<u>Problem solving-1</u>

① Convert the following postfix expression to infix using stack :-

ⓐ a b c + d e / * -

Reading of postfix	Stack top	Expression
A	Pushed to tos "A"	A
B	Push to tos → "B"	B A
C	Push to tos→ "C"	C B A
+	POP "C" and "B" perform (+) ⇒ (C+B) → push to tos	B+C A
d	Push "d" to tos	d B+C A
e	Push "e" to tos	e d B+C A
/	POP "e" & "d" perform push to d/E → tos	d/E B+C A
*	POP "d/E" & C+B perform (*)	(C+B)*(d/E) A
-	A -((C+B)*(d/E))	A-((C+B)*(d/E))

① ⑥ 1+2+

12 +3*45*-

Scanf symbol	Stack to P	Expression
1	Push →to2	[1]
2	Push 2→tos	[2 / 1]
+	Pop (1)+(2) => 3 Push to "tos"	(1+2)
3	Push "3" to→tos	[3 / (1+2)]
*	*	[(1+2) * (3)]
4	4	[4 / (1+2)*(3)]
5	5	[5 / 4 / (1+2)*] [3] , [5 / 4 / (1+2)*(3)]
*	*	[(4*5)] [(1+2)*(3)]
-	-	((1+2)*(3)) - (4*5)

The final result got as

$$((1+2)*(3)) - (4*5)$$

2(a)   +*AB*CD

Conversion between Prefix to Postfix to.

Prefix to infix

Reverse Prefix Expression:-

$$D C *B A *+$$

Symbol Scanned	Stack top	Expression
D	D	$\Rightarrow$ $\boxed{D}$ $\Rightarrow$ D pushed
C	C	$\Rightarrow$ $\boxed{\frac{C}{D}}$ $\Rightarrow$ C pushed
*	POP C & D (D*C)	$\Rightarrow$ $\boxed{C*D}$ (C*D)
B	B	$\Rightarrow$ $\boxed{\frac{B}{C*D}}$ "B" pushed
A	A	$\Rightarrow$ $\boxed{\frac{A}{B}{C*D}}$ "A" pushed
*	POP A & B (B*A)	$\Rightarrow$ $\boxed{\frac{A*B}{C*D}}$ A*B pushed
+	POP (A*B) & (C*B) Perform (+) operation	$\boxed{(A*B)+(C*B)}$ is pushed

The finial Expression for infix

$$(A*B)+(C*D)$$

②⓪ Prefix to infix

$- + a */ bc \wedge def$

Reverse expression

$fed \wedge cb / * a + -$

Reading symbol	Stack top	Expression
"f"	f	f
"e"	e	e / f
"d"	d	d / e / f
"∧"	∧	(e ∧ d) / f
"c"	c	c / (e ∧ d) / f
"b"	b	b / c / (e ∧ d) / f
"/"	/	(c / b) / (e ∧ d) / f
"*"	★	((e ∧ d)*(c \ b)) / f
"a"	a	a*((a ∧ d)*(c \ b)) / f

+	+	$\left(\dfrac{((e^{\wedge}d) \ast (c \backslash b)) + a)}{F}\right)$
-	-	$\left(F - (((e^{\wedge}d) \ast (c \backslash b)) + a)\right)$

the dinial expression for infix

$$F - (((e^{\wedge}d) \ast (c \backslash b)) + a))$$

Evaluate the following ~~Postfix~~ prefix notation
⑨ and given the output (using stack)

ⓐ $+9*3/84$

reverse the given equation .

$4\ 8\ /\ 3\ *\ 9\ +$

Symbol Scanned and stack:

Symbol Scanned	Stack
4	$\Rightarrow \boxed{4}$
8	$\Rightarrow \boxed{\begin{array}{c}8\\4\end{array}}$
/	$\overset{2}{8/4}$ $\Rightarrow \boxed{2}$
3	$\Rightarrow \boxed{\begin{array}{c}3\\2\end{array}}$
*⟩	$3\times2 \Rightarrow 6$ $\boxed{6}$
9	$\boxed{\begin{array}{c}9\\6\end{array}}$
+	$\boxed{15}\ 9+6=15$

