Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Third Semester B.Tech Degree (S,FE) Examination January 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 What is a recursive function? Write a recursive function to find factorial of a number. (3)

2 What is frequency count? Compute the frequency count of the following code fragment. (3)

```
int a=0;
for(i=0 ; i< N  ; i++)
        for(j=N ; j > i ; j--)
                a= a + i + j;
```

3 Write down the advantages and disadvantages of Singly Linked List. (3)

4 Write an algorithm to delete last node from a circular singly linked list. (3)

PART B

Answer any two full questions, each carries 9 marks.

5 a) What is rate of growth of a function? Explain Big O notation with an example. (5)

b) What is stepwise refinement technique? (4)

6 a) What is abstract data structures? (2)

b) Represent the following polynomial and its resultant polynomial using linked list. (7)

$5X^5 + 4X^4 + 6X^2 - 4$

$8X^6 + 4X^4 + 3X^3 + 2X^2 + X$

Write an algorithm to add two polynomials.

7 a) What is time complexity and space complexity? Derive the Big O notation for $f(n) = 3n^3 + 2n + 7$. (4.5)

b) Write an algorithm for insertion of a node in the middle of doubly linked list. (4.5)

PART C

Answer all questions, each carries 3 marks.

8 Convert the given infix expression to prefix expression (3)

(A + B) * C - (D - E) * (F + G)

9 What are the differences between queue and circular queue? (3)

10 Write an algorithm to concatenate two strings without using string functions. (3)

11 What is binary tree? How a binary tree is represented using an array? (3)

PART D

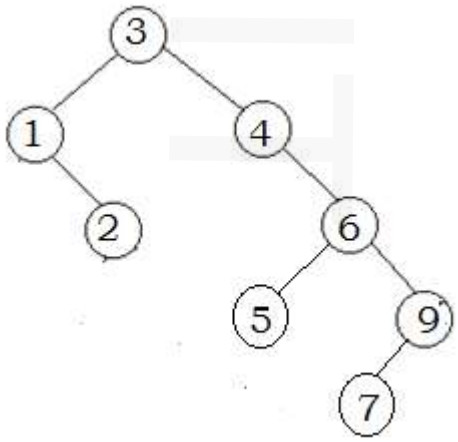
Answer any two full questions, each carries 9 marks.

12 a) Write an algorithm to convert infix expression to postfix. Trace the algorithm for the expression (6)

((A + B) * (C – D) + E) / (F + G)

b) Write an algorithm to dequeue an element which is implemented using linked list. (3)

13 a) Show the result of inorder, preorder and postorder traversal of given tree (3)

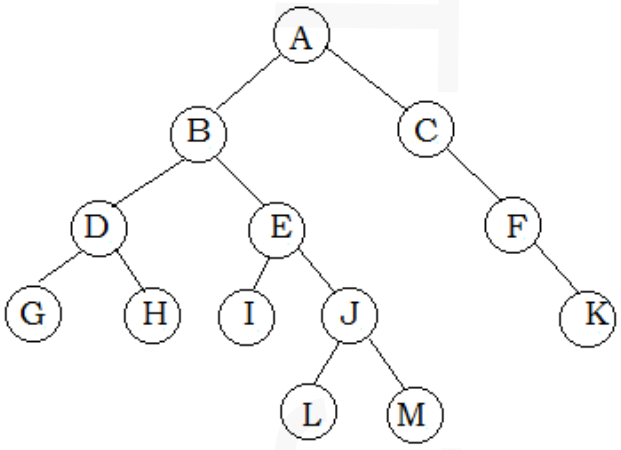


b) What is a Binary Search Tree (BST)? Show the creation of the binary search tree after adding each of the following values in that order: 8, 3, 10, 1, 6, 14, 4, 7, 13. Show the steps for deleting the value 10 from the above resultant tree. (6)

14 a) Given five memory partitions of 200 KB, 400 KB, 600 KB, 500 KB, 300 KB and 250 KB (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes of sizes 357 KB, 210 KB, 468 KB and 491 KB (in order)? (5)

b) For the given tree 1) compute height of the tree (2)

2) List the siblings for node E



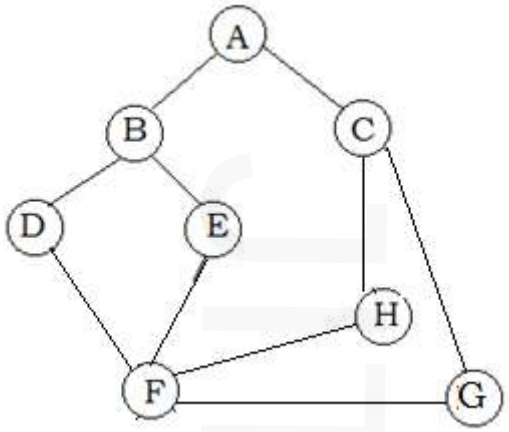
c) Explain Full binary tree and complete binary tree with example. (2)

PART E

Answer any four full questions, each carries 10 marks.

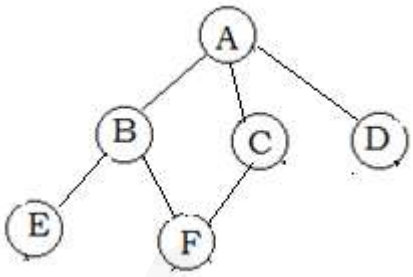
15 a) For the graph given below Find 1)adjacency matrix (4)

2)List representation



b) Sort the following elements using quick sort algorithm (6)
< 2, 10, 9, 6, 1, 15, 5, 11 >

16 a) Write an algorithm to perform Depth First Search. Apply DFS on below graph (5)



b) Sort the following sequence using insertion sort (5)
3, 10, 4, 2, 8, 6, 5, 1

17 a) What is heap? Write an algorithm to perform heap sort. (5)

b) Illustrate heap sort algorithm using the following list (5)
82, 90, 10, 12, 15, 77, 55, 23

18 a) Define hashing and collision? Discuss the advantages and disadvantages of hashing over other searching techniques. (5)

b) Apply Binary search to find 123 in a list (5)
49, 198, 101, 123, 149, 194, 199, 211, 240, 286, 840, 930
Mention the best case and worst case time complexity of binary search algorithm.

19 a) Consider a hash table with 9 slots. The hash function h(k) = k mod 9. The following keys are inserted in the order 5, 28, 19, 15, 20, 33, 12, 17, 10. Draw the contents of hash table when the collision are resolved by (6)
1) Chaining
2) Linear Probing
3) Double hashing. The second hash function h2(x) = 7- (x mod 7)

b) Write the algorithm for linear search. Analyse the best and worst case performances. (4)

20 a) What is hash function? Explain any two hash functions with examples. (5)

b) Explain the different collision resolution techniques. (5)

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