Course: Open Elective-I   **Semester:** 5th

Subject Code: CS-306   **Duration:** 2 Hours

Subject Name: Data Structure   **Max Marks:** 50

Date: 17/12/2020   **Time:** 10:00 AM–12:00 PM

Note: All questions are compulsory

Instructions:

- Each Student is required to write his/her **Name, Roll No, Subject Name, Subject Code, Programme, Semester, Department, Date of Exam and Number of pages on top of the first sheet** and put the **Signature with date at the bottom of each sheet** of the answer booklet.
- Please make one complete pdf of your scanned answer sheet and save it with the name as **rollnosubjectcode.pdf** only and then upload it.
- After the exam time is over, students may take extra 15 minutes to scan and upload their answer booklet on Google Classroom. Further, **delay in submission by a student may lead to deduction in marks or rejection of whole answer booklet**.

Q.1 a) Given a linked list whose typical node consists of an INFO and LINK field. Formulate an algorithm which will count the number of nodes in the list which contain the value greater than 10.   [5]

b) How stack can be used to recognize strings aca, bcb, abcba, bacab, abbcbba? Show the trace of contents of stack for recognizing the string abcba.   [5]

Q.2 a) The Preorder traversal of the tree is: 7, 1, 0, 3, 2, 5, 4, 6, 9, 8, 10
    The inorder traversal of the tree is: [5]
        0, 1,2,3,4,5,6,7,8,9,10
   What is the postorder traversal?

b) In the following binary search tree, first insert 10 and then insert 33. After these insertions, delete 26 and, delete 14 and then delete 17. Draw the tree after each operation.   [5]
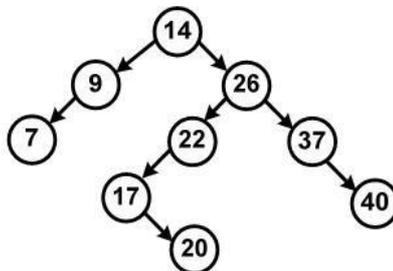
Q.3 a) Rewrite the QUICK-SORT procedure to sort the numbers into nonincreasing instead of nondecreasing order.   [5]

b) Discuss the best case and worst case complexity of Insertion sort.   [5]

Q.4 a) Find the minimum spanning tree of the graph given below using Kruskal Algorithm. [5]
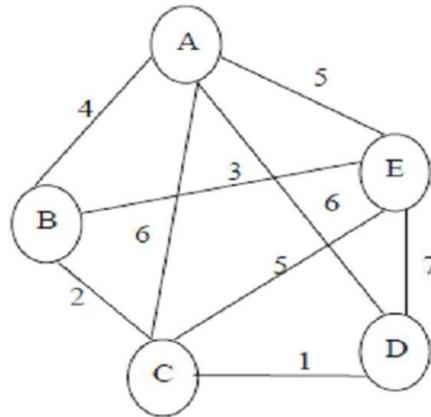
b) Demonstrate Dijkstra algorithm on graph shown above where the source vertex is B. [5]

Q.5 a) What are the minimum and maximum numbers of elements in a heap of height h? [2]

b) Is the sequence 23, 17, 14, 6, 13, 10, 1, 5, 7, 12 a max-heap? Where in a max-heap might the smallest element reside, assuming that all elements are distinct? [2]

c) Write pseudocode for the procedure MINHEAPIFY(A, i), which performs the corresponding manipulation on a min-heap. [3]

d) Demonstrate the insertion of the keys 5, 28, 19, 15, 20, 33, 12, 17, 10 into a hash table with collisions resolved by chaining. Let the table have 9 slots, and let the hash function be h(k) = k mod 9. [3]