$\boxed{+9*3/84 \Rightarrow 15}$

ⓑ $*/+12/42+35$

reverse the given expression

~~fed he~~ i.e.
$5\ 3+2\ 4/2\ 1+/*$

Symbol Scanned	Stack
5	$\boxed{5}$
3	$\boxed{\begin{array}{c}3\\5\end{array}}$
+	Pop $3,5 = 3+5=8$ $\rightarrow \boxed{8}$ push stack
2	$\boxed{\begin{array}{c}2\\8\end{array}}$
4	$\boxed{\begin{array}{c}\cancel{4}\\\cancel{2}\\8\end{array}}$
/	$\overset{2}{4/2} \Rightarrow$ poped = $\boxed{\begin{array}{c}2\\8\end{array}}$ pushed into stack
2	$\boxed{\begin{array}{c}2\\2\\8\end{array}}$ top of stack $\Rightarrow 2$
1	$\boxed{\begin{array}{c}1\\2\\2\\8\end{array}} \Rightarrow$ top of stack $\Rightarrow 1$
+	$\boxed{\begin{array}{c}3\\2\\8\end{array}}$ $1+2=3$ (poped)

1/	..pop 3 and 2 $8/2$ 1.5 [1.5] [8] Stack	The result obtain from given expression is 12
*	$8 \times 1.5 = 12.00$ [2] Stack	

Evaluate Prefix notation

$$10\ 28*+3$$

$$[*/+12/42+35] \Rightarrow 12$$

④ Evaluate the following Postifix notation
and give the output (using stack).

soln

step1   5 3 * 9 + 6 / 8 4 / +

the first character scanned is '5' which is
an operand, so push it to the stack

| 5 | [   ]
Stack   expression

step2:

5 3 * 9 + 6 / 8 4 / +

the next character scanned '3' ⇒ operand
Push it to stack.-

| 3 |
| 5 |
Stack

step3:

Next character scanned "*", which is operator
so pop two operands and perform operatio
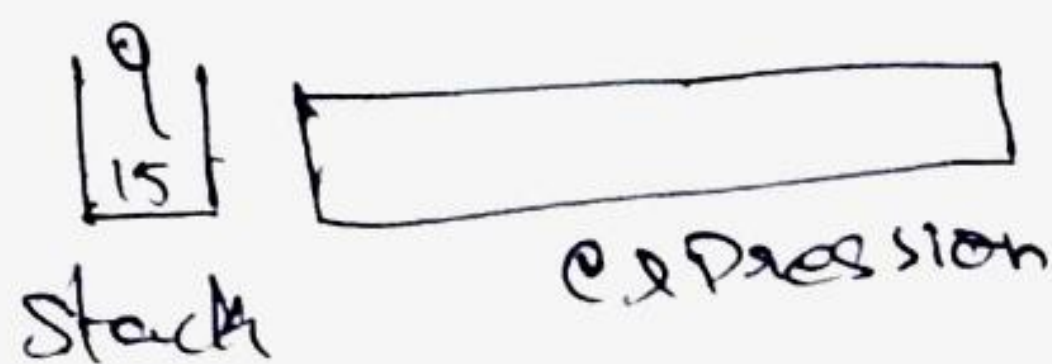
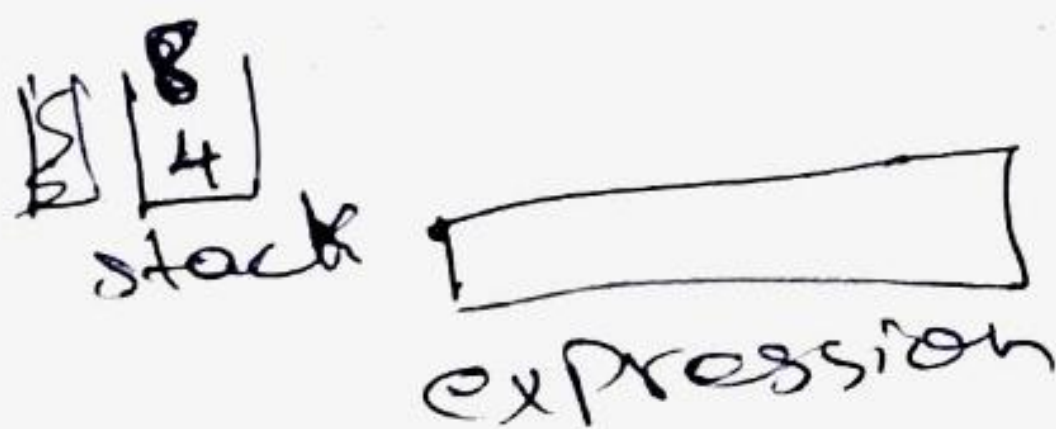| | | 5 * 3 = 15 |
Stack   Expression

Push result to stack

| 15 |

step 4:

5 3 * 9 + 6 / 8 4 / +

$\boxed{\begin{array}{c}9\\15\end{array}}$ $\boxed{}$
Stack   expression

step 5:

