Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous College Affiliated to University of Mumbai)

Mid Semester Examination
March 2018

Max. Marks: 30 | **Duration: 90 min**
Class: S.E. | **Semester: IV**
Course Code: IT41/CE41 | **Branch: IT/ COMP**
Name of the Course: Design and Analysis of Algorithm

Instructions:
(1) All Questions are Compulsory
(2) Draw neat diagrams
(3) Assume suitable data if necessary

Q No.	
Q1	• Algorithm= 2mks and • Time Complexity Analysis =2mks

Insertion Sort Algorithm:
Step 1 – If it is the first element, it is already sorted. return 1;
Step 2 – Pick next element
Step 3 – Compare with all elements in the sorted sub-list
Step 4 – Shift all the elements in the sorted sub-list that is greater than the value to be sorted
Step 5 – Insert the value
Step 6 – Repeat until list is sorted

Analysis:
Best Case:

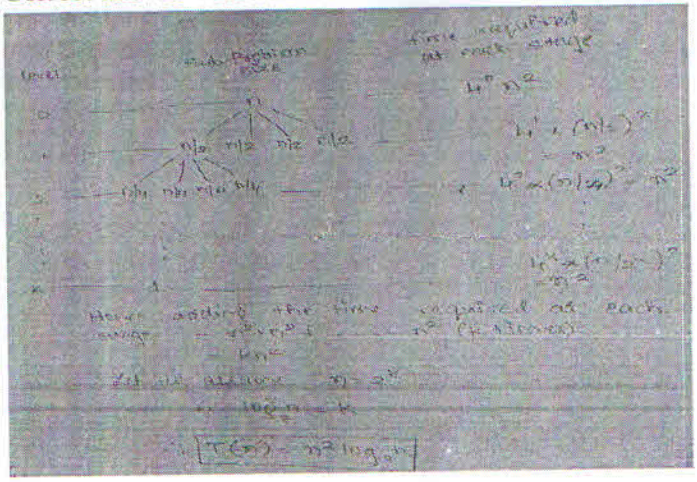
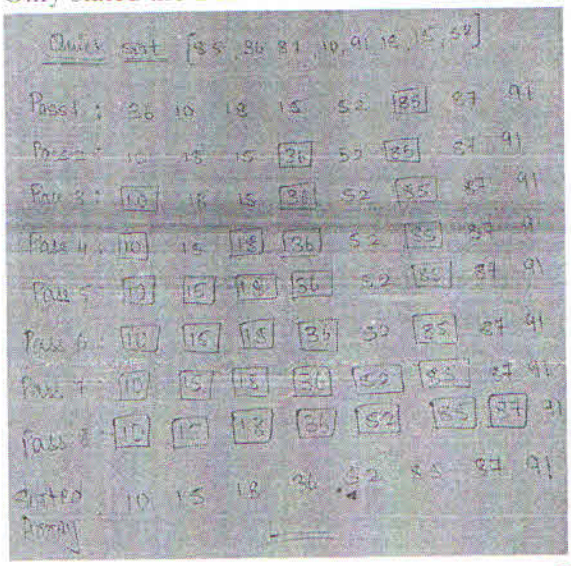
The best case is when the list is already sorted. In this case, there is only one comparison per iteration through the outer loop, giving a total of $N-1$ comparisons.

Thus $B(N) = O(N)$.

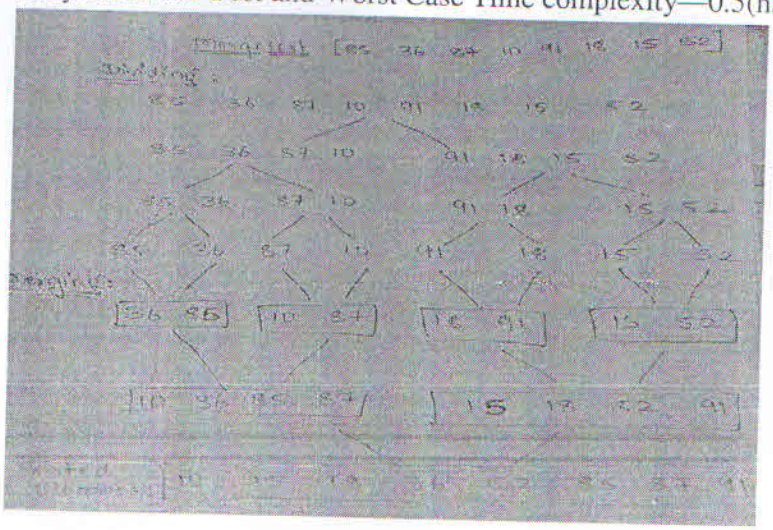
Worst Case:

