Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(Computer Science Engg.) / (IT) (Sem.–3)

DATA STRUCTURES AND PROGRAMMING METHODOLOGY

Subject Code : CS-207

Paper ID : [A0454]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**

SECTION-A

1. Write briefly :

a) State the Criteria used for evaluating the suitability of a particular data structure for a given application.

b) Which data structure is used to implement DFS algorithm and why?

c) When do we use Priory queues?

d) Define the term File-structure and File-organization.

e) What are the advantages and disadvantages of representing a group of items as an array verses a linear linked list?

f) What is Graph and name its applications?

g) Describe the term Algorithmic complexity and time-space tradeoff.

h) Derive an expression for addressing an arbitrary element in 2-D array.

i) Can you traverse a single linked list in backward direction? Justify your answer.

j) What are the various operations that can be performed on sets?

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SECTION-B

2. Write a recursive program/algorithm to search an element from a given list of 50 numbers using Binary search method and examine how much space and time it requires as list size becomes large.

3. Write an algorithm to perform the Deletion (in the middle) operation for single and doubly linked lists. Which is more efficient on doubly linked list than on single linked list? Justify your answer.

4. What are non-linear data structures? Is Linked list a non-linear structure? Write algorithms to print the sum of the contents of all the nodes in a link list.

5. Compare the terms: Complete Binary tree and Heap tree, Height balanced tree and B-tree with examples.

6. Assuming that a circular array with N memory cells is used to store a queue and De-queue then give the formula to find the number of elements in both queue and de-queue in terms of REAR and FRONT variables.

SECTION-C

7. a) Write a routine INFIX which will accept a character string of Operators and operands representing Postfix expression and will create an equivalent fully parenthesized infix form of the original postfix. Can you implement this routine without Stack?

   b) Use the same INFIX routine to transform each of the following postfix expressions to Infix :

      i) AB – C + DEF – + $

      ii) ABCDE – +$ *EF * –

      iii) ABC + *CBA – + *

      iv) AB + C – BA + C$ –

8. Name various tree traversal algorithms. Make a binary search tree from the given data and traverse tree using all traversal algorithms:

   23 7 92 6 12 14 40 44 20 21

   Which traversal algorithm leads to sorted output data and why?

9. a) Describe in brief the Selection sort algorithm. Show the contents of the array after every pass for the given data set:

   48 7 26 44 13 23 98 57 100 5 32

   b) Write short notes on Index Sequential file organization and Hashing method.

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