

# CS & IT ENGINEERING

**Data Structure & Programming**

**Stack** *and Queues*  
**DPP 01** *Discussion Notes*



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# TOPICS TO BE COVERED

01 Question

02 Discussion



Q.1

Consider the following infix expression:

$$P-Q/(R*S)+T*U$$

The prefix notation of the given expression is-

**A**  $-+P/Q*RS*TU$

☒ **B**  $+ -P/Q*RS*TU$

**C**  $+ -/PQ*RS*TU$

**D** None of the above.

(B)

$$+ -P/Q*RS*TU$$

$$P-Q/(R \times S)+T \times U$$

[MCQ]

$$P-Q/[\times RS]+T \times U$$

$$P-[/Q \times RS]+T \times U$$

$$P-[/Q \times RS]+[\times TU]$$

$$[-P/Q \times RS]+[\times TU]$$





Q.2

Consider the following expression:

$$P+Q/R-S*T^U/V-W$$

$$PQR/+STU^*V/-W-$$

The post fix notation of the given expression is-

[MCQ]

☒ A  $PQR/+STU^*V/-W-$

☐ B  $PQ+RS-TU^*V/-W-$

☐ C  $PQR/-STU^*V/W+-$

☐ D None of the above

$$\begin{aligned} &P+Q/R-S*T^U/V-W \\ &\quad \quad \quad \Downarrow \\ &P+Q/R-S*[T^U]/V-W \\ &\quad \quad \quad \Downarrow \\ &P+[QR/+]-S*[T^U]/V-W \end{aligned}$$

$$\begin{aligned} &P+[QR/+]-[STU^*]/V-W \\ &\quad \quad \quad \Downarrow \\ &P+[QR/+]-[STU^*V/-]-W \\ &\quad \quad \quad \Downarrow \\ &[PQR/+]-[STU^*V/-]-W \\ &\quad \quad \quad \Downarrow \\ &[PQR/+STU^*V/-]-W \end{aligned}$$



Q.3

Consider the following prefix notation:  
 $/^{\wedge} * + abc / de^{\wedge} gh$

$$((a+b)*c)^{\wedge}(d/e) / (g^{\wedge}h)$$



The postfix notation of the given expression is-

[MCQ]

**B**  $ab+c*de/^{\wedge}gh^{\wedge}/$

**A**  $abc+*de/^{\wedge}gh^{\wedge}/$

**C**  $abc+de/*^{\wedge}gh^{\wedge}/$

**D** None of the above

Handwritten conversion steps for prefix to postfix:

$$\begin{aligned} & /^{\wedge} * + abc / de^{\wedge} gh \\ & /^{\wedge} * + abc ( / de ) g^{\wedge} h \\ & /^{\wedge} * ( + ab ) c ( d / e ) , ( g^{\wedge} h ) \end{aligned}$$

Handwritten conversion steps for prefix to postfix:

$$\begin{aligned} & /^{\wedge} ( + (a+b), c ) , d / e , g^{\wedge} h \\ & / , ^{\wedge} , (a+b)*c , d / e , g^{\wedge} h \\ & / , [ (a+b)*c ]^{\wedge} (d / e) , g^{\wedge} h \end{aligned}$$



Q.3

Consider the following prefix notation:  
 $/^*+abc/de^gh$

The postfix notation of the given expression is-

$$\frac{((a+b)*c)^{(d/e)}}{(g^h)}$$

$[ab+]*c$

$$\frac{([ab+cx]^{[de/]})}{(g^h)}$$

[MCQ]

☒ B  $ab+c*de/^gh^/$

☐ A  $abc+*de/^gh^/$

☐ C  $abc+de/*^gh^/$

☐ D None of the above

$$\frac{[ab+cxde/^]}{(g^h)}$$
$$[ab+cxde/^]/[g^h]$$



# Q.4

Consider the following infix expression:

