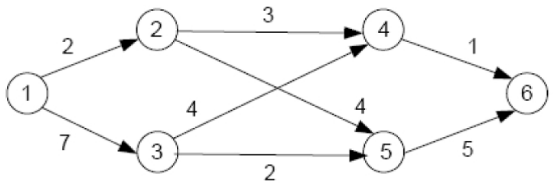
(c) Show that Hamiltonian cycle is in NP class of problem.

the five items along with their respective weight and values: $I=\{I_1,I_2,I_3,I_4,I_5\}$, $W=\{5,10,20,30,40\}$, $V=\{30,20,100,90,160\}$. The knapsack has capacity w=60. Find the solution of the problem using the concept of fractional knapsack.

(c) Explain dynamic programming. Apply it on matrix Chain-multiplication problem.

4. Attempt any **Two** of the following questions: **6 x 2 = 12**

(a) Explain and write the Bellman-ford algorithm. Solve the following instance of the single source shortest path problem with vertex '1' as the source.



(b) Define spanning tree? Discuss the design steps in kruskal algorithm to construct Minimum spanning tree with example.

(c) Define topological sorting? Solve topological sorting problem using DFS algorithm with an example.