Total No. of printed pages = 3

CSE 181304

Roll No. of candidate | | | | | | | | | |

2021

B.Tech. 3rd Semester End-Term Examination

Computer Science and Engineering

DATA STRUCTURE AND ALGORITHMS

(New Regulation and New Syllabus)

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 : (Choose the correct option) (10 × 1 = 10)

   (i) What is the need for a circular queue?

   (a) implement LIFO principle in queues

   (b) easier computations

   (c) to delete elements based on priority

   (d) effective usage of memory

   (ii) Linked list is considered as an example of ———— type of memory allocation.

   (a) Dynamic (b) Static

   (c) Compile time (d) Heap

   (iii) What is the best case time complexity of deleting a node in a Singly Linked list?

   (a) O(n) (b) O (n^2)

   (c) O (nlogn) (d) O(1)

   (iv) Which type of traversal of binary search tree outputs the value in sorted order?

   (a) Pre-order (b) In-order

   (c) Post-order (d) None

[Turn over

(v) What data structure is used when converting an infix notation to prefix notation?

(a) Stack (b) Queue

(c) B-Trees (d) Linked-list

(vi) What is a full binary tree?

(a) Each node has exactly zero or two children

(b) Each node has exactly two children

(c) All the leaves are at the same level

(d) Each node has exactly one or two children

(vii) An algorithm is showing growth of 3n^2+4n+5, what is the running time of the algorithm?

(a) O(3n) (b) O(n^3)

(c) O(n^2) (d) O(3)

(viii) How do you initialize an array in C?

(a) int arr[3] = (1,2,3); (b) int arr(3)={1,2,3};

(c) int arr[3]= {1,2,3}; (d) int arr(3)=(1,2,3);

(ix) _____ refers to situation where one wants to delete data from a data structure that is empty.

(a) Free storage (b) Underflow

(c) Overflow (d) Compaction

(x) In _____, the problem of sorting a set is reduced to the problem of sorting two smaller sets.

(a) QuickSort (b) Heapsort

(c) Bubble sort (d) Merge sort

2. (a) Define the asymptotic notations Big-oh(O), Big-omega (Ω), Theta(θ). Explain them with suitable examples. (9)

(b) Write an algorithm/function for a descending order linked list. (6)

3. (a) What is recursion? Compare the recursive and iterative approach. (7)

(b) Apply the stack based algorithm to convert the infix to postfix A+(B *C-(D* E-F)/G)/H (8)

4. (a) Write the Depth First Search algorithm. (7)

(b) Apply the heap sort algorithm to sort the sequence. (8)

44, 33, 11, 55, 77, 90, 40, 60, 99, 22, 88

5. (a) What is AVL tree? Explain one rotation which is applied in AVL tree? (5)

(b) Write the following function/algorithms (10)

(i) Add an element at the end of a linked list

(ii) Add an element before a user-defined position

6. (a) What is a queue? What are the drawbacks of a queue? How are the drawbacks overcome? Explain the scenario with examples and proper justification. (10)

(b) Prove or disprove: f(n) = 90n^2+18n+6=O(n^2) (5)

7. (a) Consider the following 4-digit employee numbers (8)

9614, 5882, 6713, 4409

Find the 2— digit hash address of each number using

(i) The division method, with m=97

(ii) The folding method without reversing

(b) Sort the following values using Quicksort: (7)

75 70 60 80 85 95 55 50 45