

**Tribhuvan University**  
**Institute of Science and Technology**  
**2072**

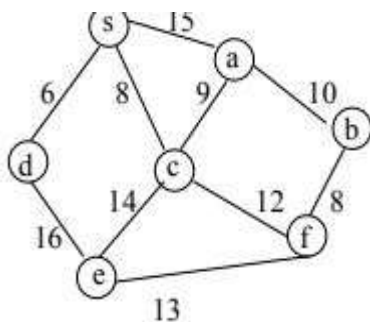
Bachelor Level/ Third Year/ Fifth Semester/ Science  
Computer Science and Information Technology (CSc. 303)  
**(Design and Analysis of Algorithm)**

Full Marks: 80  
Pass Marks: 32  
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. Describe the best case and worst case complexity of an algorithm. Write algorithm for insertion sort and estimate the best and worst case complexity. [2+6]
2. Explain the big Oh of the following recurrence relations using the iterative expansion method [4+4]
  - a)  $T(n)=2T(n/2) + k, n>1$   
 $=1, n=1$
  - b)  $T(n)=2T(n/2) + kn, n>1$   
 $=1, n=1$
3. What is the worst-case of quick sort? Show that how quick sort can be made to run in optimal time in the worst case. [1+7]
4. Trace the heap-sort algorithm for the following data: { 16, 41, 18, 99, 74, 20, 17, 25, 10}. [8]
5. What is prefix code? How Huffman algorithm generates optimal prefix codes? Explain with suitable example. [1+3+4]
6. What do you mean by dynamic programming approach for design of algorithm? Write the algorithm for matrix chain multiplication and estimate its time complexity. [2+6]
7. Write the Dijkstra's algorithm for single source shortest path in a weighted connected graph. Find the shortest path form the node s to other nodes in the following graph. [4+4]



8. Write an algorithm to compute the LCS of given two sequences. Trace the running of the algorithm to find the LCS of the sequences "XMJYAUZ" and be "MZJAWXU". [4+4] e
9. Define the term diagonal, ear and mouth of a simple polygon. How can you determine the intersection of two line segment efficiently? Explain in detail. [3+5]

10. Discuss NP completeness. What is the role of approximation algorithms? Explain the algorithm for vertex cover of a graph with running example. [2+6]