Assignment -1

Q1.
Ans
stack is a linear data structure that collects items and arrange in stack in the LIFO (Last in First out) and FILO (First in last out) system. It Performs following operations : ✓ Push, Pop, Peek, display.

Infix to Postfix ~~and~~ expression

- create a empty stack and a variable top.
- intialize top with -1 because the stack starts with 0 to (n-1). Top also carry the initial Position of stack element.
- expression should be read from left to right.
- Operand in the expression would be directly printed to the output string.
- closing Bracket push it into stack.
- If the current character is opening bracket then compare its Precedence
  Precedence of operator are
          ^ Power (highest)
      * / $\div$
      + -
- If the current character is an closing bracket pop operator from stack

and append them to output
string.

For example :-
$$(A + B * C)$$

- For opening bracket we don't have any operation.
- 'A' would we directly printed to the output.
- '+' would be pushed into the stack

+			

- 'B' would be directly printed to the output

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OUTPUT
AB
```

- '*' would be pushed into stack.

+	*		

- Now inbetween '+' and '*' we will check the precision and higher precision will would be printed in the output
- 'c' would be ~~pushed~~ directly printed to the output

```
OUTPUT
ABC*+
```

- Now we have closing bracket so before closing bracket we need to empty the stack and pop the elements out.

Q2. **(a)** $(A + B) / (C - D * E)$

expression	stack	output
(	-	-
A	.	A
+	+	A
B	+	AB
)	+	AB+
/	/	AB+
(	/	AB+
C	/	AB+C
-	/-	AB+C
D	/-	AB+CD
*	/-*	AB+CD
E	/-*	AB+CDE

$$\boxed{Ans = AB+CDE*-/}$$

(b) $A * C / D - E * F$

expression	stack	output
A	-	A
*	*	A
C	*	AC
/	*/	AC*
D	/	AC*D
-	/-	AC*D/
E	/-	AC*D/E
*	/-*	AC*D/E
F	/-*	AC*D/EF

$$\boxed{y = AC*D/EF*-}$$

(c) $A \wedge B \wedge C - D / E$

expression	stack	output
A		A
^	^	A
B	^	AB
^	^ ^	AB
C	^ ^	ABC
-	^ ^ -	ABC ^ ^
DD	^ -	ABC ^ ^ D
/	- /	ABC ^ ^ D
E	- /	ABC ^ ^ DE

$$y = ABC \wedge\wedge DE / -$$

(d) $A / B + C / D * E$

expression	stack	output
A		A
/	/	A
B	/	AB
+	/ +	AB
C	+	AB / C
/	+ /	AB / C
D	+ /	AB / CD /
*	+ *	AB / CD /
E	+ *	AB / CD / E * +

$$y = AB / CD / E * +$$

Q3. (a)   546 + * 493 / + *

6 ⎤
4 ⎦   6 + 4 = 10

5

⇓

10 ⎤
5 ⎦   10 × 5 = 50

      b / a

3 ⎤
9 ⎦   9 / 3 = 3

4

50

⇓

3 ⎤
4 ⎦   4 + 3 = 7

50

⇓

7 ⎤
50 ⎦   50 × 7 = 350

| Ano = 350 |

(b)   562 + * 93 / −

2 ⎤
6 ⎦   6 + 2 = 8

5

⇓

8 ⎤
5 ⎦   8 × 5 = 40

$$\begin{array}{l}3\\9\\40\end{array}\Big\} \qquad \begin{array}{c}b/a\\9/3 = 3\end{array}$$

$\Downarrow$

$$\begin{array}{l}3\\40\end{array}\Big\} \qquad \begin{array}{c}b-a\\40-3 = 37\end{array}$$

$$\boxed{Ans = 37}$$

(C) $4542^+ * 22^93/* -$

$$\begin{array}{l}2\\4\end{array}\Big\} \quad 4^2 = 16$$
$$\begin{array}{l}5\\4\end{array}$$

$\Downarrow$

$$\begin{array}{l}16\\5\end{array}\Big\} \quad 16+5 = 21$$
$$\begin{array}{l}4\end{array}$$

$\Downarrow$

$$\begin{array}{l}21\\4\end{array}\Big\} \quad 21 \times 4 = 84$$

$$\begin{array}{l}2\\2\end{array}\Big\} \quad 2^2 = 4$$
$$84$$

$$\begin{array}{l}3\\9\end{array}\Big\} \quad 9/3 = 3$$
$$\begin{array}{l}4\\84\end{array}$$

$\Downarrow$

$$\left.\begin{array}{c} \overset{3}{4} \\ 84 \end{array}\right\} \quad 4 \times 3 = 12$$

$$\Downarrow$$

$$\left.\begin{array}{c} 12 \\ 84 \end{array}\right\} \quad \begin{array}{c} b - a \\ 84 - 12 = 72 \end{array}$$

$$\boxed{Ans = 72}$$

(b)   5 6 7 + * 8 −

$$\left.\begin{array}{c} 7 \\ 6 \end{array}\right\} \quad 7 + 6 = 13$$

$$5$$

$$\Downarrow$$

$$\left.\begin{array}{c} 13 \\ 5 \end{array}\right\} \quad 13 \cdot \times 5 = 65$$

$$\left.\begin{array}{c} 8 \\ 65 \end{array}\right\} \quad 65 - 8 = 57$$

$$\boxed{Ans = 57}$$