ACE OF PACE

ENGINEERING **Grade X moving to XI** **DATE: 21/12/2025**

Section – A

1. **(D)**

$y+k$ is a factor $\Rightarrow -k$ is a root of $y^2+2y-15$ and y^3+a.

$\Rightarrow k^2-2k-15=0$

$\Rightarrow (k-5)(k+3)=0$

$\Rightarrow k=5$ or –3.

Since, k is positive $\Rightarrow k=5$.

Now, $\Rightarrow -k^3+a=0$

$\Rightarrow -125+a=0$.

$a=125$

$\Rightarrow a+k=130$

2. **(B)**

–5 is a root of $2x^2+px-15$.

$\Rightarrow 2\times(-5)^2+p\times(-5)-15=0$

$-5p+35=0 \Rightarrow p=7$.

$\Rightarrow$ Roots of $7x^2+7x+k$ are equal.

$\Rightarrow D=0$

$\Rightarrow 49-28k=0$

$k=\frac{49}{28}=\frac{7}{4}$

3. **(A)**

Dividing $x^3-3x^2+6x-15$ by $x-3$ leaves remainder 3.

Hence, –3 must be added.

4. **(A)**

$2x+3y=7 \qquad .....(1)$

$(a-b)x+(a+b)y=3a+b-2 \qquad .....(2)$

For infinite solutions:

$\frac{2}{a-b}=\frac{3}{a+b}=\frac{7}{3a+b-2}$

$2a+2b=3a-3b$

$a=5b \qquad .....(1)$

$6a+2b-4=7a-7b$

$a-9b=-4 \qquad .....(2)$

$\Rightarrow a=5,\ b=1$

5. **(A)**

V_A, V_B

A.T.Q. $\frac{150}{V_A + V_B} = 1$

$\Rightarrow \; V_A + V_B = 150 \qquad .....(1)$

and $\frac{150}{V_A - V_B} = 15$

$\Rightarrow \; V_A - V_B = 10 \qquad .....(2)$

$\Rightarrow \; V_A = 80, V_B = 70$

6. **(D)**

Let fraction be $\frac{x}{y}$.

A.T.Q $\quad x + y = 2x + 4$

$\Rightarrow \; y - x = 4 \qquad .....(1)$

and $\frac{x+3}{y+3} = \frac{2}{3}$

$\Rightarrow \; 3x + 9 = 2y + 6$

$\Rightarrow \; 2y - 3x = 3 \qquad .....(2)$

$x = 5, y = 9$

$\Rightarrow \; \frac{5}{9}$

7. **(D)**

Let work done by a man in one day be *m*, and the work done by one women in one day be *w*.

$\Rightarrow \; 8w + 12m = \frac{1}{10} \qquad .....(1)$

and $6w + 8m = \frac{1}{14}$

Solving, we get $w = \frac{1}{140}$

$\Rightarrow$ it takes 1 women 140 days to finish the work.

8. **(B)**

$x^2 + 4x + 3 \Rightarrow (x+3)(x+1)$

$\Rightarrow$ Roots are $-3, -1 = \alpha, \beta$

$\Rightarrow \; 1 + \frac{\beta}{\alpha}$ and $1 + \frac{\alpha}{\beta} \quad \Rightarrow \; 1 + \left(\frac{-1}{-3}\right)$ and $1 + \left(\frac{-3}{-1}\right)$

$\Rightarrow \; \frac{4}{3}$ and 4.

$\Rightarrow$ Polynomial $= k \times \left(x^2 - \left(\frac{4}{3} + 4\right)x + \frac{4}{3} \times 4 \right)$

$k = 3 \Rightarrow 3x^2 - 16x + 16$

9. **(C)**

Product of all three roots

$$\Rightarrow \quad \alpha\times\beta\times\gamma=\frac{-\left(-4\sqrt{2}\right)}{6}=\frac{2\sqrt{2}}{3}$$

$$\Rightarrow \quad \sqrt{2}\times\beta\times\gamma=\frac{2\sqrt{2}}{3}$$

$$\Rightarrow \quad \beta\times\gamma=\frac{2}{3}$$

10. **(A)**

Price of T.V. = x

Price of Fridge = y

A.T.Q

$$0.05x+0.1y=2000 \qquad .....(1)$$

$$0.1x-0.05y=1500 \qquad .....(2)$$

$$\Rightarrow \quad 0.25x=5000 \quad \Rightarrow \quad x=20,000$$

11. **(A)**

Let 2 roots be α, $-\alpha$.

Sum of roots $=\alpha+(-\alpha)+\gamma=-(-5)$

$$\Rightarrow \quad \gamma=5$$

12. **(C)**

$$x^4+x^2+1+x^2-x^2$$

$$=x^4+2x^2+1-x^2$$

$$=\left(x^2+1\right)^2-x^2$$

$$=\left(x^2+1-x\right)\left(x^2+1+x\right)$$

13. **(D)**

$$3\cdot\left(x^2+\frac{5}{3}x+4\right)$$

Complete the square.

