

# POKHARA UNIVERSITY

Level: Bachelor

Semester: Spring

Year : 2021

Programme: BE

Full Marks: 100

Course: Analysis and Design of Algorithm

Pass Marks: 45

Time : 3hrs.

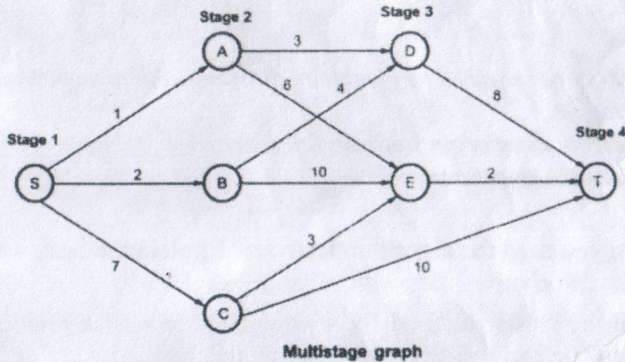
*Candidates are required to give their answers in their own words as far as practicable.*

*The figures in the margin indicate full marks.*

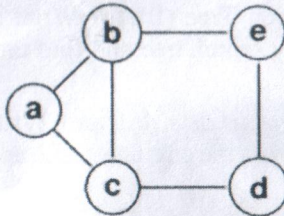
***Attempt all the questions.***

1. a) Why do you need the algorithm analysis? Explain the best, worst and average case complexities with suitable example. 8  
b) Explain the master method for solving the recurrence relations. Solve the following recurrence relations using this method. 7
  - i.  $T(n) = 3T(n/2) + n$
  - ii.  $T(n) = 2T(n/4) + \sqrt{n}$
2. a) Explain Binary Search Tree (BST)? Write an algorithm to insert an element to the binary search tree and find the time complexity of your algorithm. 7  
b) Briefly explain the Queue data structure. Write an algorithm to add and remove an element from the circular queue and compute the complexity of your algorithm 8
3. a) Consider five items along with their respective weights and profit values 7  
Items I = < I1, I2, I3, I4, I5 >  
Weights w = < 5, 10, 20, 30, 40 >  
profit value v = < 30, 20, 100, 90, 160 >  
The Knapsack has capacity W=60. Find an optimal solution to the Knapsack Problem  
b) Explain how you use the divide and conquer approach to solve Strassen's Matrix Multiplication. 8
4. a) Write an algorithm for quick-sort and trace out the algorithm for the following array A [ ] = { 16, 7, 15, 14, 18, 25, 55, 32 }. 8

- b) Briefly explain the dynamic programming method for problem solving. What is the basic difference between Dynamic programming and Greedy method? 7
5. a) Find the shortest path in the following multistage graph using dynamic programming from vertex S to T. 8



- b) Define spanning tree. Generate spanning tree for graph below using both BFS and DFS method. 7



6. a) Define articulation point and bi-connected component of the graph? Write the algorithm for finding articulation point in the graph with suitable example. 7
- b) Explain about the complexity classes P, NP and NP complete with suitable examples. 8

7. Write short notes on: (**Any two**) 2×5
- Travelling Salesman Problem
  - Optimal Storage on Tapes Problem.
  - Graph Colouring Problem