Hall Ticket No | | | | | | | | | | | Question Paper Code: ACSB03

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

MODEL QUESTION PAPER-II

Four Year B.Tech III Semester End Examinations, November-2019

Regulations: R18

DATA STRUCTURES

(Common to ME/CSE/IT/ECE/CE)

Time: 3 hours **Max. Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

MODULE – I

1. a) Explain the following two sort algorithms with an example and Compare them? **[7M]**
   i. Bubble sort
   ii. Selection sort

   b) A phone book is stored in a text file, containing names of people, their city names and phone numbers. Choose an appropriate searching techniques to search a person's phone number based on his / her first name and city and write algorithm for the same technique. **[7M]**

2. a) Explain merge sort procedure for the given list of elements and also write its time complexity? **[7M]**
   33, 14, 25, 45, 62, 85, 77, 65, 40, 22, 94

   b) Explain Binary Search procedure for the following list of elements and assume the key element is 49. **[7M]**
   List: 12, 23, 34, 45, 55, 62, 71, 85, 96

MODULE – II

3. a) Evaluate the following postfix expression using stack: **[7M]**
   (i) 9 3 4 * 8 + 4 / -
   (ii) 5 6 2 + * 1 2 4 / - +

   b) Define a double ended queue (DEQUE). Explain input restricted and output restricted DEQUE. Write an algorithm of input restricted DEQUE? **[7M]**

4. a) Compare between linear queue and circular queue? Write down algorithms for insert and delete operations in a circular queue? **[7M]**

   b) Write an algorithm for evaluation of postfix expression and evaluate the following expression showing every status of stack in tabular form. **[7M]**
   5 6 2 - * 4 9 3 / + *

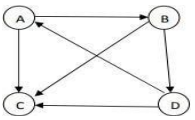
MODULE – III

5. a) Write an algorithm/program to implement following operations in the "Singly Linked List". **[7M]**
   (i) Insert the node at end
   (ii) Delete the node whose value = Y.
   b) Write advantages and disadvantages of linked list, doubly linked list and circular linked list with example. **[7M]**

6. a) What are the advantages of doubly linked list? Write a function to find maximum element from doubly linked list. **[7M]**
   b) Write an algorithm to insert a node before a given node in a singly linked list. Is it advantageous to use a doubly linked list for this operation? Explain. **[7M]**

MODULE – IV

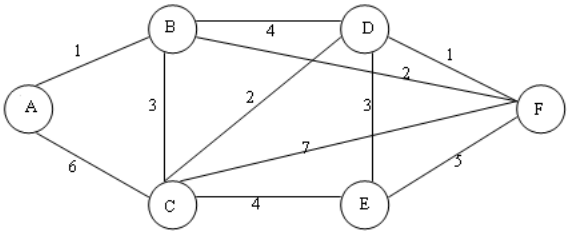
7. a) Compare Graph traversal Techniques and explain BFS and DFS algorithm for the following example. **[7M]**



   b) The inorder and preorder traversal of a binary tree are **[7M]**
   d b e a f c g
   a b d e c f g respectively
   Construct binary tree and find its postorder traversal.

[7M]

8. a) Briefly explain importance of Priority Queues and compare priority queues with ordinary queue.
   b) Define Directed graph, spanning tree and minimum spanning tree. Find minimum spanning tree for the graph shown in Figure 1. **[7M]**



c

MODULE – V

9. a) Create a Binary Search Tree for the following data and do In-order, Preorder and Post-order traversal of the tree. **[7M]**
   50, 60, 25, 40, 30, 70, 35, 10, 55, 65, 5
   b) The keys 12, 18, 13, 2, 3, 23, 5 and 15 are inserted into an initially empty hash table of length 10 using open addressing with hash function h(k) = k mod 10 and linear probing. What is the resultant hash table? **[7M]**
10. a) What do you mean by hashing? What are the various hash functions? Explain each one in brief. **[7M]**
   b) Define AVL tree. Construct AVL tree for following data
   10,20,30,40,50,60,70,80 **[7M]**

INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal, Hyderabad - 500 043

COURSE OBJECTIVES
The course should enable the students to:

I	Learn the basic techniques of algorithm analysis.
II	Demonstrate searching and sorting algorithms and analyse their time complexities.
III	Implement linear data structures viz. stack, queue and linked list.
IV	Demonstrate non-linear data structures viz. tree and graph traversal algorithms.
V	Study and choose appropriate data structure to solve problems in real world.

