Roll No. ....

Total No. of Questions : 13]   [Total No. of Pages : 02

J-3268[S-1124]   [2037]

MCA (Semester - 3ʳᵈ) (B.Sc. IT (Sem. - 2ⁿᵈ))
DATA STRUCTURES & ALGORITHMS (MCA - 302/202)

Time : 03 Hours   **Maximum Marks : 75**

Instruction to Candidates:

1) Section - A is **compulsory.**

2) Attempt any **Nine** questions from Section - B.

Section - A

(15 X 2 = 30)

Q1)

a)   What are the applications of stack?

b)   A complete binary tree contains 15 nodes. Calculate the depth of the tree.

c)   Define ADT. What are its advantages?

d)   What is the difference between linklist and array?

e)   What is the difference between graph and tree?

f)   What are the limitations of binary tree?

g)   What is the complexity of an algorithm?

h)   What is deque? List its different types?

i)   What is Bubble sort technique?

j)   Define :

(i)   almost complete binary tree

(ii)   strictly binary tree.

k)   What are AVL trees? What are its advantages?

l)   Write the complexities of

(i)   Heap sort   (ii)   Quick sort   (iii) Merge sort

m)   Differentiate between depth first search and breadth first search.

n)   Define :

(i)   Minimum spanning tree

(ii)   Forest

o)   What are the applications of graph?

P.T.O.

Section - B

Q2) Explain Dijkastra's algorithm.

Q3) Write an algorithm to insert an element in a binary search tree.

Q4) Write an algorithm to insert an element at the end in a circular link list.

Q5) Discuss the different tree representation methods.

Q6) Write the procedure to insert an element in the middle of an array.

Q7) Write a procedure to convert infix expression to postfix expression. Apply the procedure on the following data

Q:((A+B)*D)↑(E-F)

Q8) Write heap sort algorithm. Discuss its complexity.

Q9) Let E denote the following algebraic expression:

[a+(b-c)]*[(d-e)/(f+g-h)]
  (a) Draw the corresponding binary tree
  (b) Apply the preorder traversal
  (c) Apply the postorder traversal

Q10) Explain the various graph representation methods. List merits and demerits of each.

Q11) Write a short note on Redix sort.

Q12) How would you implement a queue of stacks, a stack of queues, a queue of queues? Write routines to implement the appropriate operations for each of these data structures.

Q13) Write an algorithm for selection sort.

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