

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE –
RAIGAD -402 103
Semester Winter Examination – Dec. - 2019

Branch: Information Technology
Subject: - Design and Analysis of Algorithms (BTITC502)
Date: - 11/12/2019

Sem.:- V
Marks: 60
Time: 3 Hr.

Instructions to the Students

1. Each question carries 12 marks.
2. Attempt **any five** questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

Q.1. Solve the following Questions: (06*02=12)

- A) What is Performance Analysis? How Performance of an algorithm is measured?
 B) Define and explain with example asymptotic notations: O , Ω and Θ .

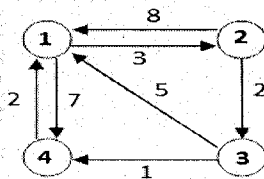
Q.2. Solve the following Questions: (06*02=12)

- A) Write recurrence relation and formulas for Strassen's Matrix Multiplication. Multiply following two matrices using Strassen's Matrix Multiplication: $A = \begin{bmatrix} 15 & 7 \\ 8 & 5 \end{bmatrix}$ $B = \begin{bmatrix} 20 & 23 \\ 17 & 2 \end{bmatrix}$

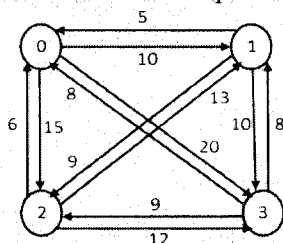
- B) Solve the following instance of Knapsack Problem using Greedy approach:
 $n = 6$, $m = 20$, $(p_1, \dots, p_6) = (12, 5, 15, 7, 6, 18)$ and $(w_1, \dots, w_6) = (2, 3, 5, 7, 1, 5)$

Q.3. Solve the following Questions: (06*02=12)

- A) Find All Pairs shortest path for given graph (Starting Vertex is 1):

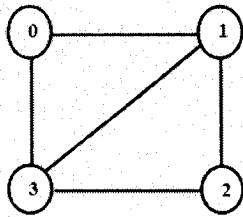


- B) Find optimal tour for TSP problem in given graph (Starting Vertex is 0):



Q.4. Solve the following Questions: (06*02=12)

A) Write algorithm for Graph Coloring Problem using Backtracking. Give only three colors (Red, Green and Blue) to the vertices in given graph using Backtracking and draw its State Space Tree (Starting Vertex is 0):

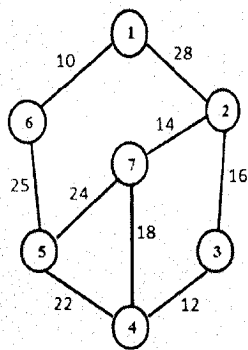


B) Define the terms Live node, E-node, Dead node and Bounding Function. Explain Least Cost Search using Branch-and-Bound.

Q.5. Solve the following Questions:

(06*02=12)

A) Define Spanning Tree. Write Prim's Algorithm for Minimum Cost Spanning Tree. Find minimum cost and draw spanning tree for following graph using Prim's Algorithm (Starting Vertex is 1):



B) What is String Matching? Write the Naïve String Matching Algorithm. Give the Complexity and number of valid string matching shifts using Naïve String Matching Algorithm for following problem instance: $T = 1011101110$ and $P = 111$ where $n = 10$ and $m = 3$.

Q.6. Solve the following Questions:

(06*02=12)

A) Draw and explain commonly believed relationship between P, NP, NP-hard and NP-complete Problems.

B) What are Hamiltonian Path and Hamiltonian Circuit? Explain with example Hamiltonian Circuit Problem is NP-complete Problem.

*** Paper End ***