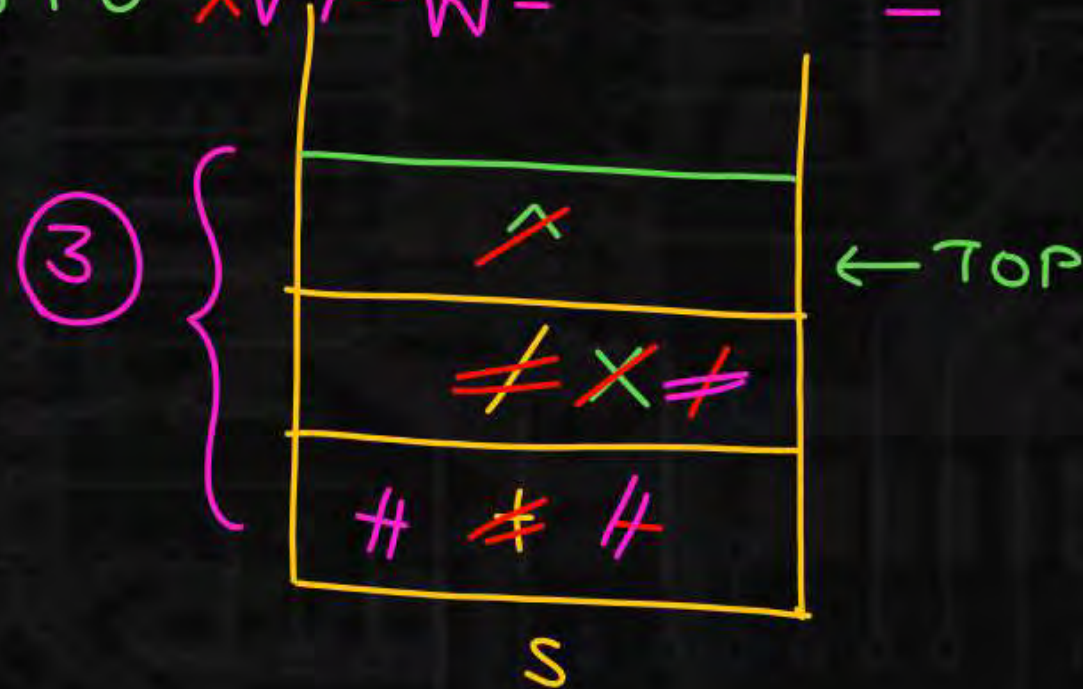
$$P+Q/R-S*T^U/V-W$$

The maximum size of the operator stack required to convert the given infix to postfix notation is 3.

[NAT]

infix:  $P+Q/R-S \times T^U/V-W$  End

o/p:  $PQR/+STU^XV/-W-$





Q.5

Consider the following infix expression:

$P*Q/R-S*T+U/V*W$

On reaching the symbol V, the top two contents of the operator stack are:

A  $/, *$

B  $/, -$

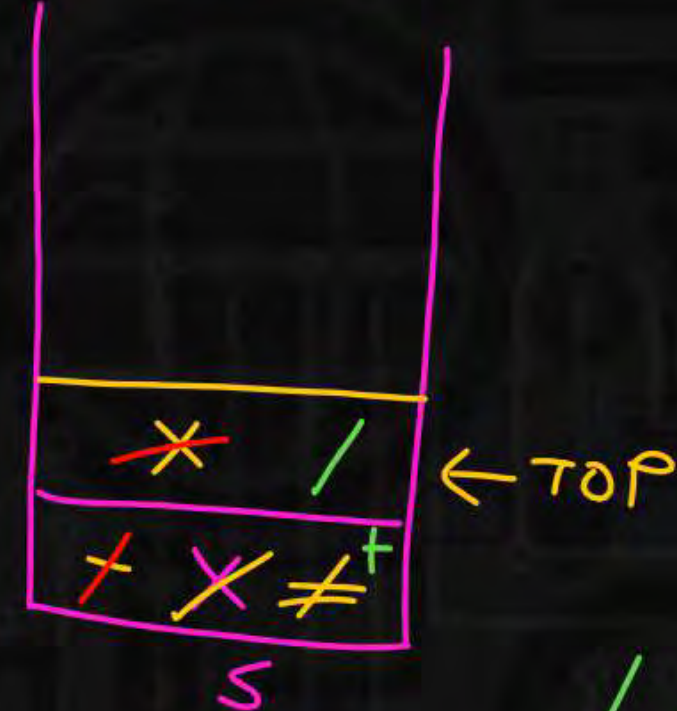
C  $*, +$

☒ D  $/, +$

[MCQ]

i/p:  $P \times Q / R - S \times T + U / V \times W$

o/p:  $PQ \times R / ST \times - UV$



$/, +$



Q.6

Consider the following postfix expression:

$8\ 2\ 3\ /\ 5\ 3\ *\ 2\ 1\ /\ -$

The result of evaluating the above postfix expression is 14.

