

Assignment 4

Ques-1- Define stack and its application?

Ans-4- A stack is a linear data structure, collection of items of the same type, stack follows the last in first out (LIFO) where in the last element entered is first one to be popped out.

Application of Stack are:-

- 1) Balancing the Symbols.
- 2) Forward and backward features in web browsers.
- 3) Infix to postfix conversion.
- 4) Redo-undo features at many places like editors, photoshops.
- 5) In graph algorithm like topological sorting and strongly connected components.

Ques-2- Discuss polish and reverse polish notation with suitable example?

Ans-2- Polish Notation - is a notation form for expressing arithmetic, logic and algebraic equations. Prefix notation is also known as polish notation.

For example $+ab$. This is equivalent to its infix notation $a+b$

- Reverse polish Notation - polish prefix notation or simply postfix notation is a mathematical notation in which operators follow their operands.

| Expression | Stack | Action |
|------------|------------|--------------|
| 7 | 7, | push 7 |
| 8 | 7, 8 | push 8 |
| 3 | 7, 8, 3 | push 3 |
| 2 | 7, 8, 3, 2 | push 2 |
| ^ | 7, 8, 9 | pop 2 items. |
| * | 7, 72 | pop 2 items. |
| 4 | 7, 72, 4 | push 4 |
| + | 7, 76 | pop 2 items. |
| + | 83 | pop 2 items. |

Ques-3- Write step by step procedure to convert given infix notation to it's corresponding postfix notation?

Ans-3-

$$((A+B) * C) \wedge (D-E)$$

Step 1: First push both starting brackets in stack.

Step 2: Now push A to Output & + to Stack.

Step 3: Now push B to Output & closing braces will pop from Stack & push into output.

Step 4: Now push * into Stack & C into output & closing braces will pop from Stack & pushed to output.

Step 5: \wedge is a exponential with higher precedence pushed into Stack.

Step 6: opening braces into stack & D pushed in output.

Step 7: Operator get pushed to Stack & to output & closing braces will pop from Stack & pushed to output.

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Step 8: T will go pop from stack & pushed to output to empty the stack.

Ques-4. Let $A=3$, $B=2$, $C=3$, $D=2$, $E=1$, use given values to evaluate compare obtained postfix expression with given infix expression in q 3.

Ans-4- Given infix notation is

$$((A+B) * C) \uparrow (D-E)$$

$$\Rightarrow ((3+2) * 3) \uparrow (2-1)$$

$$\Rightarrow (5 * 3) \uparrow 1$$

$$\Rightarrow 15$$

Computed postfix notation is $AB + C * DE - \uparrow$

$$\Rightarrow 3 \cdot 2 + 3 * 2 \cdot 1 - \uparrow$$

$$\Rightarrow (6 + 6 - 0)$$

$$\Rightarrow 12$$

Comparison is both the notation when computed gives the different answers.

Ques-5. Discuss overflow & underflow condition for array based linear queue & circular queue?

Ans-5. (A) Array Based Linear queue:-
Whenever the array rear get its equal to maxsize of the array $N-1$.

① Overflow condition

```
if (rear == maxsize - 1) {
```

② Underflow condition

whenever the array front gets equal to -1, or front became greater than rear)

```
if (front == -1 || front > rear) {
```

③ Array based circular queue:-

① Overflow condition

~~if (front == 0, & rear~~

```
if (front == 0 & rear == maxsize - 1) {
```

```
else if (front == rear + 1) {
```

② Underflow condition

```
if (front == -1) {
```