Indian Institute of Science Education and Research Thiruvananthapuram
Data Structures (DSC 314)
Quiz 2 (February 14, 2025)

Time: 30 min Max. marks: 20

Answer all questions. Each question carries 2 marks.

1 Consider the following sequence of operations on an empty stack.

push(54); push(52); pop(); push(55); push(62); s=pop();

Consider the following sequence of operations on an empty queue.

enqueue(21); enqueue(24); dequeue(); enqueue(28); enqueue(32); q=dequeue();

What is the value of $s + q$.....

Answer: $s + q = 62 + 24 = 86$

2 A doubly linked list is declared as:

```
struct Node {
int Value;
struct Node *Fwd;
struct Node *Bwd;
};
```

where Fwd and Bwd represent forward and backward link to the adjacent elements of the list. Write the segment of code that deletes the node pointed to X from the doubly linked list, if it is assumed that X points to neither the first nor the last node of the list?

Answer: $temp = X \rightarrow Bwd \rightarrow Bwd$;
$temp \rightarrow Fwd = X$; $X \rightarrow Bwd = temp$

3 A circular queue has been implemented using a single linked list where each node consists of a value and a single pointer pointing to the next node. We maintain exactly two external pointers FRONT and REAR pointing to the front node and the rear node of the queue, respectively. Which of the following statements is/are CORRECT for such a circular queue, so that insertion and deletion operation can be performed in $\mathcal{O}(1)$ time?

i Next pointer of front node points to the rear node.

ii Next pointer of rear node points to the front node.

Answer: ii Next pointer of rear node points to the front node.

4 The result evaluating the postfix expression 10 5 + 60 6 / * 8 − is:

Answer: 142

5 What does the following function do for a given Linked List with first node as head?

```
void fun1(struct node* head)
{
      if(head == NULL)
            return;
      fun1(head→next);
      printf("%d ", head→data);
}
```

a) Prints all nodes of linked lists

b) Prints all nodes of linked list in reverse order

c) Prints alternate nodes of Linked List

d) Prints alternate nodes in reverse order

Answer: b)Prints all nodes of linked list in reverse order

6 The time required to search an element in a linked list of length n is

a) $\mathcal{O}(logn)$ b) $\mathcal{O}(n)$ c) $\mathcal{O}(1)$ d) $\mathcal{O}(n^2)$

Answer: $\mathcal{O}(n)$

7 Which one of the following is an application of Queue Data Structure?

a) When a resource is shared among multiple consumers.

b) When data is transferred asynchronously (data not necessarily received at same rate as sent) between two processes

c) Load Balancing

d) All of the above

Answer: d) All of the above

8 Suppose a circular queue of capacity (n – 1) elements is implemented with an array of n elements. Assume that the insertion and deletion operation are carried out using REAR and FRONT as array index variables, respectively. Initially, REAR = FRONT = 0. The conditions to detect queue full and queue empty are

a) Full: (REAR+1) mod n == FRONT, empty: REAR == FRONT

b) Full: (REAR+1) mod n == FRONT, empty: (FRONT+1) mod n == REAR

c) Full: REAR == FRONT, empty: (REAR+1) mod n == FRONT

d) Full: (FRONT+1) mod n == REAR, empty: REAR == FRONT

Answer: a) Full: (REAR+1) mod n == FRONT, empty: REAR == FRONT

9 The seven elements A, B, C, D, E, F and G are pushed onto a stack in reverse order, i.e., starting from G. The stack is popped five times and each element is inserted into a queue.Two elements are deleted from the queue and pushed back onto the stack. Now, one element is popped from the stack. The popped item is .....

i A

ii B

iii F

iv G

Answer: B

10 Convert the following infix expression into its equivalent post fix expression $(A+B\hat{}D)/(E-F)+G$

Answer: $ABD\hat{}+EF-/G+$