



## Applied Algorithms

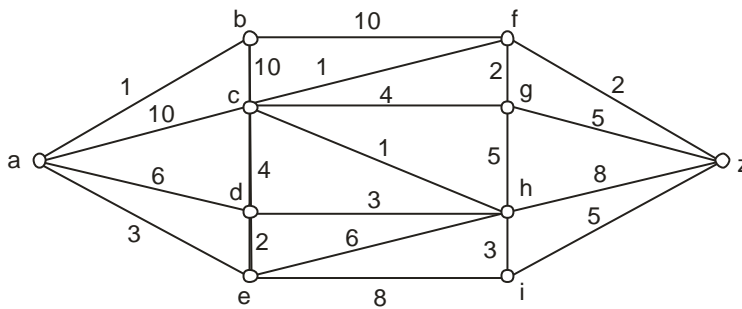
P. Pages : 2

Time : Three Hours

Max. Marks : 100

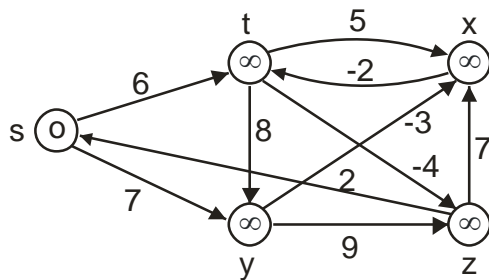
Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
  2. Answer sheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
  3. Students should note, no supplement will be provided.
  4. Figures to the right indicate full marks.
  5. Assume suitable data wherever necessary.
  6. Draw neat diagrams wherever necessary.
  7. Attempt **any five** questions.
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1. a) Write routines to perform insertion sort and selection sort. Analyze their best, average and worst case running time. **10**
  - b) Explain deletion operation performed on Red black tree with algorithm. Justify with example. **10**
  2. a) Given two sequences  $X[1.....m]$  and  $Y[1.....n]$ . find the longest subsequence common to both. **10**  
 $X : ABCBDAB$  and  $Y = BDCABA$
  - b) Write routine for Dijkstra's shortest path algorithm Apply the same on following graph and find shortest path from a to z. **10**



3. a) Explain following terms : **10**
  - i) Comparison networks.
  - ii) Merging networks.
- b) Explain the algorithm of binomial heap union operation with the help of suitable example. **10**

4. a) Write the routine for Bellman ford algorithm. Justify the same on following graph. 10



- b) Explain optimal binary search tree with example. 10
5. a) Write an algorithm for deleting a node from a Fibonacci heap. Calculate it's time complexity. 10
- b) Write an algorithm to find minimal spanning tree using Prims method. Find it's time complexity. What is the select – Greedy function and feasibility function used in Prim. 10
6. a) Prove that Kruskal's algorithm indeed finds the minimum spanning tree. Prove any lemma that you may use in the process. 10
- b) Explain the algorithm for creation of B-tree. Construct a B-tree of order 5 for following keys 3, 4, 7, 1, 8, 5, 11, 17, 13, 6, 23, 12, 20, 26, 4, 16, 18, 24, 25, 19. 10
7. a) Explain the following standard notations and common functions : 10
- monotonically
  - floors and ceilings
  - modular arithmetic
  - polynomials
  - Exponentials
- b) Write short notes on : 10
- Bitonic sorting networks.
  - Zero-one principle.
8. a) Explain Divide and conquer technique. Also explain merge sort with it's analysis. 10
- b) Explain with algorithm and suitable example matrix chain multiplication. 10

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