CS/B.Tech/CSE/IT-NEW/SEM-3/CS-302/2013-14

GROUP – C
(**Long Answer Type Questions**)

Answer any *three* of the following.   3 × 15 = 45

7. When will interpolation search be more appropriate than binary search ? How does an interpolation search work ? Write an algorithm for interpolation search. Show with an appropriate example that worst case time complexity of interpolation search is $O(n)$. What is the average case time complexity of interpolation search ?   1 + 5 + 4 + 3 + 2

8. a) Show the operation of merge sort with an example.

   b) Write the pseudo code for Heap sort.

   c) Explain the complexity of Quick sort.

   d) Explain the advantages of binary search over sequential search.   5 + 3 + 4 + 3

9. a) Define Hashing.

   b) Explain one collision resolution scheme citing one example.

   c) What is index ? What are the various types of indexing ? State the advantages of using indexing over a sequential file.   2 + 5 + (2 + 3 + 3)

10. a) What are the differences between stack and Queue ? Write the algorithm for insertion and deletion in a circular Queue.

    b) What is the adjacency matrix representation of a graph ?   (2 + 6) + (5 + 2)

11. Write short notes on any *three* of the following :   3 × 5

    a) Recursive *vs* iterative solution of algorithms

    b) B Tree

    c) AVL Tree

    d) Linear Lists

    e) Dijkstra's Algorithm.

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2013
DATA STRUCTURE AND ALGORITHMS

Time : 3 Hours   *Full Marks : 70*

The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

GROUP – A
(**Multiple Choice Type Questions**)

Choose the correct alternatives for the following : 10 × 1 = 10

i) Which is better computing time (in analysis of algorithm) ?

   a) $O(n)$ b) $O(2n)$

   c) $O(\log 2n)$ d) None of these.

ii) Which type of linked list contains a pointer to the next as well as previous node in the sequence ?

   a) Singly Linked List   b) Circular Linked List

   c) Doubly Linked List   d) All of these.

iii) Which of the following is essential for converting an infix expression to the postfix expression efficiently ?

    a)   An operator stack

    b)   An operand stack

    c)   An operand stack and operator stack

    d)   A parse tree.

iv) A dynamic data structure where we can search for desired records in $O(\log n)$ time is

    a)   heap   b)   binary search tree

    c)   circularly linked list   d)   array.

v) For Column Major, what is the address of [3, 2] th element of a 3 × 4 Matrix (contains integer number) ? It is given that the 'Base Address is 2000'.

    a)   2010   b)   2012

    c)   2016   d)   2018.

vi) To implement DFS which data structure is generally used ?

    a)   Stack   b)   Queue

    c)   Both (a) and (b)   d)   None of these.

vii) The maximum possible height of an AVL tree with 7 nodes is

    a)   3   b)   4

    c)   5   d)   none of these.

The best sorting technique when the data is almost sorted is

    a)   Selection sort   b)   Bubble sort

    c)   Quick sort   d)   Insertion sort.

operation for adding an entry to a stack is additionally called

    a)   Add   b)   Append

    c)   Insert   d)   Push.

best data structure to evaluate an arithmetic expression in postfix form is

    a)   Queue   b)   Stack

    c)   Tree   d)   Linked List.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

comparison among Data Type, Abstract Data Type and structure.

are the differences between linear and non-linear data structures ?

Evaluate the following postfix expression :

4, 2, ^, +, *, 2, 2, ^, 9, 3, /, *, –

Write pseudo code for evaluating postfix expression.   2 + 3

What is priority queue ? How many types of priority queues are there ? Can you consider stack as a priority queue ? If yes, how ?   1 + 2 + 2

Write the Town of Hanoi Algorithm and calculate the time complexity of your algorithm.