Code: IT5T2

III B.Tech-I Semester–Regular / Supplementary Examinations March 2021

DESIGN METHODS AND ANALYSIS OF ALGORITHMS
(INFORMATION TECHNOLOGY)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer *all* the questions.   All questions carry equal marks

$$11x\ 2 = 22\ M$$

1.

a) Define algorithm and list the properties of a good algorithm.

b) Define Big Oh class. Give 2 examples.

c) What is meant by exhaustive search?

d) State the difference between brute force approach and exhaustive search.

e) State the basic principle of divide and conquer strategy.

f) Define binary heap and its properties.

g) What are disjoint sets? Give examples.

h) Write the basic principle of dynamic programming.

i)What are limitations of algorithms?

j) Write the Knapsack problem statement.

k) Give the solution tree for 4 queen's problem using backtracking.

PART – B

Answer any *THREE* questions. All questions carry equal marks.

$$3 \times 16 = 48 \text{ M}$$

2. a) Explain the 3 asymptotic classes with examples.   8 M

   b) Write iterative and recursive algorithms to find the factorial of given number and find time and space complexity of the algorithms.   8 M

3. a) Write the algorithm for sequential search. Discuss the time complexity of the algorithm for best, worst and average case inputs.   8 M

   b) State the assignment problem.   2 M

   c) Solve the following assignment problem with exhaustive search approach. No of persons = 4, No of jobs = 4
Cost matrix: {P1: (9 2 7 8), P2: (6 4 3 7),
P3: (5 8 1 8), P4: (7 6 9 4)}   6 M

4. a) Write the algorithm to perform topological sorting and explain with an example. Analyse the time complexity of the algorithm.   8 M

   b) Illustrate with diagram the step by step procedure of constructing a binary min heap with following set of elements. 1, 3, 7, 5, 6, 8, 10, 9, 2. From the constructed heap, sort the elements in ascending order.   8 M

5. a) Write the algorithm to generate Huffman tree.   2 M

b) Generate Huffman codes for the following input: (a, 0.35), (b, 0.1), (c, 0.2), (d,0.2), (-, 0.15). Compress the text BAD-AD-DAD.   6 M

c) Solve the matrix chain multiplication problem for a chain of length 5 with order (4 10 3 12 20 7)   8 M

6. a) Write the backtracking algorithm to solve subset sum problem and apply the algorithm to solve the following problem: A = (1,3,4,5), d=11   10 M

b) Describe P, NP, NP hard and NP Complete problems.   6 M