ST. JOSEPH'S COLLEGE (AUTONOMOUS), BANGALORE-27
M.Sc. Computer Science –I SEMESTER
SEMESTER EXAMINATION: NOVEMBER 2020
CS 7318- Design and Analysis of Algorithms

Time- 2 1/2 hrs　　　　　　　　　　　　**Max Marks-70**

This paper contains three printed pages

Answer any **seven** questions. Each question carries 10 marks　　　7*10=70

1.　a. What is Priori analysis and Posterior analysis?
　　b. Compare and Contrast between Analysis and Profiling.　　　　[5+5]

2.　a. Define order of growth. Justify why large values of 'n' are chosen?

　　b. What are the factors on which space efficiency depends?

　　c. Define Big-Oh notation. Show that $2x^3 + 3x^2 + 1 = O(x^3)$　　　[3+3+4]

3.　a. What are the steps involved in Divide and Conquer method of design of algorithms?

　　b. Compare and contrast between Merge Sort and Quick Sort.

　　c. Given the following recurrence relation

　　　　$T(n) = 2T(n/2) + 2$　　　$n > 2$

　　　　　　$= 1$　　　　　　$n = 2$

　　　　　　$= 0$　　　　　　$n = 1$

　　　Prove that $T(n) = 3n/2 - 2$ by substitution method.　　　[2+3+5]

4. a. What are the different strategies that can be adopted to find solution for the Knapsack Problem?

　　b. Consider the Knapsack problem with n=3, M=20.

　　　Profit[p1,p2,p3]=[25,24,15] and weights[w1,w2,w3]=[18,15,10].

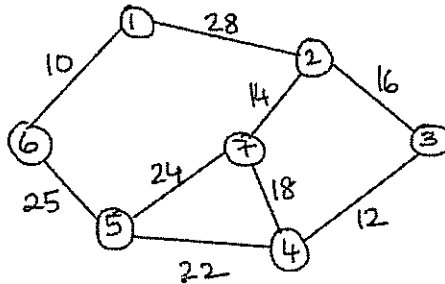Find the maximum profit earned? [3+7]

5. a. What are spanning trees?

   b. Mention two different algorithms to find minimum cost spanning tree.

   c. Find the minimum cost spanning tree for the graph given below. [2+2+6]
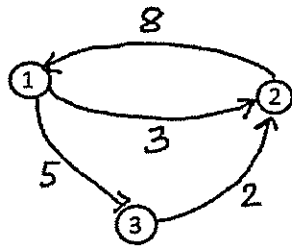

6. a. Define Principal of Optimality.

   b. Compare Greedy Method and Dynamic Programming.

   c. Consider the weighted graph. Determine all pair shortest paths. [2+3+5]

7 a. What is the problem statement for job sequencing with deadlines? What are the objective function and constraint equation for this problem.

   b. Let n=4.Let (p1,p2,p3,p4)=(100,10,15,27) and deadlines(d1,d2,d3,d4)=(2,1,2,1).Find the optimal solution for this problem of job sequencing with deadlines. What is the maximum profit? [4+6]
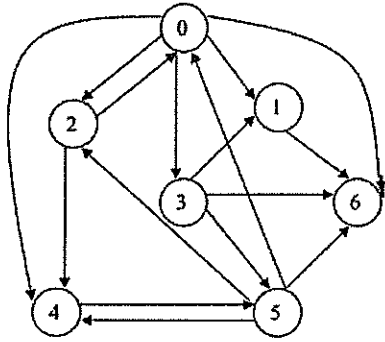
8. a. What is backtracking?

   b. Explain 8-queens problem using backtracking. [3+7]

9. a. Define NP-Hard and NP-Complete problems.

   b. Explain DFS algorithm. Draw depth-first search (DFS) tree of the following digraph originating from vertex 0 and label the vertices with pre-order and post-order labels.

[4+6]

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