Total No. of printed pages = 4

CS 131602 (OR)

2F/7/22

Roll No. of candidate

2022

B.Tech. 6th Semester End-Term Examination

ECE

DATA STRUCTURE

(Old Regulation)

Full Marks – 100   Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer Question No. 1 and any *six* from the rest.

1. Choose the correct answer : $(10 \times 1 = 10)$

    (i) Pick out the non-linear data structure

      (a) Array   (b) Tree

      (c) Stacks   (d) String

    (ii) Process of removing an element from an empty stack is

      (a) Removing   (b) Underflow

      (c) Deleting   (d) Overflow

    (iii) Which of these is a postfix expression?

      (a) $a+b-c$ (b) $+ab$

      (c) $abc*+de-+$ (d) $a*b(c+d)$

    (iv) Asymptotic time complexity to find an element in the linked list is

      (a) $O(N+1)$ (b) $O(n^2)$

      (c) $O(n)$ (d) $O(1)$

    (v) Minimum number of fields in each node of a doubly linked list is _____.

      (a) 2   (b) 3

      (c) 1   (d) None of the above

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(vi) A graph in which all vertices have equal degree is known as —————.

    (a) Complete graph   (b) Regular graph

    (c) Multi graph   (d) Simple graph

(vii) In —————, search start at the beginning of the list and check every element in the list.

    (a) Linear search   (b) Binary search

    (c) Interpolation search   (d) All of the above

(viii) To represent hierarchical relationship between elements, which data structure is suitable?

    (a) Queue   (b) Stack

    (c) Tree   (d) Graph

(ix) ————— the condition indicates the queue is empty.

    (a) Front = Null   (b) Null = Front

    (c) Front = Rear   (d) Rear = Null

(x) A binary search tree whose left sub-tree and right sub-tree differ in height by at most 1 unit is called —————.

    (a) AVL tree   (b) B Tree

    (c) Threaded binary tree   (d) B+ Tree

2. (a) What are primitive and non primitive data structures? Explain with examples. (5)

   (b) What is abstract data type? What is the advantage of abstract data type? (5)

   (c) What is sparse matrix? Explain the types of sparse matrix with examples. (5)

3. (a) Compare array and linked list. (3)

   (b) Define circular linked and doubly circular linked list. (4)

   (c) Write algorithm/functions to insert and delete a node from the end of singly linked list. (8)

4. (a) Define the terms OVERFLOW and UNDERFLOW in stack represented using array. (2)

   (b) What is recursion? Explain the types of recursion with example. (6)

   (c) Write algorithm/functions to implement PUSH and POP operation in stack. (7)

5. (a) State the advantages of circular queue over linear queue. (3)

   (b) With necessary examples, explain different operations performed in a queue if represented using : (8)

      (i) Array

      (ii) Linked list.

   (c) Define Priority Queue and Deque. (4)

6. (a) Define the following : (4)

      (i) Forest

      (ii) Complete binary tree

      (iii) Degree of a node

      (iv) Height of a tree.

   (b) Find the Pre order, In order and Post order traversals of the following tree : (6)
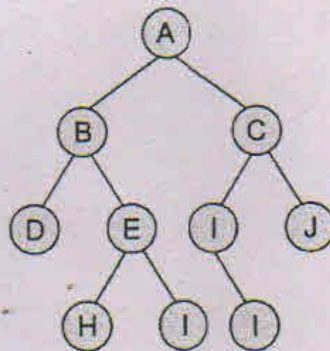
   (c) Construct an expression tree for the following expression : (5)

   $\{(a/b)+(c*d)\} \wedge \{(f\%g)/h-i\}$.

7. (a) Construct a Binary Search Tree (BST) for the following sequence of numbers : (4 + 2)

   50, 70, 60, 20, 90, 10, 65, 40, 30, 100

   Also delete the nodes 40 and 70 form the above constructed tree.

   (b) What is threaded binary tree? What are the advantages of threaded binary tree? (4)

   (c) Construct an AVL tree by inserting the following elements in the given order. (5)

   63, 9, 19, 27, 18, 108, 99, 81

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8. (a) Define the following terms : (5)

      (i) Isolated vertex

      (ii) Pendant vertex

      (iii) Sink

      (iv) Source

      (v) Connected graph.

    (b) Give the adjacency Matrix representation for the following matrix. (5)
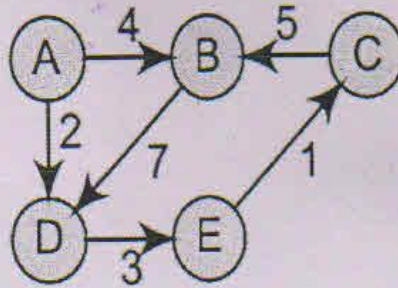
    (c) State the differences between BFS and DFS algorithm. (5)

9. (a) Write the algorithm for Binary search. (5)

    (b) Show step by step, how the following element will be sorted in (10)

      (i) Ascending order using Radix sort

      (ii) Descending order using Insertion sort.

        39 9 45 63 18 81 108 54 72 36