ACE OF PACE

ENGINEERING **Grade X moving to XI** **DATE: 26/10/2025**

Section – A

1. (A)

By remainder theorem,

$$P\left(-\frac{1}{2}\right)=-1$$

$$\therefore \quad 4\left(-\frac{1}{2}\right)^3-k\left(-\frac{1}{2}\right)^2-\frac{1}{2}-7=-1$$

$$\therefore \quad -\frac{1}{2}-\frac{k}{4}-\frac{15}{2}=-1$$

$$\therefore \quad k=-28$$

2. (D)

Let $u=\frac{1}{7x-4y}$ and $v=\frac{1}{4x-7y}$

$\therefore \quad 4u+10v=-5$ and $3u-10v=-2$

On solving we get, $u=-1$ and $v=\frac{-1}{10}$

$\therefore \quad 7x-4y=-1$ and $4x-7y=-10$

On solving we get, $x=1$ and $y=2$

$\therefore \quad x^2+y^2=1^2+2^2=5$

3. (B)

$$|-4x+3|=\frac{1}{2}\Rightarrow -4x+3=\pm\frac{1}{2}\Rightarrow -4x=-\frac{5}{2},-\frac{7}{2}\Rightarrow x=\frac{5}{8},\frac{7}{8}$$

$$\therefore \quad \frac{5}{8}+\frac{7}{8}=\frac{12}{8}=\frac{3}{2}$$

4. (A)

$$x=1+2^{1/3}+2^{2/3}$$

$$\therefore \quad (x-1)^3=\left(2^{1/3}+2^{2/3}\right)^3$$

$$\therefore \quad (x-1)^3=6+6(x-1)$$

$$\therefore \quad x^3-3x^2-3x=1$$

5. (C)

By reminder theorem,

$P(3)=2$ and $P(2)=3$

Also, $P(x)=Q(x)(x-2)(x-3)+ax+b$

$\therefore \quad P(3) = 3a + b = 2$ and $P(2) = 2a + b = 3$

On solving we get, $a = -1$ and $b = 5$

$\therefore$ Remainder $= ax + b = -x + 5$

6. (D)

$x^2 - 4x + k = (x - \alpha)(x - \beta)$

$\therefore \quad \alpha + \beta = 4$ and $\alpha\beta = k$

$2\alpha + 3\beta = 10$

On solving we get, $\alpha = \beta = 2$

$\therefore \quad k = \alpha\beta = 4$

7. (A)

$\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^2 = x + \frac{1}{x} + 2$ and $\left(x + \frac{1}{x}\right)^2 = x^2 + \frac{1}{x^2} + 2$

$\therefore \quad x + \frac{1}{x} = \pm 3 \qquad \therefore \sqrt{x} + \frac{1}{\sqrt{x}} = \pm\sqrt{5}$

8. (B)

$y = p(x)$ intersects X-axis 3 times.

9. (C)

$x^4 + 2x^2 + 9 = x^4 + 6x^2 + 9 - 4x^2 = (x^2 + 3)^2 - 4x^2 = (x^2 + 2x + 3)(x^2 - 2x + 3)$

$\therefore \quad k_1 + k_2 = -2 + 2 = 0$

10. (C)

Let $a = 857$ and $b = 537$.

Use $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$

11. (A)

Since value of square root is always non-negative.

$x - 1 = 0, y - 2 = 0, z - 3 = 0$

$\therefore \quad x = 1, y = 2, z = 3$

$\therefore \quad x + y + z = 1 + 2 + 3 = 6$

12. (C)

$$= \frac{\frac{(b-a)\cancel{(b+a)}(b^2+a^2)}{a\cancel{(a+b)}} - \frac{b^3}{a}}{b^2 - ab + a^2}$$

$$= \frac{1}{a}\frac{\left[\cancel{b^3} + a^2b - ab^2 - a^3 - \cancel{b^3}\right]}{b^2 - ab + a^2}$$

$$= \frac{ab - b^2 - a^2}{b^2 - ab + a^2}$$

$$= -1$$

13. (A)

$P(1) = 1 + a + b + c = 2 \Rightarrow a + b + c = 1$ … (1)

$P(2) = 8 + 4a + 2b + c = 6 \Rightarrow 4a + 2b + c = -2$ … (2)

$P(3) = 27 + 9a + 3b + c = 12 \Rightarrow 9a + 3b + c = -15$ … (3)

On solving (1), (2) and (3) we get

$a = -5, b = 12$ and $c = -6$

$\therefore \quad P(x) = x^3 - 5x^2 + 12x - 6$

$\therefore \quad P(4) = 4^3 - 5(4)^2 + 12(4) - 6$

$\therefore \quad P(4) = 26$

14. (D)

Let $3^{x^2-1} = t$

$\therefore \quad t^2 - 10t + 9 = 0$

$\therefore \quad t = 1$ or $t = 9$

$\therefore \quad 3^{x^2-1} = 1$ or $3^{x^2-1} = 9$

$\therefore \quad x^2 - 1 = 0$ or $x^2 - 1 = 2$

$\therefore \quad x = \pm 1$ or $x = \pm\sqrt{3}$

15. (A)

Let α be one root of $x^3 + 3x + 2k = 0$

$\therefore \quad x^2 + 3x + 2k = (x - \alpha)(x - 2\alpha) = x^2 - 3\alpha x + 2\alpha^2$

$\therefore \quad 3 = -3\alpha$ and $2k = 2\alpha^2$

$\therefore \quad \alpha = -1$ and $\alpha^2 = k$

$\therefore \quad k = 1$

$k = 1$ satisfy $x^2 - 2x + 1 = 0$

16. (C)

For no solution,

$\frac{3}{p} = \frac{p}{3} \Rightarrow p^2 = 9 \Rightarrow p = \pm 3$

17. (D)

$b^2x - a^2y + a^2b + ab^2 = 0$ … (1)

$bx - ay + 2ab = 0$ …. (2)

By $(1) - (2) \times b$, we get

$-a^2y + aby + a^2b - ab^2 = 0$

$\therefore \quad ay(-a + b) = ab(b - a)$

$\therefore \quad ay = ab$

$\therefore \quad y = b$

By putting $y = b$ in equation (2), we get $x = -a$.

