Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree (S,FE) Examination December 2022 (2015 scheme)

~~Course Code: CS205~~

Course Name: DATA STUCTURES

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 3 marks. Marks

1 How complexity of algorithm affects run time and space in terms of input size?. (3)

2 Mention the significance of documentation. (3)

3 Differentiate Vector and Arrays. (3)

4 How is a 2D array represented in memory . Derive an expression to locate an element [i,j]. (3)

PART B

Answer any two full questions, each carries 9 marks.

5 a) What is the purpose of Frequency count? Calculate the total computation time for the following code . (4)

```
k=0;
for ( i=0;i<n; i=i*2)
   for (j=0;i<n; j=j*2)
            k++;
```

b) Let L1 be a singly linked list in memory. Write an algorithm to find the number of non-zero elements in L1. (5)

6 a) Explain Stepwise refinement technique in detail. (5)

b) Given a doubly linked list, write an algorithm that removes a node with a particular value from the list and inserts it in the front. (4)

7 a) Define big-oh notation. Show that n^3+3n^2+2 is $O(n^3)$ (4)

b) Write an algorithm to add two polynomials using linked lists. Demonstrate your algorithm with appropriate examples. (5)

PART C

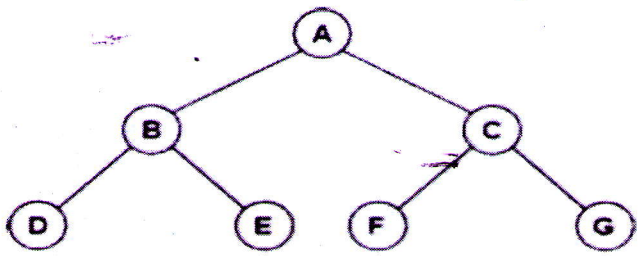
Answer all questions, each carries3 marks.

8		Show pictorially the contents an initially empty circular queue of size 6 after each of the following operations: insert (2), insert(3), insert(5), delete, insert (4), insert(9), delete, insert(10), insert(1), delete, insert(7), insert(8).	(3)
9		Compare Complete and Fully binary tree with diagrams.	(3)
10		List down the applications of queue data structure.	(3)
11		Show the structure of the binary search tree after adding each of the following values in that order: 1, 12, 5, 7, 1, 0.	(3)

PART D

Answer any two full questions, each carries 9 marks.

12	a)	Write an algorithm for evaluating a postfix expression and evaluate the following postfix expression using the algorithm :AB +CD/ AD-EA^ +* where A=2, B=7, C=9, D=3, E=5.	(6)
	b)	Write notes on priority queue.	(3)
13		Write a function(C/ pseudo code) to i) Insert an element into BST. ii) Search an element from BST	(9)
14	a)	Given five memory partitions of 300Kb, 700Kb, 400Kb, 500Kb, 800Kb (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes of 412 Kb, 617 Kb, 112 Kb, and 626 Kb (in order)?	(5)
	b)	Write the output of inorder, preorder & postorder traversals on the following tree.	(4)



PART E

Answer any four full questions, each carries10 marks.

15	a)	Perform linear search in the given set of elements [12, 23, 27, 35, 39,42, 50] to search 23 and 47.	(5)
	b)	Write an algorithm to perform DFS in a graph. Explain with an example.	(5)

16	a)	Explain any two graph representation methods with example	(4)
	b)	Give an algorithm for performing a quick sort on a given set of integers. Demonstrate working on set {30,38,45,17,14,28,13}	(6)
17	a)	Trace the steps of selection sort for sorting the following numbers: 8 5 7 1 9 3.	(5)
	b)	Write an algorithm to perform binary search. Discuss its time complexity	(5)
18	a)	Using insertion sort explain the different passes for sorting the list 35, 19, 66, 14, 8, 10, 57, 100	(4)
	b)	Explain heap sort with an example.	(6)
19	a)	Define hashing. What are the properties of a good hash function?	(2)
	b)	Explain the different hashing functions with examples.	(8)
20	a)	Define collision. What is linear probing? The following keys 10, 16, 11, 1, 3, 4, 23 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?	(10)

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