Seat No. : _____

NH-111

December-2015

B.C.A., Sem.-III

CC-202 : Data Structures

Time : 3 Hours] **[Max. Marks : 70**

1. (A) Answer the following : **6**

   (1) Explain different types of data structures in detail.

   (2) Explain singly and doubly linked list with proper diagram.

   OR

   Answer the following :

   (1) An array A[–5: –1] [1:5] is stored in a memory with the starting address 520. If word size is 2, then attempt the following :

   (a) Find A [–4][5] in column major order.

   (b) Find A [–2][3] in row major order.

   (2) Sort the following data using insertion sort technique :

   44, 75, 23, 43, 55, 12, 64, 77, 33

   (B) Write an algorithm for following : **8**

   (1) To search an element with binary search method.

   (2) To perform insert element at last in a singly linked list.

   OR

   Write an algorithm for following :

   (1) To sort an array using selection sort.

   (2) To perform delete element at first in a doubly linked list.

2. (A) Answer the following : **6**

   (1) What is queue ? Explain deque with proper diagram.

   (2) Convert infix to prefix : ((A + B) * C – (D – E))$(F + G)

   OR

   Answer the following :

   (1) What is recursion ? Explain polish and reverse polish notations with example.

   (2) Evaluate postfix expression : 20 2 * 9 + 14 7 / – 5 3 * +

(B) Answer the following : **8**

(1) Write an algorithm for push and pop operations of a stack using singly linked list.

(2) Show the stack status after each operation in the conversion of following expression to postfix.

(A* (B – C)) / ((D – E) * (F + G – H))

OR

Write an algorithm for insert and delete an item from a simple queue.

3. (A) Answer the following : **6**

(1) Create Binary search tree from following data :

13, 3, 4, 12, 14, 10, 5, 1, 8, 2, 7, 9, 11, 6 and 18.

(2) Explain max heap with example.

OR

Answer the following :

(1) Define following terms : Full binary tree, Siblings, Forest, Non-terminal node.

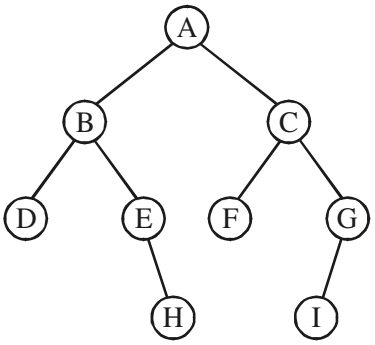
(2) Create B-tree of order 5 for following data :

Order : 1, 12, 8, 2, 25, 5, 14, 28, 17, 7, 52, 16, 48, 68, 3, 26, 29, 53, 55 and 45.

(B) Answer the following : **8**

(1) Explain AVL tree with rotations.

(2) Define binary tree. Write the in-order, pre-order, and post-order of following tree :



OR

Answer the following :

(1) Explain threaded binary tree.

(2) Construct binary tree for following :

In-order : D B E A F C

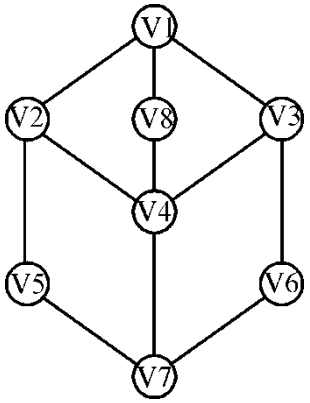
Pre-order : A B D E C F

4. (A) Answer the following : **6**

(1) Define following terms :

Isolated node, Cycle, Undirected graph

(2) Show adjacency lists and matrix representation for following graph :



OR

Answer the following :

(1) Define following terms : Path, Loop, Degree

(2) What is spanning tree ? Take a weighted graph for your choice and draw at least two spanning trees.

(B) Answer the following : **8**

(1) Explain Prim's algorithm with example.

(2) Explain DFS traversal in Graph.

OR

Answer the following :

(1) Explain BFS traversal in Graph.

(2) Explain Kruskal's algorithm with example.

5. Do as directed : **14**

(1) In prefix notations, the operator comes after the operands. (T/F)

(2) Sparse matrix is a two dimensional array where the most of elements have the value null. (T/F)

(3) When using linear search to search an array, the array must always be sorted order. (T/F)

(4) A graph is connected if every vertex has a path to every other vertex. (T/F)

(5) A linked list where the last node points the header node is called _____.

(6) The node at the top of a tree is called its _____.

(7) Show linked list representation of following polynomial equation.

$10\ x^3y^3 + 8\ x^2y^3 + 6\ x^3y^2 + 4\ xy + 2.$

(8) Which of the following is an application of stack ?

(a) Finding factorial (b) Infix to postfix

(c) Tower of Hanoi (d) All of the above

(9) Give difference between pop operation and peep operation of stack.

(10) The value of REAR is increased by 1 when _____.

(a) An element is deleted in a queue

(b) An element is traversed in a queue

(c) An element is added in a queue

(d) An element is merged in a queue

(11) Merge sort uses _____.

(a) Divide-and-conquer (b) Backtracking

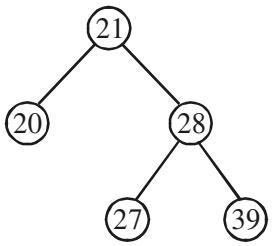
(c) Heuristic approach (d) Greedy approach

(12) Quick sort is also known as _____.

(a) Merge sort (b) Heap sort

(c) Bubble sort (d) None of these

(13) State whether the following binary tree is binary search tree or not.



(14) In Binary trees nodes with no successor are called _____.

(a) End nodes (b) Terminal nodes

(c) Final nodes (d) Last nodes

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