Reg. No._____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

SECOND SEMESTER MCA DEGREE EXAMINATION, MAY 2017

Course Code: RLMCA104
Course Name: DATA STRUCTURES

Max. Marks: 60 Duration: 3 Hours

PART A

Answer All Questions, Each Carries 3 Marks

1. Convert the given infix expression to prefix and postfix
   (A-B)^C^D*E+F-G/H
2. How can you overcome the limitations of a linear queue when implemented as an array?
3. How can you represent a sparse matrix using linked list?
4. Write an algorithm to delete an element from a doubly linked list in a given position.
5. Show that maximum no. of nodes possible in a binary tree of height h is 2^h-1.
6. Define a minimum spanning tree for a graph .Give an example.
7. What is the running time of insertion sort if all keys are equal?
8. Is Bubble Sort a stable sort algorithm? Justify your answer.

PART B

Answer Any One Question from Each Module, Each Carries 6 Marks

MODULE I

9. (i) Devise a formula to calculate memory location for each element in a three dimensional array
   1. Row major order 2. Column Major Order (2)
   (ii) How can you find out the time complexity of an algorithm which checks whether a matrix is diagonal or not. (4)

OR

10. (i) Define Asymptotic Notations. (3)
    (ii) How can asymptotic notations be used to represent time complexity? (3)

MODULE II

11. Write an algorithm to check for balanced parentheses in C language using stack.

OR

12. Write a recursive algorithm using stack to list out all prime factors of a given number in ascending order.

MODULE III

13. (i) Write an algorithm to delete an element from a linked queue. (4)

(ii) Write any two representations of a priority queue. (2)

OR

14. Write an algorithm that reverses all the elements in a queue using stack.

MODULE IV

15. Write an algorithm to add two polynomials using linked list. What is the time complexity of the algorithm if the polynomials have M and N terms respectively?

OR

16. Given two sorted lists L1 and L2. Write an algorithm to compute L1 ∩ L2 using only the basic list operations.

MODULE V

17. (i) Define a Binary Search Tree. (2)

(ii) Show the result of inserting 3, 1, 5, 6, 10, 2, 5, 8 into an initial empty binary search tree. (2)

(iii) Show the result of deleting the root. (2)

OR

18. Write an algorithm to solve the single source shortest path problem with an example.

MODULE VI

19. (i) Show how heapsort processes the input 14,54,12,6,45,88,57,43,11 (4)

(ii)What is the running time of heapsort algorithm for

1) Sorted input in ascending order 2) sorted input in descending order (2)

OR

20. Write a recursive algorithm for merge sorting .What is the worst case complexity of that algorithm?

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