$\therefore \quad (x, y) = (-a, b)$.

18. (B)

Clearly $x = \frac{1}{1+x}$

$\therefore \quad x^2 + x - 1 = 0$

$\therefore \quad x = \frac{-1 \pm \sqrt{1^2 - 4(1)(-1)}}{2}$

$\therefore \quad$ Since $x > 0$, $x = \frac{-1+\sqrt{5}}{2}$

19. (D)

Non-real roots,

$D < 0$

$\therefore \quad (3p)^2 - 4(1)(4) < 0$

$\therefore \quad 9p^2 < 16$

$\therefore \quad p^2 < \frac{16}{9}$

$\therefore \quad -\frac{4}{3} < p < \frac{4}{3}$

20. (D)

Let x and y be length and breadth of rectangle.

$\therefore \quad 2(x+y) = 14$ and $xy = 12$

$\therefore \quad x = 4$ and $y = 3$ or $x = 3$ and $y = 4$

Length of diagonal $= \sqrt{x^2 + y^2}$

$= \sqrt{3^2 + 4^2}$

$= 5\,m$

Section – B

21. (C)

Let $\left(3+2\sqrt{2}\right)^{x^2-7} = t$

$\because \quad 3 - 2\sqrt{2} = \frac{1}{3+2\sqrt{2}}$

We get, $t + \frac{1}{t} = 6$

$\therefore \quad t^2 - 6t + 1 = 0$

$\therefore \quad t = \frac{6 \pm \sqrt{36-4}}{2} = \frac{6 \pm \sqrt{32}}{2} = 3 \pm 2\sqrt{2}$

$\therefore \quad \left(3+2\sqrt{2}\right)^{x^2-7} = 3+2\sqrt{2}$ or $\left(3+2\sqrt{2}\right)^{x^2-7} = 3-2\sqrt{2}$

$\therefore \quad x^2 - 7 = 1 \quad$ or $\quad x^2 - 7 = -1$

$\therefore \quad x^2 = 8 \quad$ or $\quad x^2 = 6$

$\therefore \quad x = \pm\sqrt{8} \quad$ or $\quad x = \pm\sqrt{6}$

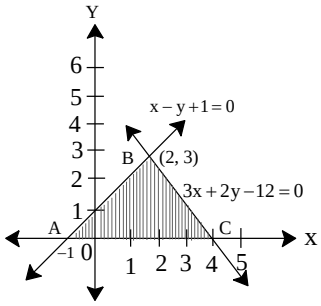
$\therefore \quad$ Sum of square of roots $= 8 + 8 + 6 + 6 = 28$

22. (A)

From Diagram,

In ΔABC, length of base is 5 and height is 3.

$\therefore$ Area of $\Delta ABC = \frac{1}{2} \times 3 \times 5 = \frac{15}{2}$ sq.units.



23. (A)

$\alpha + \beta = p - 2$ and $\alpha\beta = p^2 + 1$

Also, $(\alpha + \beta)^2 - 2\alpha\beta = \alpha\beta$

$\therefore \quad (\alpha + \beta)^2 = 3\alpha\beta$

$\therefore \quad (p - 2)^2 = 3(p^2 + 1)$

$\therefore \quad p^2 - 4p + 4 = 3p^2 + 3$

$\therefore \quad 2p^2 + 4p - 1 = 0$

$\therefore$ sum of all values of p is –4 / 2 = –2.

24. (C)

Let the required number be $10x + y$.

From given information,

$10x + y = 4(x + y)$ and $10x + y = 2xy$

On solving, we get $x = 3$ and $y = 6$

$\therefore$ The number is 36.

25. (D)

Let the speed of train be x km/hr and car be y km/hr respectively.

According to problem,

$\frac{280}{x} + \frac{200}{y} = 8$ And $\frac{140}{x} + \frac{340}{y} = \frac{88}{10} = \frac{44}{5}$

On solving we get, $x = 70$ km / hr and $y = 50$ km / hr

Section – C

26. (B)

Saturday's tomorrow is Sunday. This is my yesterday.

Wednesday's yesterday is Tuesday. This is my tomorrow.

Therefore, today is my Monday.

27. (A)

Q and P are both north of the swing.

But only P is south-west of the slide.

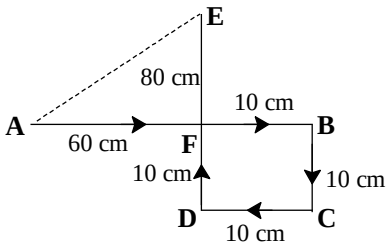
28. (D)

$3 \times 3 \times 3$ are non-painted small identical cubes.

29. (C)

The movement of Rahul from A to E are as shown in figure.

$$AE = \sqrt{(AF)^2 + (FE)^2}$$
$$= \sqrt{60^2 + 80^2}$$
$$= 100$$



30. (D)

A	L	L	O	W	A	N	C	E
–1↓	+1↓	–1↓	+1↓	–1↓	+1↓	–1↓	+1↓	–1↓
Z	N	K	P	V	B	M	D	D

D	E	A	R	N	E	S	S
–1↓	+1↓	–1↓	+1↓	–1↓	+1↓	–1↓	+1↓
C	F	Z	S	M	F	R	T