BRAINWARE UNIVERSITY

Term End Examination 2018 - 19

Programme – Master of Science in Computer Science

Course name - Design & Analysis of Algorithm

Course Code - MCS201

(Semester – 2)

Time allotted: 3 Hours **Full Marks : 70**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group –A

(Multiple Choice Type Question) 10 x 1 = 10

1. *Choose the correct alternative from the following*

(i) Which of the following problems is solved by using Branch and Bound Method?

a. Knapsack Problem
b. Hamiltonian Problem
c. Travelling Salesman Problem
d. 15 Puzzle Problem

(ii) Which of the following approaches is adopted in divide and Conquer Algorithm?

a. Top – Down
b. Bottom –Up
c. Both (a) and (b)
d. None of these

(iii) The technique of Pruning is used in

a. Branch and Bound
b. Backtracking
c. Divide and Conquer
d. Dynamic Programming

(iv) Which one is true of the following?

a. All NP hard problems are NP Complete
b. Some NP complete problems are NP hard
c. All NP Complete problems are NP hard
d. None of the these

(v) The minimum number of color needed to color a graph having n>3 vertices and 2 edges is

a. 2
b. 3
c. 4
d. 1

(vi) Kruskal's Algorithm is an example of

a. Dynamic Programming
b. Greedy Method
c. Both (a) and (b)
d. None of the these

(vii) The worst-case time complexity of Merge Sort is

a. O(n2)
b. O(log n)
c. O(n)
d. O(n logn)

(viii) The recurrence relation capturing the optimal time of the Tower of Hanoi problem with n discs is

a. $T(n) = 2T(n – 2) + 2$
b. $T(n) = 2T(n/2) + 1$
c. $T(n) = 2T(n – 1) + n$
d. $T(n) = 2T(n – 1) + 1$

(ix) Travelling Salesman Problem is

a. NP Hard
b. NP
c. NP Complete
d. None of the these

(x) The edge, removal of which makes a graph disconnected is called

a. Pendent Vertex
b. Bridge
c. Articulation point
d. Coloured Vertex

Group – B

(Short Answer Type Questions) 3 x 5 = 15

Answer any *three* from the following

2. What is the difference between dynamic programming and greedy approach? [5]

3. Write down all the cases of master theorem. [5]

4. Describe Floyd's Algorithm for all pair shortest path problem. Find the time Complexity. [5]

5. Discuss briefly the criterion on which the measures of complexity depend. [5]

6. Find out the optimal solution for the fractional Knapsack problem with capacity 60 is given below: [5]

$$w = \{5, 10, 20, 30, 40\}$$
$$v = \{30, 20, 100, 90, 160\}$$

Group – C

(Long Answer Type Questions) 3 x 15 = 45

Answer any *five* from the following

7. (a) Define classes P. NP and NP complete. [6]

   (b) Write an algorithm of the n-queen problem and find the time complexity of the algorithm. [9]

8. Given the four matrices A(4 x 10), B(10 x 3), C(3 x 12), D(12 x 20) ,E(20 x 7). Find the optimal sequence for the computation of multiplication operation. [15]

9. (a) Describe the Prim's Algorithm with an example. [5]

   (b) Given a Knapsack having maximum weight capacity W=3 and number of items available are three, such that S=3, wi={1, 2, 3} and vi={2, 3, 4}. Fill the Knapsack using 0/1 method such that Knapsack should not exceed its maximum capacity and it should have maximum profit value. [10]

10. (a) Describe the Quick sort algorithm. [7]

(b) Find out the time complexity of Quick Sort. [3]

(c) Write an efficient algorithm to find the Kth largest value among n numbers. [5]

11. Write a short note of any three of the following. [3x5]

(a) KMP :String Matching Algorithm

(b) Strassen's matrix multiplication

(c) Travelling Salesman problem

(d) Heap Sort

(e) Union find Algorithm
