Total No. of printed pages = 4

CSE 181304

3CS

Roll No. of candidate

2021

B.Tech. 3rd Semester End-Term Examination

DATA STRUCTURE AND ALGORITHMS

(New Regulation (w.e.f. 2017-18))

(New Syllabus (w.e.f. 2018-19))

Full Marks – 70   Time – Three hours

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

Answer question No. 1 and any *four* from the rest.

1.   Answer the following questions :   (10 × 1 = 10)

   (i)   Elements in an array are accessed

       (a)   Randomly

       (b)   Sequentially

       (c)   Exponentially

       (d)   Logarithmically

   (ii)   While evaluating a prefix expression, the string is read from?

       (a)   Left to right

       (b)   Right to left

       (c)   Center to right

       (d)   Center to left to right

   (iii)   When an operand is read during Postfix conversion, which of the following is done?

       (a)   It is placed on to the output

       (b)   It is placed in operator stack

       (c)   It is ignored

       (d)   Operator stack is emptied

(iv) What is the time complexity of an infix to postfix conversion algorithm?

  (a) O (N log N)

  (b) O (N)

  (c) O (N²)

  (d) O (M log N)

(v) How many children does a binary tree have?

  (a) 2

  (b) Any number of children

  (c) 0 or 1 or 2

  (d) 0 or 1

(vi) B-tree of order n is a order-n multiway tree in which each non-root node contains

  (a) At most $(n-1)/2$ keys

  (b) Exact $(n-1)/2$ keys

  (c) At least $2n$ keys

  (d) At least $(n-1)/2$ keys

(vii) Which of the following is false?

  (a) A B+ -tree grows downwards

  (b) A B+ -tree is balanced

  (c) In a B+ -tree, the sibling pointers allow sequential searching

  (d) B+ -tree is shallower than B-tree

(viii) Hashing is the problem of finding an appropriate mapping of keys into addresses.

  (a) True

  (b) False

(ix) Descending priority queue can be implemented using

  (a) Max heap

  (b) Min heap

  (c) Min-max heap

  (d) Trie

(x) The postfix form of the expression $(A+B)*(C*D-E)*F/G$ is?

  (a) AB + CD * E − FG / * *

  (b) AB + CD * E − F * * G/

  (c) AB + CD * E − * F * G /

  (d) AB + CDE * − * F * G /

2. (a) Define the term Data Structure. Explain the categorization of Data Structures in detail with example. (1+3=4)

    (b) Write down the algorithm for infix to postfix conversion. Convert the following expression into equivalent postfix expression: (3+5=8)

    9 * 6 – (4/2+ (10% 5 * 2 + (8 % 3)) / 7) * 4)

    (c) Explain Threaded Binary Tree with proper diagram. (3)

3. (a) Explain algorithm complexity. Explain different asymptotic notations. (5)

    (b) Write a program to perform the insert and delete operation in a circular queue. (5)

    (c) Construct a BST from the following: (5)

    23, 18, 34, 56, 97, 58, 43, 66, 54, 32, 19, 49, 88, 76, 98

4. (a) Describe the different methods of Graph representations with suitable examples. (5)

    (b) Explain the algorithm to perform the following operations in a doubly linked list: (10)

   (i) Insert element at the beginning.

    (ii) Delete element after a specific element.

5. (a) Explain Binary Searching technique with proper example. Analyse the time complexity for different best, worst and average case. (5)

    (b) Consider the following key values and construct a B Tree of order 3: (10)

    7 2 10 8 11 9 22 13 19 20 32 6 40 3

6. (a) Traverse the following tree using pre-order, in-order and post-order traversal method: (5)
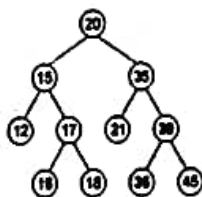
    (b) Sort the following sequence in descending order using Heap sort: (10)

    43 32 10 3 56 78 55 48 23 64 5 38 84 22 15

7. (a) Define collision in Hashing. Explain different collision resolution techniques. (5)

(b) Explain BFS algorithm with proper example. (5)

(c) Define AVL tree. Construct an AVL tree from the following values (perform rotation if required): (5)

50 41 68 32 44 41

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