5 3 * 9 ± 6 / 8 4 / +

$\boxed{}$ $\boxed{15+9=24}$
Stack   Expression

$\boxed{24}$
Stack

step 6:

5 3 * 9 + 6 / 8 4 / +

$\boxed{\begin{array}{c}6\\24\end{array}}$ ⇒ stack $\boxed{}$
                        EXPression

step 7:

5 3 * 9 + 6 / 8 4 / +

$\boxed{|}$ ⇒ stack $\boxed{24/6 \Rightarrow 4}$
                  expression
$\boxed{4}$ ⇒ stack.

step 8:

5 3 * 9 + 6 / 8 4 / +

$\boxed{\begin{array}{c}8\\4\end{array}}$
stack $\boxed{}$
          expression

step 9:

$\boxed{\begin{array}{c}4\\8\\4\end{array}}$ ⇒ stack

$\boxed{}$
          expression

$\boxed{4}$ ⇒ stack $\boxed{8/4 = 2}$
                    expression

$\boxed{\begin{array}{c}2\\4\end{array}}$ ⇒ stack

$\boxed{|}$ ⇒ stack $\boxed{4+2 = 6}$
                  Expression

∴ the final value for given
$\boxed{\text{equation} \Rightarrow 6}$

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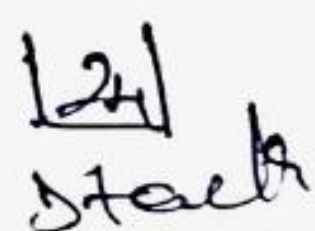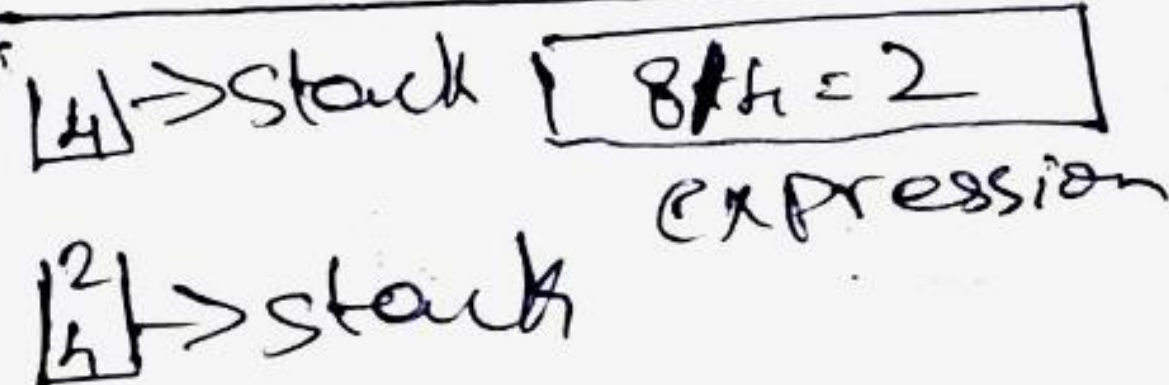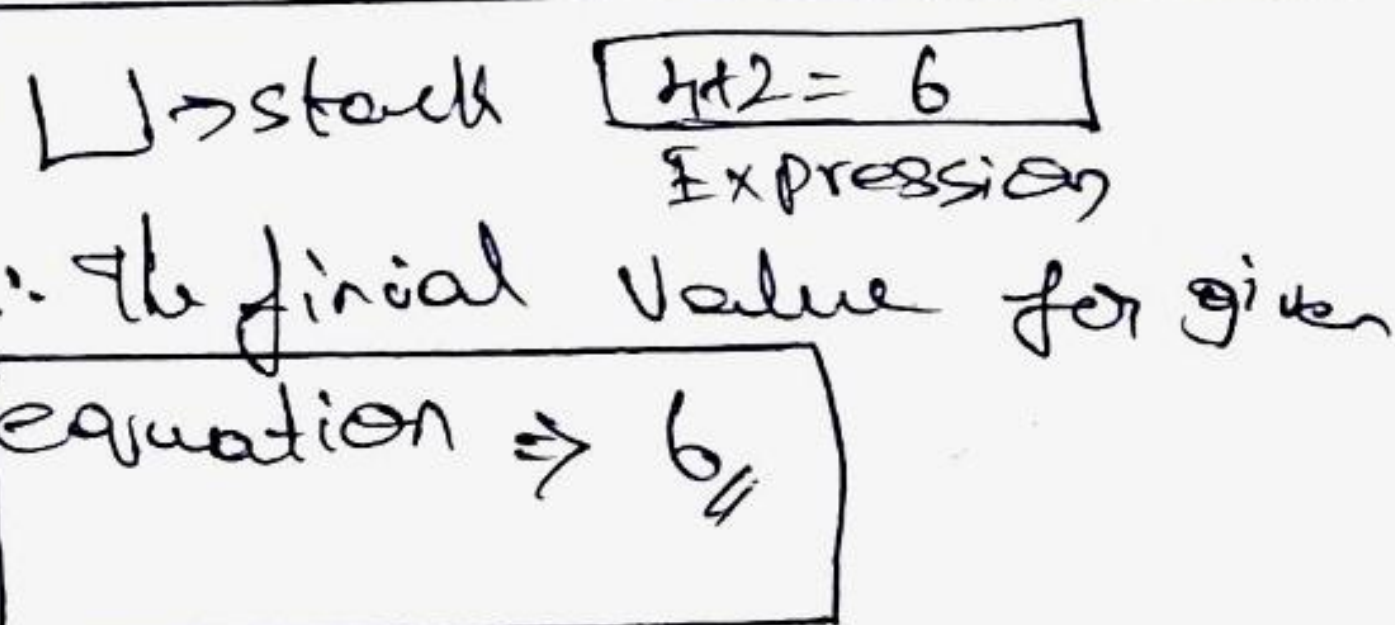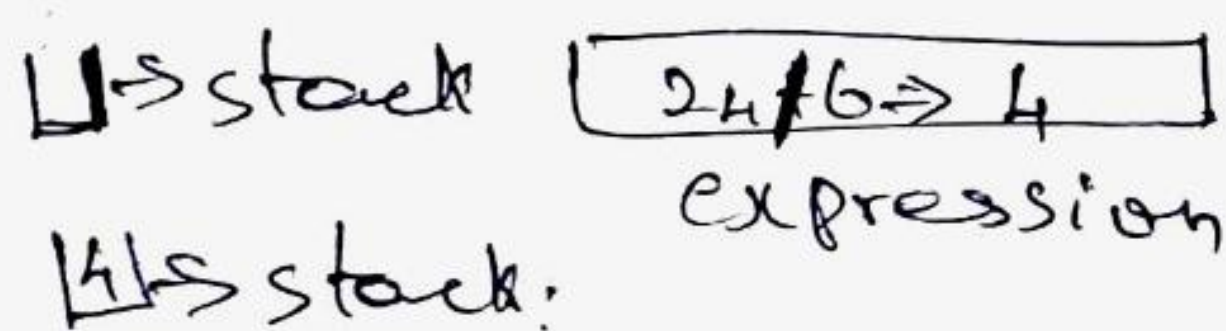
④ ⓑ Evaluate Postfix notation