COURSE OUTCOMES (COs):

CO 1	Understand the concept of data structures and apply algorithm for solving problems like sorting, searching, insertion and deletion of data.
CO 2	Understand linear data structures for processing of ordered or unordered data.
CO 3	Explore various operations on dynamic data structures like single linked list, circular linked list and doubly linked list.
CO 4	Explore the concept of non linear data structures such as trees and graphs.
CO 5	Understand the binary search trees, hash function, and concepts of collision and its resolution methods.

COURSE LEARNING OUTCOMES (CLOs):

ACSB03.01	Understand algorithms and data structures in terms of time and space complexity of basic operations.
ACSB03.02	Choose a suitable algorithm to organize the data in ascending or descending order.
ACSB03.03	Explore an algorithm to find the location of an element in a given list.
ACSB03.04	Compare the time complexities of various searching and sorting algorithms.
ACSB03.05	Implementation of stack and queues using an underlying array.
ACSB03.06	Understand application of stacks in arithmetic expression conversion and evaluation.
ACSB03.07	Understand working of circular queues and double ended queue.
ACSB03.08	Understand dynamic data structures and their real time applications.
ACSB03.09	Understand the basic insertion and deletion operations associated with linked list.
ACSB03.10	Organize the data in various linked representation format.
ACSB03.11	Understand the concept of non-linear data structures viz. trees and graphs.
ACSB03.12	Application of trees, graphs and graph traversal techniques.
ACSB03.13	Compare and Contrast the operations of binary search trees and AVL trees.
ACSB03.14	Understand the concept of M-way search trees, operations and applications.
ACSB03.15	Understand the implementation of hashing using hash table and hash function.
ACSB03.16	Describe the concept of collision and its resolving methods in applications.
ACSB03.17	Strengthen the knowledge of data structures and algorithms for employability.

MAPPING OF SEMESTER END EXAM TO COURSE LEARNINIG OUTCOMES

SEE Question No		Course Learning Outcomes		Course Outcomes	Blooms Taxonomy Levels
1	a	ACSB03.02	Choose a suitable algorithm to organize the data in ascending or descending order..	CO 1	Understand
	b	ACSB03.03	Explore an algorithm to find the location of an element in a given list.	CO 1	Understand
2	a	ACSB03.02	Choose a suitable algorithm to organize the data in ascending or descending order..	CO 1	Understand
	b	ACSB03.03	Explore an algorithm to find the location of an element in a given list.	CO 1	Understand
3	a	ACSB03.06	Understand application of stacks in arithmetic expression conversion and evaluation.	CO 2	Understand
	b	ACSB03.07	Understand working of circular queues and double ended queue.	CO 2	Remember
4	a	ACSB03.07	Understand working of circular queues and double ended queue.	CO 2	Understand
	b	ACSB03.06	Understand application of stacks in arithmetic expression conversion and evaluation.	CO 2	Remember
5	a	ACSB03.09	Understand the basic insertion and deletion operations associated with linked list.	CO 3	Understand
	b	ACSB03.10	Organize the data in various linked representation format.	CO 3	Understand
6	a	ACSB03.10	Organize the data in various linked representation format.	CO 3	Remember
	b	ACSB03.09	Understand the basic insertion and deletion operations associated with linked list.	CO 3	Understand
7	a	ACSB03.11	Understand the concept of non-linear data structures viz. trees and graphs.	CO 4	Understand
	b	ACSB03.12	Application of trees, graphs and graph traversal techniques.	CO 4	Understand
8	a	ACSB03.11	Understand the concept of non-linear data structures viz. trees and graphs.	CO 4	Understand
	b	ACSB03.12	Application of trees, graphs and graph traversal techniques.	CO 4	Apply
9	a	ACSB03.13	Compare and Contrast the operations of binary search trees and AVL trees.	CO 5	Understand
	b	ACSB03.15	Understand the implementation of hashing using hash table and hash function.	CO 5	Understand
10	a	ACSB03.15	Understand the implementation of hashing using hash table and hash function.	CO 5	Remember
	b	ACSB03.13	Compare and Contrast the operations of binary search trees and AVL trees.	CO 5	Understand

Signature of Course Coordinator **HOD, CSE**