VEER SURENDRA SAI UNIVERSITY OF TECHNOLOGY (VSSUT), ODISHA

Odd Mid Semester Examination for Academic Session 2024-25

COURSE NAME: B.Tech SEMESTER: 3rd

BRANCH NAME: CSE/IT

SUBJECT NAME: Data Structures

FULL MARKS: **30** TIME: **90 Minutes**

Answer **All** Questions.

The figures in the right-hand margin indicate Marks. *Symbols carry usual meaning.*

Q1. Answer all Questions. [2 × 3]

a) Find the upper bound for $f(n)=n^2+1$ - CO1

b) Consider the following sequence of operations on an empty stack: - CO2
push(54); push(52); pop(); push(55); push(62); S = pop();
Similarly consider the following sequence of operations on an empty queue:
enqueue(21); enqueue(24); dequeue(); enqueue(28); enqueue(32); Q= dequeue();
What will be the value of S + Q?

c) The height of a binary tree is the maximum number of edges in any root to leaf path. - CO3
What is the maximum number of nodes possible in a binary tree of height h?

Q2. [8]

a) What is Data Structure? Name various data structures. Explain them briefly. [4]-CO1

b) Each element of an array Data[20][50] requires 4 bytes of storage. Base address of Data is 2000. Determine the location of Data[10][10] when the array is stored as
i) Row- major
ii) Column- major

OR

a) Define the complexity of an algorithm. Explain different asymptotic notations with proper graph. [4]-CO1

b) Find the time complexity for the following code snippets: [4]

i)

```
int a = 0, b = 0;
for (i = 0; i < N; i++) {
   a = a + rand();
}
for (j = 0; j < M; j++) {
   b = b + rand();
}
```

ii)

```
int a = 0;
for (i = 0; i < N; i++) {
   for (j = N; j > i; j--) {
      a = a + i + j;
   }
}
```

P.T.O.

Q3. [8]

a) Convert the following infix expression to a postfix expression using stack. [4] - CO2
(12/ (6 - 3)) + (2 * (1+ 5))

b) Write the Pseudocode for inserting into a circular queue. [4]

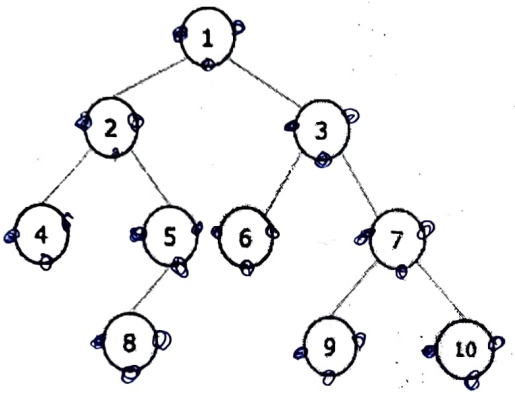
OR

a) Evaluate the given postfix expression using stack, show all the steps: [4] - CO2
5 9 8 + 4 6 * + 7 - *

b) Write the Pseudocode to delete an element at the given node in doubly linked list. [4]

Q4. [8] - CO3

a)



Find the following traversal sequences for the above mentioned binary tree:

i. Pre-order
ii. In-order
iii. Post- order

OR

a) Construct the binary tree for the following: - CO3
In-order: Q B K C F A G P E D H R
Pre-order: G B Q A C K F P D E R H