The worst case is when there are the maximum number of comparisons for each of the $N-1$ iterations through the outer loop. This is i comparisons for the ith iteration:

$$W(N) = \sum_{i=1}^{N-1} i = (N-1)N/2 \qquad \text{Thus } W(N) = O(N^2).$$

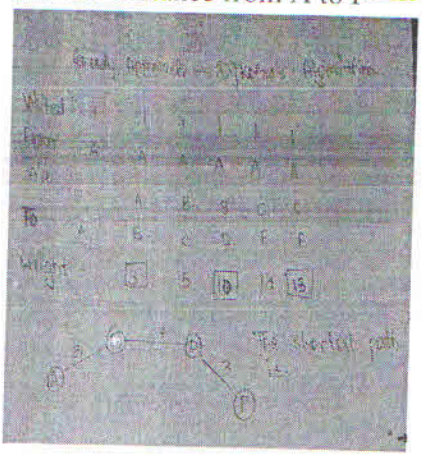
Q2	• Correct answer without tree structure----- 01 mks • Correct answer with full tree structure----- 03 mks 
Q3	• Solved correctly with all eight passes shown-------- 04mks • Solved correctly with few/ some passes -------(0.5 (half)mk for each correct pass) • Derived the Best and Worst Case time complexity correctly------ 02mks • Only stated the Best and Worst Case Time complexity—0.5(half)mk  OR • Solved correctly with dividing and merging steps shown-------- 04mks • Solved correctly with few/ some dividing and merging steps-------(0.5 (half)mk for each correct steps) • Derived the Best and Worst Case time complexity correctly------ 02mks

- Only stated the Best and Worst Case Time complexity—0.5(half)mk

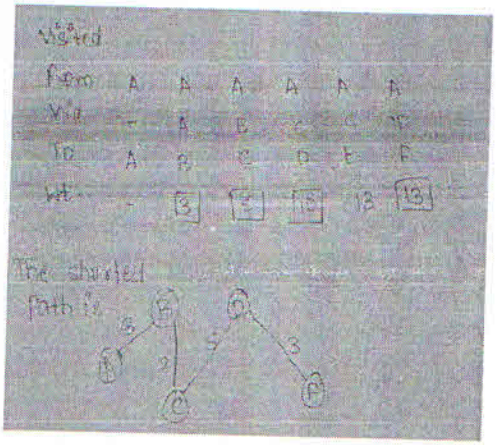


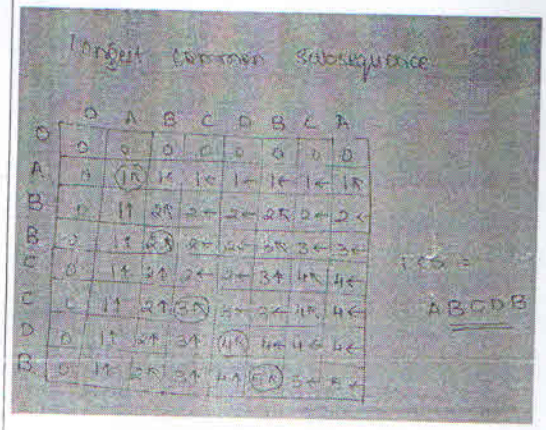
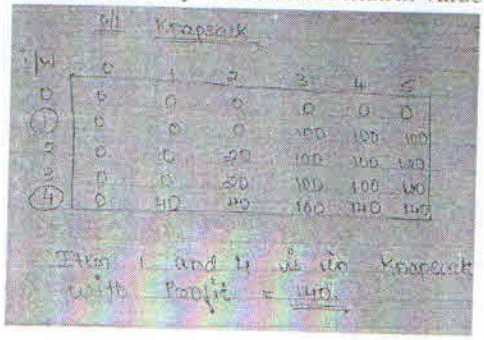
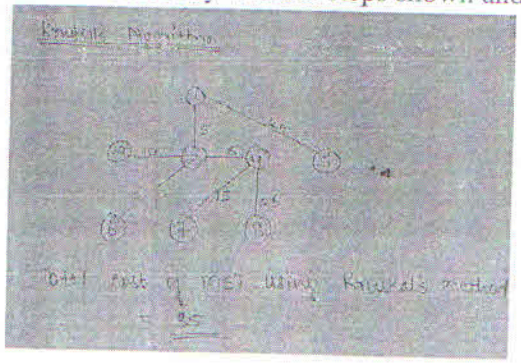
Q4

- Solved correctly with priority queue shown at each stage and show the final graph of shortest distance from A to F------ 05mks
- Solved correctly with priority queue shown at each stage and final graph not shown -- 04mks
- Solved correctly without priority queue shown at each stage and show the final graph of shortest distance from A to F----- 01mk



OR



Q5	• Correct answer------ 4mks 
Q6	• Solved correctly with correct matrix value------4mks 
Q7	• Solved Correctly with steps shown and MST Cost Stated--------4mks • Solved Correctly with steps shown and without MST Cost --------3mks • Solved Correctly without steps shown and MST Cost Stated--------1mk • Solved Correctly without steps shown and without MST Cost --------0.5(half)mk 

OR

- Tree drawn correct and Huffman Code written ----- 04mks
- Tree drawn correct and NO Huffman Code written----- 03mks
- Incorrect Tree and Huffman code correct------Zero mk