VIT
Vellore Institute of Technology

School of Computer Science and Engineering

Fall Semester 2022-2023 Continuous Assessment Test – I

Programme Name & Branch : BCB, BCE, BCI, BCT, BDS, BKT **SLOT: F1+TF1**

Course Name & code: Data Structures and Algorithms - BCSE202L

Exam Duration: 90 Min. **Maximum Marks: 50**

Answer all the questions

1. Answer the following: [3+3+4]

(i) What do you mean by a good algorithm?

(ii) Why it is necessary to analyze algorithm rather than the program?

(iii) Discuss the role of asymptotic notations with an example.

2.(i) Design the pseudocode having time complexity not more than $O(Log_2N)$ for searching an ITEM in a given array. Verify that it meets the criteria for the said time complexity. [5]

(ii) Write down the algorithm for selection sort and analyze the same for time complexity. [5]

3. Write the steps or algorithm to convert infix expression into postfix expression. Using stack, convert (A – B) / ((D + E) * F) – G into postfix notation. Show the conversion process in Table 1.

Input Character/Token	Operation (PUSH/POP)	Contents of Stack	Result/Output

Table 1

4. Assume that the operation ENQUEUE (CQ, x) inserts an item x into a circular queue CQ and another operation DEQUEUE (CQ) deletes an item from CQ in FIFO manner. Draw the circular queue of size 6. Illustrate the working for the following eight commands (in the given order) over that circular queue (illustrate with diagram for execution of every command), also give the values of the variables FRONT and REAR on execution of each command;

(i) ENQUEUE (CQ, 10); (ii) ENQUEUE (CQ, 20); (iii) ENQUEUE (CQ, 30); (iv) DEQUEUE (CQ);

(v) ENQUEUE (CQ, 40); (vi) ENQUEUE (CQ, 50); (vii) ENQUEUE (CQ, 60); (viii) DEQUEUE (CQ);

Answers are expected as per the format given in Table 2;

Command	Circular queue	Front	Rear

Table 2

5. Explain in detail about the Quick Sort algorithm followed by suitable example and running time description.