

(1)

Q. Convert the following arithmetic expressions into Reverse Polish Notation and show the stack operation for evaluating the numerical result:

a) $8 * 3 + (4 + 8) + (4 * 7 + 2) + 2 + 3$

b) $5 + 10 * 6 + (3 + 5) + 7 * (6 + 2)$

c) $(A + B) * C - (D - E) * (F + G)$

d) $A * B + C * D + E * F$

Note : Priorities of operators

\wedge
 $/*$
 $+ -$

* Note:
operand \rightarrow Postfix
operator \rightarrow stack

Associativity of operators

For, $\wedge \rightarrow$ Right to Left

$/* \rightarrow$ Left to Right

$+ - \rightarrow$ Left to Right

Answer

a)

Scanned	Stack	Postfix
8		8
*	*	8
3	*	83
+	+	83*
(+()	83*
4	+()	83*4
+	+(+	83*4
8	+(+	83*48

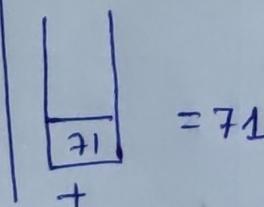
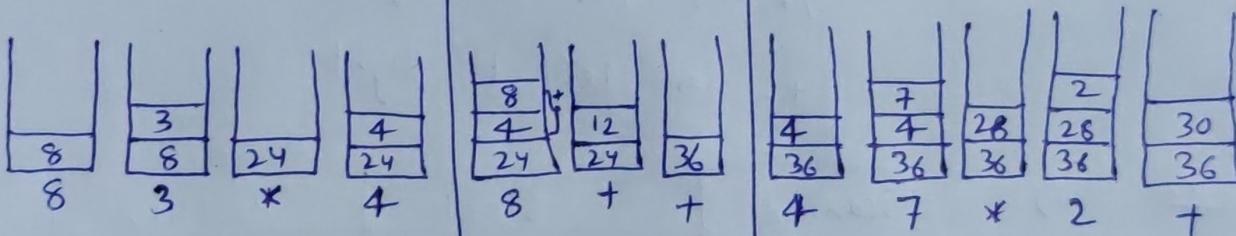
(2)

Scanned	Stack	Postfix
)	+(*) POP	83 * 48 +
+	+ + POP	83 * 48 + +
(+ (83 * 48 + +
4	+ (83 * 48 + + 4
*	+ (*)	83 * 48 + + 4
7	+ (*)	83 * 48 + + 4 7
+	+ (* + POP	83 * 48 + + 4 7 *
2	+ (+	83 * 48 + + 4 7 * 2
)	+ (*) POP	83 * 48 + + 4 7 * 2 +
+	+ + POP	83 * 48 + + 4 7 * 2 + +
2	+ +	83 * 48 + + 4 7 * 2 + + 2
+	+ +	83 * 48 + + 4 7 * 2 + + 2 +
3	+ +	83 * 48 + + 4 7 * 2 + + 2 + 3

POP

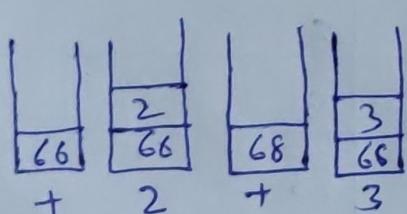
Final output

83 * 48 + + 4 7 * 2 + + 2 + 3 +



= 71

Ans.



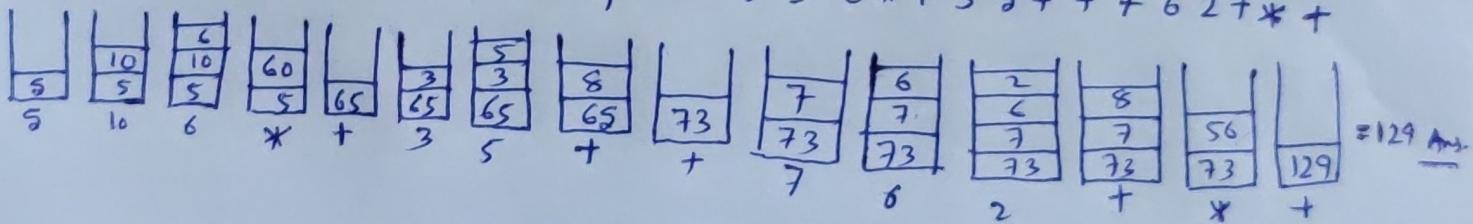
Ans. (b)

