**UNIT –III -CLO-1**

**Part-A**

**Multiple Choice Questions**

**PART-A(1 MARK)**

1.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 /

**Ans**: A AB+ CD\*E − FG /\*\*

2.What is the postfix form of the following prefix expression -A/B\*C$DE

(A) ABCDE$\*/- (B) A-BCDE$\*/-(C) ABC$ED\*/- (D) A-BCDE$\*/

**Ans**:A ABCDE$\*/-

3.The data structure required to evaluate a postfix expression is

(A) queue(B) stack(C) array (D) linked-list

**Ans**:Bstack

4. The data structure required to check whether an expression contains balanced parenthesis is

(A) Stack (B) Queue(C) Tree (D) Array

**Ans:**AStack

5.What data structure would you mostly likely see in a nonrecursive implementation of a

recursive algorithm?

(A) Stack (B) Linked list(C) Queue (D) Trees

**Ans**:AStack

6.The postfix form of A\*B+C/D is

(A) \*AB/CD+ (B) AB\*CD/+(C) A\*BC+/D (D) ABCD+/\*

**Ans**:B\*AB/CD+

7.What is the postfix form of the following prefix \*+ab–cd

(A) ab+cd–\*(B) abc+\*–(C) ab+\*cd–(D) ab+\*cd–

**Ans**:Aab+cd–\*

8.Which data structure is needed to convert infix notation to postfix notation?

(A) Branch (B) Queue(C) Tree (D) Stack

**Ans.** (D) Stack

9.What is the result of the following operation - Top (Push (S, X))

(A) X (B) null(C) S (D) None of these.

**Ans. (**A) X

10.Which data structure is used for implementing recursion?

(A) Queue. (B) Stack.(C) Arrays. (D) List.

**Ans.** (B) Queue.

11. ........form of access is used to add/ remove nodes from a stack.  
A. LIFOB. FIFOC. Both A and BD. None of these

**Ans:** A. LIFO 

12. In the linked representation of the stack ......... behaves as the top pointer variable of stack.  
A. Stop pointer

B. Begin pointer  
C. Start pointer  
D. Avail pointer  
**Ans:** C. Start pointer 

13. What happens when you push a new node onto a stack?  
A. The new node is placed at the front of the linked list  
B. The new node is placed at the back of the linked list  
C. The new node is placed at the middle of the linked list  
D. No Changes happens  
**Ans:** A. The new node is placed at the front of the linked list 

14. The retrieval of items in a stack is ...........operation.  
A. pushB. popC. retrievalD. access  
**Ans:** B. pop 

15. The term push and pop is related to  
A. Array B. ListsC. StacksD. Trees  
**Ans**:C. Stacks 

16. Which is the pointer associated with the stack?  
A. FIRSTB. FRONTC. TOP D. REAR  
**Ans**: C. TOP 

17. The elements are removed from a stack in .......... order.  
A. ReverseB. Hierarchical C. AlternativeD. Sequential  
**Ans:** A. Reverse 

18. The insertion operation in the stack is called .........  
A. insertB. pushC. pop D. top  
**Ans:** B. push 

19. Stack follows the strategy of ........  
A. LIFOB. FIFOC. LRUD. RANDOM   
**Ans**: A. LIFO

20. Which of the following is an application of stack?  
A. finding factorial B. tower of Hanoi C. infix to postfix D. all of the above  
**Ans**: D. all of the above

21. Before inserting into stack one must check the condition .........  
A. Overflow B. Underflow C. Maximum elements D. Existing elements  
**Ans:-**A. Overflow

#### 22. Before deletion condition into stack ...... has to be checked. A. Overflow B. Underflow C. Maximum elements D. Existing elements Ans:-B. Underflow

23. A linear list of elements in which deletion can be done from one end (front) and insertion can take place only at the other end (rear) is known as a ?  
a) Queue  b) Stack c) Tree d) Linked list

**Ans: a)** Queue

24.. ......... form of access is used to add and remove nodes from a queue.  
A. LIFO, Last In First OutB. FIFO, First In First OutC. Both a and bD. None of these

**Ans:** B. FIFO, First In First Out

25. New nodes are added to the ......... of the queue.  
A. Front B. BackC. MiddleD. Both A and B

**Ans:** B. Back  
29.Deletion operation is done using ......... in a queue.  
A. frontB. rear C. top D. list

#### Ans: A. front

#### PART\_B(4 Marks)

**1. Define a stack (pg.no: 219)**  
Stack is an ordered collection of elements in which insertions and deletions are  
restricted to one end. The end from which elements are added and/or removed is referred  
to as top of the stack. Stacks are also referred as piles, push-down lists and last-in-first-  
out (LIFO) lists.  
  
**2. List out the basic operations that can be performed on a stack (pg.no: 221)**  
The basic operations that can be performed on a stack are  
• Push operation  
• Pop operation  
• Peek operation  
• Empty check  
• Fully occupied check

**3. What is top of stack?(pg.no: 220)**

The end of stack, at which the items are added or deleted, is called top of stack.

**4.Write down any four applications of queues. (pg.no: 275)**

Application of Queue

(i) Queue is used in time sharing system in which programs with the samepriority form a queue while waiting to be executed.

(ii) Queue is used for performing level order traversal of a binary tree and forperforming breadth first search at a graph.

(ii) Used in simulation related problem.

(iii) When jobs are submitted to a networked printer, they are arranged in order ofarrival, ie. Jobs are placed in a queue.