$\boxed{10\ 2\ 8\ *\ +\ 3\ -}$

① 10 2 8 * + 3

$\boxed{10}$ 10= operand store
Stack   in stack.

② 10 2 8 * + 3

$\boxed{\begin{array}{c}2\\10\end{array}}$ 2= operand Push
Stack   to stack.

③ 10 2 8 * + 3

$\boxed{\begin{array}{c}8\\2\\10\end{array}}$ 8= operand Push to
Stack   stack
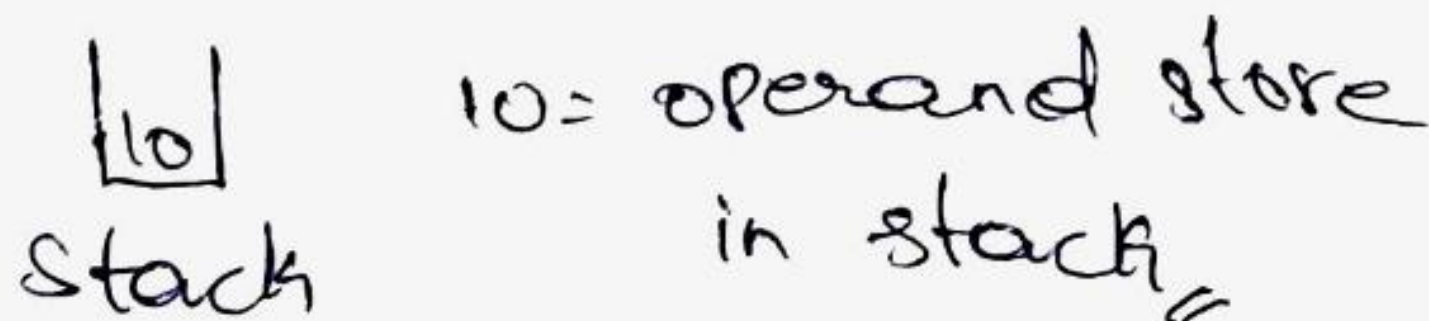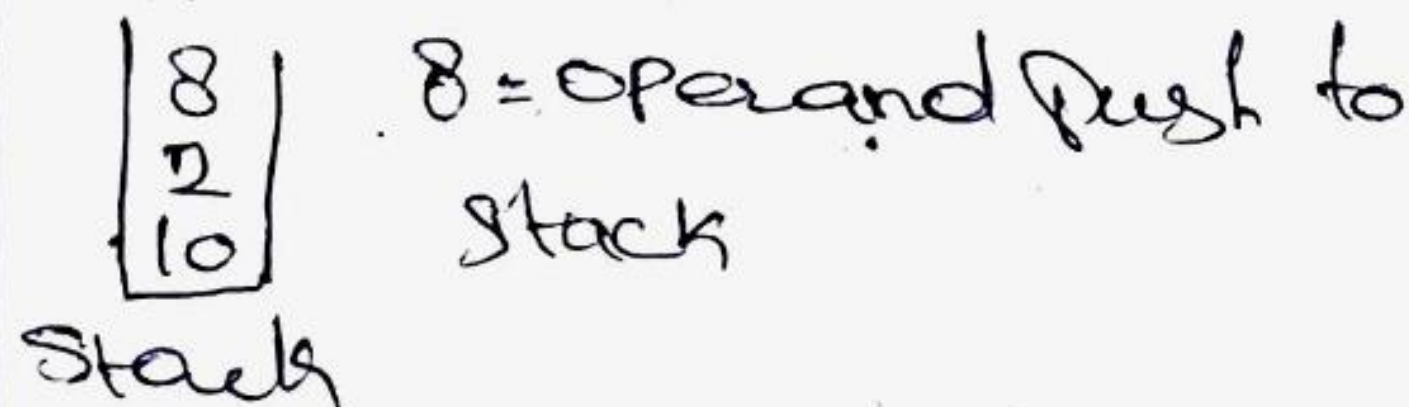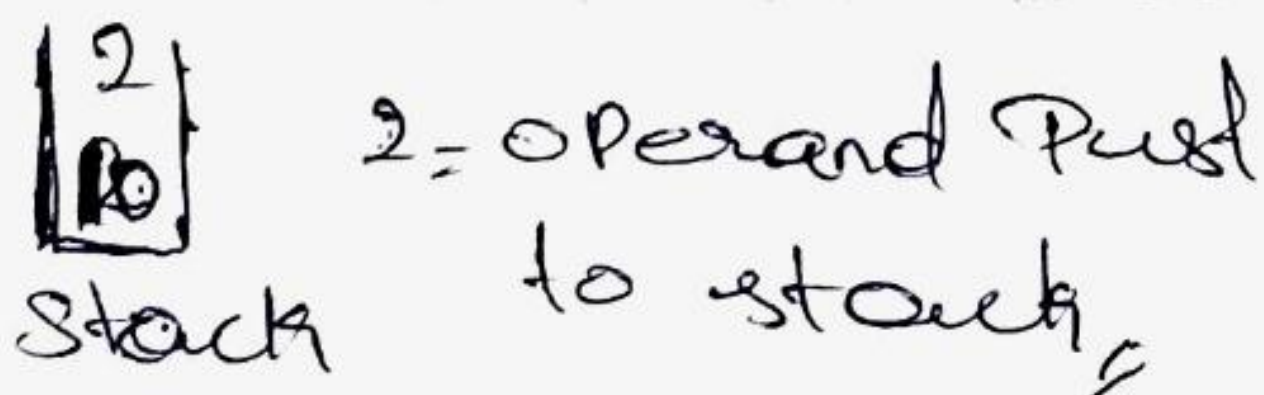
④ 10 2 8 * + 3 -

*= operator

Pop 2 operands from
top of stack.

and Perform operation between that two operands in top of stack

Expression

$$2 * 8 = 16$$

| 16 |
| 10 |
stack

---

⑤ 10 2 8 * + 3 -

+ = operator   POP 10, 16

Expression

$$10 + 16 = 26$$

| 26 |
Stack

---

⑥ 10 2 8 * + 3 -

3 = operand

| 3 |
| 26 | →stack

Push into top of stack

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⑦ 10 2 8 * + 3 -

"-" = operator   POP 2 element

$$26 - 3 = 23$$

| 23 |

→ the finial value obtained from given expression = "23"