



**B.E DEGREE EXAMINATIONS: MAY 2015**

(Regulation 2013)

Third Semester

**ELECTRONICS AND COMMUNICATION ENGINEERING**

U13CST411: Data Structure

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

1. ----- method build up the solution to a problem via a sequence of intermediate steps.
  - a) Divide-and-conquer
  - b) Dynamic Programming
  - c) Greedy
  - d) Backtracking
2. The complexity of Binary search algorithm is -----
3. An abstract data type is a set of -----
  - a) operations
  - b) inputs
  - c) Outputs
  - d) Functions
4. ----- data structure is suitable for polynomial addition.
5. A binary search tree is traversed in the following order recursively: Right, root, left.  
The output sequence will be in
  - a) Ascending order
  - b) Descending order
  - c) Level wise
  - d) No specific order
6. ----- is the minimum number of nodes in a complete binary tree of height k
7. The worst case of quick sort has order
  - a)  $O(n^2)$
  - b)  $O(n)$
  - c)  $O(n \log_2 n)$
  - d)  $O(\log_2 n)$
8. Any general purpose sorting algorithm requires ----- comparisons.
9. The maximum degree of any vertex in a simple graph with n vertices is
  - a) n
  - b) n-1
  - c) n+1
  - d) 2n-1
10. A connected undirected graph is ----- if there are no vertices whose removal disconnects the rest of the graph.

**PART B (10 x 2 = 20 Marks)**

**(Not more than 40 words)**

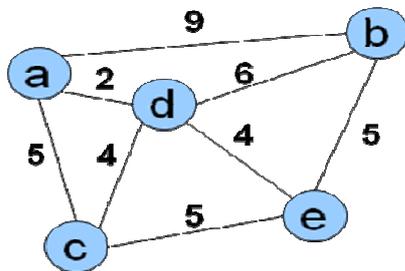
11. List the qualities and capabilities of good algorithms
12. What is the difference between dynamic programming and divide and conquer?
13. Give the advantages and disadvantages of linked lists.
14. Differentiate between stack and queue.
15. Differentiate binary heap and binary tree.
16. Construct a binary tree for the expression  $(a-b) / ((c*d)+e)$
17. How does internal sorting differ from external sorting?
18. Define Radix sort with its time and space complexity.
19. Travelling salesman problem is NP-Complete –Justify.
20. Does the minimum spanning tree of a graph give the shortest distance between any 2 specified nodes?

**PART C (5 x 14 = 70 Marks)**

**(Not more than 400 words)**

**Q.No. 21 is Compulsory**

21. a) (i) Formulate a minimum spanning tree from the following graph using Prim's algorithm. (7)



- (ii) With an algorithm, show the execution of a depth-first search on a graph (7)

22. a) (i) Summarize the various steps involved in top-down design. (7)  
(ii) What is the significance of program verification? Elaborate the various steps involved in it. (7)

**(OR)**

- b) (i) Enumerate and describe the various efficiency considerations for algorithms. (7)  
(ii) Discuss the various types of analysis on algorithms with an example. (7)
23. a) (i) With algorithms, differentiate the array and linked list implementation of queue. (7)

- (ii) Write an algorithm to insert new node at the beginning, after a node and at the end of a Singly Linked List (7)

**(OR)**

- b) (i) Explain how stack is applied for evaluating an arithmetic expression (7)  
(ii) Discuss the basic operations on circular linked list. (7)

24. a) (i) Show the result of inserting 3,1,4,6,9,2,5,7 in to an initially empty binary search tree and find the order of nodes visited during the Preorder, Post order and In order traversals. (7)  
(ii) Explain the various scenarios involved with AVL single rotations (7)

**(OR)**

- b) (i) Describe the various collision resolving techniques involved in hashing.(8) (7)  
(ii) Construct a binary heap with the following set of numbers without violating the heap properties. 5 9 4 2 1 6 (7)

25. a) (i) Examine the procedure of insertion sort with an example. (7)  
(ii) Explain the algorithm for Shell sort and apply it to sort the following numbers : (7)  
80, 93, 60, 12, 42, 30, 68, 85, 10

**(OR)**

- b) (i) Test the significance of quick sort with the following set of numbers 65, 70, 75, 80, 85, 60, 55, 50, 45 (7)  
(ii) Assess the performance of the merge sort on the following sequence of numbers:18, 26,32,6,43,15,9,1 (7)

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