$$\Rightarrow \quad 3\cdot\left(\left(x+\frac{5}{6}\right)^2+4-\frac{25}{36}\right)$$

$$\Rightarrow \quad 3\cdot\left(x+\frac{5}{6}\right)^2+3\times\left(4-\frac{25}{36}\right)$$

$$\Rightarrow \quad 3\cdot\left(x+\frac{5}{6}\right)^2+\frac{119}{12}$$

14. **(C)**

Sum of roots

$$a-b+a+a+b=3$$

$$3a=3 \Rightarrow a=1$$

Product of roots

$$(1-b)\times1\times(1+b)=-1$$

$$1-b^2=-1 \qquad\qquad b^2=2$$

15. **(C)**

Number of ₹ 50 notes = x

Number of ₹ 100 notes = y

$\Rightarrow \quad 50x+100y=15500 \qquad .....(1)$

$x+y=200$

$y=110,\ x=90$

16. **(A)**

$(\alpha+\beta)^2-\alpha\beta=24$

$$\left(\frac{-5}{2}\right)^2-\left(\frac{k}{2}\right)=24$$

$$k=\frac{-71}{2}$$

17. **(C)**

$\sqrt{a}x-\sqrt{b}y=b-a$

$\sqrt{b}x-\sqrt{a}y=0$

$\left(\sqrt{a}+\sqrt{b}\right)x-\left(\sqrt{a}+\sqrt{b}\right)y=b-a$

$$\Rightarrow \quad x-y=\frac{b-a}{\sqrt{a}+\sqrt{b}}=\sqrt{b}-\sqrt{a}$$

18. **(C)**

Let number of boys = x

Number of girls = y

$x+y=150$

$25x+50y=4900$

$x=104,\ \ y=46$

19. **(C)**

Let unit's digit = x

Ten's digit = y

$\Rightarrow$ Number is $10y+x$

A.T.Q.

$10y+x=4\times(x+y)+3$

$\Rightarrow \quad 6y-3x=3$

$2y-x=1 \qquad .....(1)$

and $10y+x+18=10x+y$

$\Rightarrow \quad x-y=2 \qquad .....(2)$

$y=3,\ \ x=5$

20. **(B)**

$D\ge 0$

$4-4\times 3\times k\ge 0$

$$\Rightarrow \quad k\le\frac{1}{3}$$

Section – B

21. **(B)**

Case-I:

₹ 2 → 3 bananas.

1 banana at ₹ $\frac{2}{3}$ for lot A.

1 banana at ₹ 1 for lot B.

$$\Rightarrow \frac{2}{3}A+B=400$$

$$\Rightarrow 2A+3B=1200 \qquad .....(1)$$

Case-II:

1 banana at ₹ 1 for lot A.

1 banana at ₹ $\frac{4}{5}$ for lot B.

$$\Rightarrow A+\frac{4}{5}B=460$$

$$5A+4B=2300 \qquad .....(2)$$

$(1)+(2)$

$$\Rightarrow 7A+7B=3500$$

$$\Rightarrow A+B=500$$

22. **(D)**

Length = ℓ ; Breadth = b

$A=\ell\cdot b$

A.T.Q:

$$(\ell-5)\times(b+3)=\ell b-9$$

$$\Rightarrow \cancel{\ell b}+3\ell-5b-15=\cancel{\ell b}-9$$

$$3\ell-5b=6 \qquad .....(1)$$

and $(\ell+3)(b+2)=\ell b+67$

$$\Rightarrow \cancel{\ell b}+2\ell+3b+6=\cancel{\ell b}+67$$

$$2\ell+3b=61 \qquad .....(2)$$

$(1)\times 2$

$$6\ell-10b=12$$

$(2)\times 3$

$$6\ell+9b=183$$

$$19b=171$$

$$b=9$$

$$\Rightarrow \ell=17$$

23. **(D)**

$$P(x)=Q(x)\times g(x)+R(x)$$

$$\Rightarrow x^3-5x^2+6x-4=(x-3)\times g(x)+(-3x+5)$$

$$\Rightarrow g(x)=\frac{x^3-5x^2+9x-9}{x-3}$$

$$g(x)=x^2-2x+3$$

24. **(B)**

If $2+\sqrt{3}$ is a root,

$2-\sqrt{3}$ is also a root.

$\Rightarrow \left(x-\left(2+\sqrt{3}\right)\right)\cdot\left(x-\left(2-\sqrt{3}\right)\right)$ is a factor.

$\Rightarrow x^2-4x+1$ is a factor.

$$\begin{array}{r|l} & x^2-2x-35 \\ x^2-4x+1 & x^4-6x^3-26x^2+138x-35 \\ & \underline{x^4-4x^3+x^2} \\ & -2x^3-27x^2+138x \\ & \underline{-2x^3+8x^2-2x} \\ & -35x^2+140x-35 \\ & \underline{-35x^2+140x-35} \\ & 0 \end{array}$$

$\Rightarrow \left(x^2-4x+1\right)\cdot\left(x^2-2x-35\right)$

Roots are $\Rightarrow 2+\sqrt{3}, 2-\sqrt{3}, -5, 7$.

Positive rational root = 7

25. **(C)**

Let first person's capital = x

second person's capital = y

A.T.Q.

$x+100=2\times(y-100)$

$\Rightarrow 2y-x=300$ .....(1)

and $y+10=6\times(x-10)$

$\Rightarrow 6x-y=70$ .....(2)

$x=40,\ y=170$

Section – C

26. **(C)**

The relationship is : $3x:3$

27. **(D)**

28. **(D)**

29. **(D)**

30. **(D)**