[NAT]

$8\ 2\ 3\ /\ 5\ 3\ *\ 2\ 1\ /\ -$

$(8\ 2\ /)\ 5\ 3\ *\ 2\ 1\ /\ -$

$1\ (5\ 3\ *)\ +\ 2\ 1\ /\ -$

$1\ 15\ +\ 2\ 1\ /\ -$

$16\ (2\ 1\ /\ -)$   
 $16\ 2\ -$

$(14)$



Q.7



Let X be the result when the below postfix expression is evaluated:

$$X = 8 \ 3 \ 1 + - \ 2 \wedge 7 \ 1 \ 2 - * +$$

And Y be the result of the following postfix expression:

$$Y = X \ 3 / 4 +$$

The value of  $(X+Y)0.5$  is 4

$$Y = (9 \ 3 /) 4 +$$

[NAT]

$$8 \ (3 \ 1 +) - 2 \wedge 7 \ 1 \ 2 - * +$$

$$(8 \ 4 -) 2 \wedge 7 \ 1 \ 2 - * +$$

$$(4 \ 2 \wedge) 7 \ 1 \ 2 - * +$$

$$16 \ 7 \ (1 \ 2 -) * +$$

$$16 \ 7 \ (-1) * +$$

$$16 - 7 +$$

$$(9)$$

$$Y = 7$$

$$X = 9$$

$$3 \ 4 +$$

$$16^{1/2}$$

$$= 4$$



Q.8



Let X be the result when the below postfix expression is evaluated:

$X = 4\ 5\ 1\ +\ *\ 2\ /\ 3\ 1\ 2\ +\ *\ +$  End

Let Y be the maximum size of the operand stack, the value of X-Y is \_\_\_\_\_

[NAT]

$X = 21$   
 $Y = 4$   
 $21 - 4$   
 $= 17$

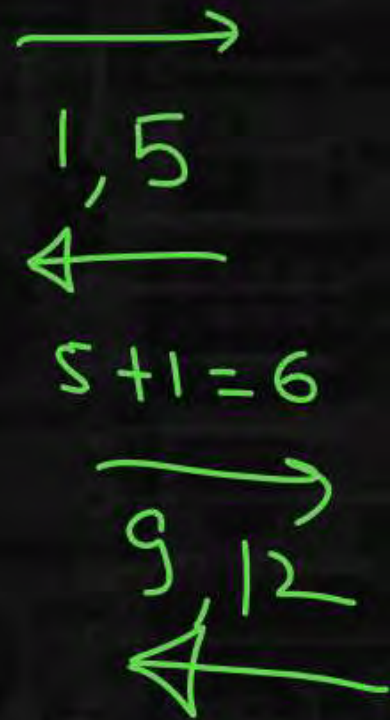


Diagram illustrating the evaluation of the postfix expression  $4\ 5\ 1\ +\ *\ 2\ /\ 3\ 1\ 2\ +\ *\ +$ . The stack grows from bottom to top. The stack contains the values 1, 5, 6, 4, 4, 12, 24. The stack size is 7.

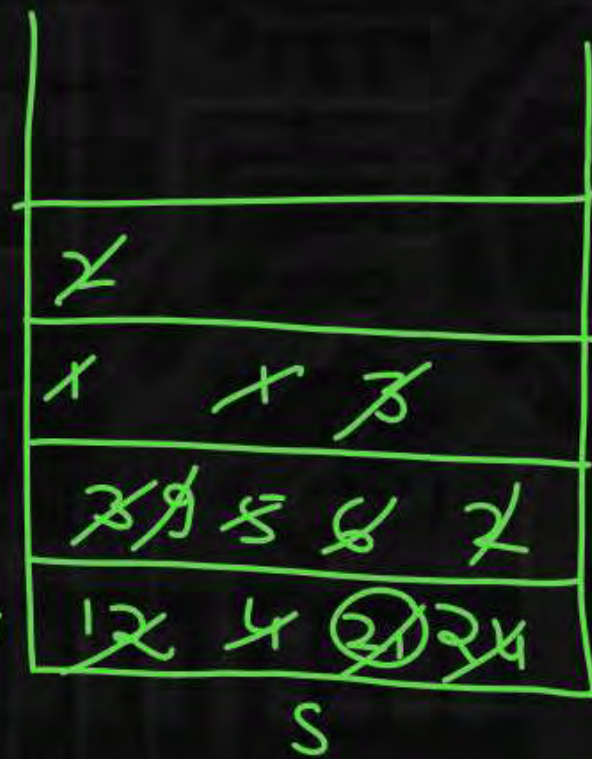


Diagram illustrating the evaluation of the postfix expression  $4\ 5\ 1\ +\ *\ 2\ /\ 3\ 1\ 2\ +\ *\ +$ . The stack grows from bottom to top. The stack contains the values 1, 5, 6, 4, 4, 12, 24. The stack size is 7.