(3)

$$5 + 10 * 6 + (3+5) + 7 * (6+2) =$$

Scanned	Stack	Postfix	
5		5	
+	+	5	
10	+	5 10	
*	+*	5 10	
6	+*	5 10 6	
+	+*+	5 10 6 *	POP
(+()	5 10 6 * +	
3	+()	5 10 6 * + 3	
+	+()	5 10 6 * + 3	
5	+()	5 10 6 * + 3 5	
)	+ (+)	5 10 6 * + 3 5 +	POP
+	+ +	5 10 6 * + 3 5 + +	POP
7	+	5 10 6 * + 3 5 + + 7	
*	+ *	5 10 6 * + 3 5 + + 7	
(+ * (5 10 6 * + 3 5 + + 7	
6	+ * (5 10 6 * + 3 5 + + 7	
+	+ * (+	5 10 6 * + 3 5 + + 7 6	
2	+ * (+	5 10 6 * + 3 5 + + 7 6	
)	+ * (+)	5 10 6 * + 3 5 + + 7 6 2	POP
		5 10 6 * + 3 5 + + 7 6 2 +	POP

$$\text{Final output} = 5 10 6 * + 3 5 + + 7 6 2 + * +$$



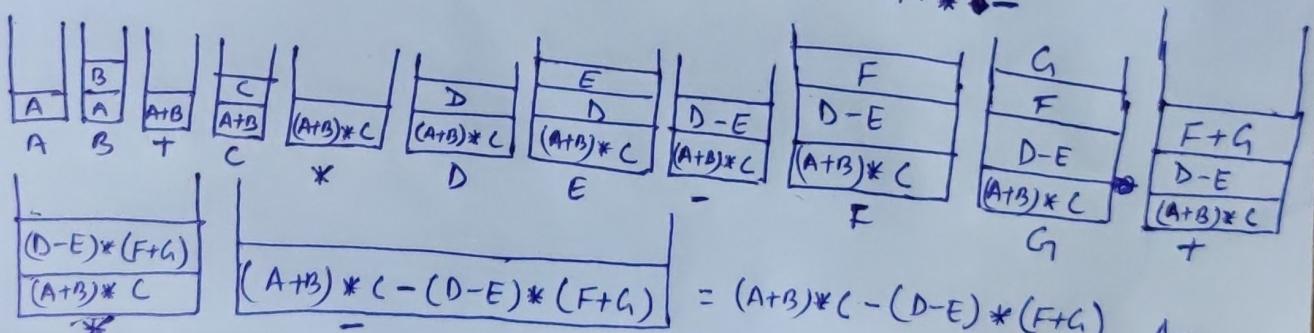
Ans. (c)

$$(A+B)*C - (D-E)*(F+G)$$

(4)

Scanned	Stack	Postfix
((
A	(A
+	(+	A
B	(+	AB
)	(*) POP	AB+
*	*	AB+
C	*	AB+C
-	*-	AB+C*
(-()	AB+C*
D	-()	AB+C*D
-	-(-)	AB+C*D
E	-(-)	AB+C*D E
)	-(-)	AB+C*D E-
*	-*	AB+C*D E-
(-*(AB+C*D E-
F	-*(AB+C*D E-F
+	-*(+	AB+C*D E-F
G	-*(+	AB+C*D E-F G
)	-*(*)	AB+C*D E-F G +

Final output = AB+C*D E-F G + *



Ans (d)

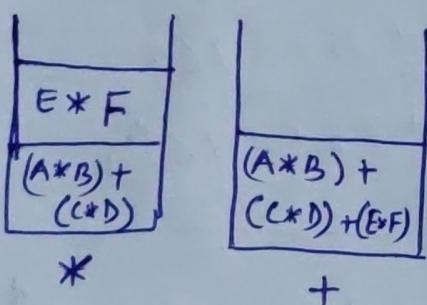
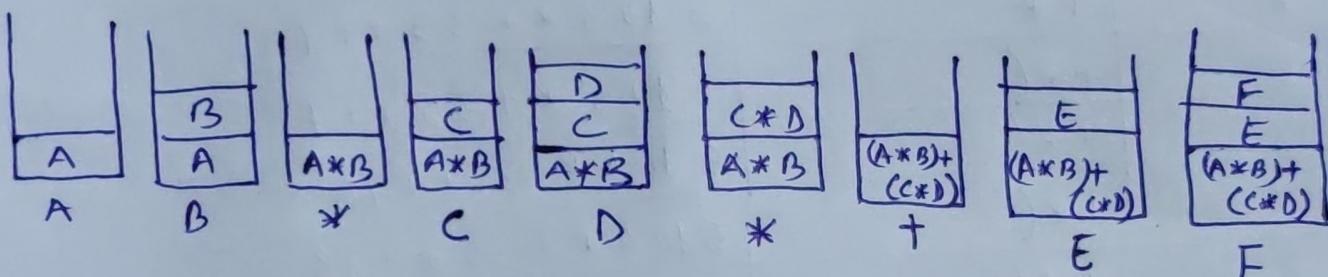
$$A * B + C * D + E * F$$

(5)

Scanned	Stack	Post fix
A		A
*	*	A
B	*	AB
+	* +	AB *
C	* +	AB * C
*	+ *	AB * C
D	+ *	AB * CD
+	+ * +	AB * CD * +
E	+	AB * CD * + E
*	+ *	AB * CD * + E
F	+ *	AB * CD * + EF

POP

$$\text{Final output} = AB * CD * + EF *$$



$$= A * B + C * D + E * F$$

Ans