**5. Why stack is called LIFO ?(pg.no: 219)**

The last element inserted into the stack is the first element to be deleted. For this reason,

stack is called Last-In First-Out list.

**6. What is empty stack?(pg.no: 221)**

The stack which contains no items in it is called Empty stack.

**7.What causes underflow of stack? How it could be avoided?(pg.no: 221)**

If an illegal attempt is made to pop or access an item from empty stack, it causes stack

underflow.To avoid underflow, before any pop(S) or stacktop(S), check whether empty(S) is true orfalse.

**8. What are the limitations in the stack, when array used as home of stack?(pg.no: 224)**

The Array is finite collection of elements and in stack the number of elements is

unlimited. As the stack dynamically changes the attempts to insert more elements than the array

size cause overflow

**9.What are the error conditions that could occur in stack implementation? How could they be rectified?(pg.no: 221)**

i) Overflow

ii) Underflow

To avoid overflow, the stack should be checked whether it is full or not before every push

operation.

To avoid underflow, the stack should be checked for emptiness before every popoperation.

**10. State the different ways of representing expressions.(pg.no: 232)**  
The different ways of representing expressions are  
• Infix Notation  
• Prefix Notation  
• Postfix Notation

**11.Why infix expression should be converted to Prefix / Postfix?(pg.no: 232)**

In Infix, operator precedence can be set only after scanning the expression for several

times. But, conversion of Infix to Postfix or Prefix with use of stack, help to set precedence

based on order of arrangement in a single scanning

#### 12. State the advantages of using infix notations. (pg.no: 236) • It is the mathematical way of representing the expression • It is easier to see visually which operation is done from first to last 13. State the advantages of using postfix notations. (pg.no: 236) • Need not worry about the rules of precedence • Need not worry about the rules for right to left associativity • Need not need parenthesis to override the above rules 14. State the rules to be followed during infix to prefix conversions . (pg.no.233) • Fully parenthesize the expression starting from left to right. During parenthesizing, the operators having higher precedence are first parenthesized • Move the operators one by one to their left, such that each operator replaces their corresponding left parenthesis • The part of the expression, which has been converted into prefix is to be treated as single operand • Once the expression is converted into prefix form, remove all parenthesis

#### 15. State the difference between stacks and linked lists The difference between stacks and linked lists is that insertions and deletions may occur anywhere in a linked list, but only at the top of the stack

**16. List the applications of stacks. (pg.no.230)**  
• Towers of Hanoi  
• Reversing a string  
• Balanced parenthesis  
• Recursion using stack  
• Evaluation of arithmetic expressions  
  
**17. List the applications of queues (pg.no.275)**  
• Jobs submitted to printer  
• Real life line  
• Calls to large companies  
• Access to limited resources in Universities  
• Accessing files from file server  
  
**18.What is the data structures used to perform recursion?(pg.no.243)**

Stack. Because of its LIFO (Last In First Out) property it remembers its 'caller' so

knows whom to return when the function has to return. Recursion makes use of system

stack for storing the return addresses of the function calls.Every recursive function has its equivalent iterative (non-recursive) function. Even whensuch equivalent iterative procedures are written, explicit stack is to be used.

#### 19. state the disadvantages of linked list implementation of stack.(pg.no.251)

#### 1. Calls to malloc and free functions are expensive.

#### 2. Using pointers is expensive.

**20.Define Queue.(pg.no.253)**

Queue is also an abstract data type or a linear data structure, in which the first element isinserted from one end called REAR(also called tail), and the deletion of exisiting element takes place from the other end called as FRONT(also called head). This makes queue as FIFO data structure, which means that element inserted first will also be removed first.The process to add an element into queue is called Enqueue and the process of removal

of an element from queue is called Dequeue.

#### PART-C(12 MARKS)

**PART-C**

1.What is a Stack? Explain with example?**(pg.no.219)**

2. Write the algorithm for converting infix expression to postfix expression?**(pg.no.233)**

3. Explain the applications of stack?**(pg.no.230)**

4.Define recursion. Explain with it Fibonacci series**(pg.no.243)**

5.Explain the various operations performed on a stack.**(pg.no.221)**

6. Convert the following infix expressions into its equivalent postfix expressions;

(i) A B D/E −FG

(ii) A\*BD/ E −F\*G H K

7.Execute your algorithm to convert an infix expression to a post fix expression

with the following infix expression on your input

mn\*k p/g / ba b / c

8.Define a stack. Describe ways to implement stack**(pg.no.219)**

9.Write an algorithm to evaluate an expression given in postfix notation. Show the

execution of your algorithm for the following expression.

AB^CD-EF/GH+/+\*

10.Write the algorithm for evaluation of postfix expression. Explain Recursion with examples.**(pg.no.236)**

12.Implement a stack using linked list. Show both the PUSH and POP operations**(pg.no.224)**

13. Implement a Queue using a singly linked list L. The operations INSERT and DELETE should still take O (1) time.**(pg.no.256)**

14.Assume that a queue is available for pushing and popping elements. Given an input sequence

a,b, c, (c be the first element), give the output sequence of elements if the rightmost element

given above is the first to be popped from the queue.

15.Devise a representation for a list where insertions and deletions can be made at either end.

Such a structure is called Deque (Double ended queue). Write functions for inserting and

deleting at either end.

16.Write a routine to implement queues using linked list.**(pg.no.256)**

17.Write a routine to implement queues using Array.**(pg.no.254)**

18.What are circular queues? Write down routines for inserting and deleting elements from a circular queue implemented using arrays. **(pg.no.260)**

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