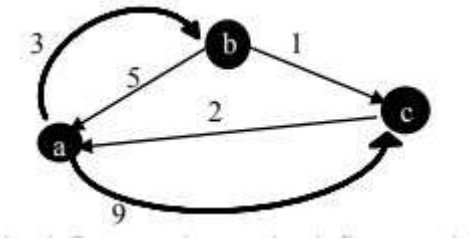
Tribhuvan University
Institute of Science and Technology
2071

Bachelor Level/ Third Year/ Fifth Semester/ Science — Full Marks: 80
Computer Science and Information Technology (CSc. 303) — Pass Marks: 32
(Design and Analysis of Algorithm) — Time: 3 hours

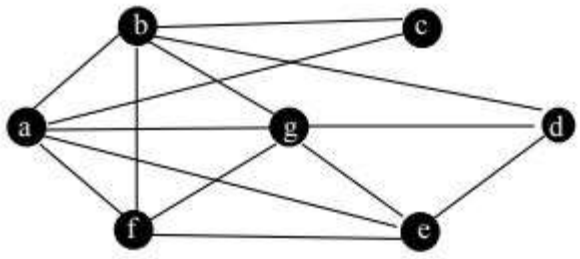
Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.

Attempt all the questions.

1. Why do you need the algorithm analysis? Explain the best, worst and average case complexities with suitable example. (2+6)
2. Explain the master method for solving the recurrence relations. Solve the following recurrence relations using
this method. (2+3+3)
a. $T(n) = 3T(n/2) + n$
b. $T(n) = 2T(n/4) + n$
3. Explain the divide and conquer approach for algorithm design. Design the binary search algorithm and
analyze it's time complexity. (2+6)
4. Explain the merge-sort algorithm with example and analyze its time complexity. (8)
5. What do you mean by a prefix code? How Huffman algorithm generates prefix codes? Explain with an
example. (2+3+3)
6. Discuss the 0/1 knapsack problem and how this problem can be solved? Explain the algorithm. (4+4)
7. Explain the algorithm to find the all pair shortest path of a weighted connected graph. Trace the algorithm for the following graph. (3+5)



8. Write an algorithm for depth first search. Use depth first search to find a spanning tree of the following graph.
(3+5)



9. Define the convex hull in 2D. Write the Grahm's scan algorithm for computing the convex hull of points in 2D and analyze its time complexity. (2+6)
10. What do you mean by approximation algorithm? Write the algorithm for approximate the vertex cover of connected graph with example. (2+6)