ACE OF PACE

ENGINEERING **Grade X moving to XI** **DATE: 14/12/2025**

Section – A

1. **(B)**

By using remainder theorem

$p(-1) = -2+5+1+3 = 7$

2. **(B)**

$$x^3+4x^2-x-4 = x^2(x+4)-1(x+4)$$
$$= (x^2-1)(x+4)$$
$$= (x-1)(x+1)(x+4)$$

3. **(C)**

$5x+6y = 800$

$2x+3y = 350$

$\therefore \quad 4x+6y = 700$

$\therefore \quad x = 100, \; y = 50$

$\therefore \quad 10x+2y = 1100$

4. **(D)**

$\alpha+\beta = 5, \quad \alpha\beta = 3$

$\alpha^2+\beta^2 = (\alpha+\beta)^2 - 2\alpha\beta = 25-6 = 19$

5. **(A)**

$$x+\frac{1}{x} = 2+\sqrt{3}+2-\sqrt{3} = 4$$

$$x^3+\frac{1}{x^3} = \left(x+\frac{1}{x}\right)^3 - 3\left(x+\frac{1}{x}\right)$$
$$= 64 - 12 = 52$$

6. **(B)**

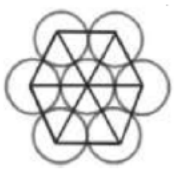
$\alpha = 5+2\sqrt{2}$

$\therefore \; \beta = 5-2\sqrt{2}$

$q = \alpha\beta = 25-8 = 17$

7. **(B)**

It can be seen that if we place 3 coins touching each other, their centers form an equilateral triangle. Hence the angle made by the centers of the coins around the central coin is 60°. Since the total angle to be covered is 360°, there has to be 6 coins surrounding the central coin.



8. **(C)**

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

$= (x^2 + 1)^2 - (x)^2$

$= (x^2 - x + 1)(x^2 + x + 1)$

9. **(B)**

The area of the circle inside the triangle is 45% of the total area of the diagram.
The area of the circle outside the triangle is (100 – 40 – 45)% = 15% of the total area of the diagram.
Therefore, the percentage of the circle that lies outside the triangle is $\frac{15}{15+45} \times 100 = 25\%$.

10. **(A)**

α, β are roots of $x^2 - 7x + 4 = 0$.

$\alpha\beta^2 + \alpha\beta^2 = \alpha\beta(\alpha + \beta) = 4 \times 7 = 28$

11. **(D)**

$\alpha + \frac{1}{\beta} = 5$ & $\beta + \frac{1}{\alpha} = 4$

$\alpha\beta + 1 = 5\beta$ & $\alpha\beta + 1 = 4\alpha$

$\therefore\ 5\beta = 4\alpha$

$\therefore\ \frac{\alpha}{\beta} = \frac{5}{4}$

12. **(D)**

$p(x) = x + \frac{1}{x}$ is NOT a polynomial

13. **(C)**

We know that there are infinitely many irrational numbers between two distinct real numbers

14. **(D)**

Required number = LCM (4, 6, 7) + 2 = 86.

15. **(A)**

Let total gift are x.

i.e. dolls are = $x - 6$

cars are = $x - 6$

books are = $x - 6$

i.e. $x = 3(x - 6)$

$x = 3x - 18$

$18 = 2x$

$x = 9$

16. **(A)**

Since 899 is divisible by 29, so you can directly divide the remainder of 63 by 29, so $\frac{63}{29}$ will give 5 as a remainder, option (A).

17. **(A)**

$(n-m)(n+m)=2\times 7 \Rightarrow$ For n, m = even or odd

$n-m$ and $n+m$ will be even or odd.

Hence no solution.

18. **(D)**

$\frac{a}{4}-\frac{b}{2}+c=0$

Compare it with $ax^2+bx+c=0 \Rightarrow x=-\frac{1}{2}$

19. **(B)**

$(a+b+c)^2=a^2+b^2+c^2+2(ab+bc+ca)$

$\therefore\ ab+bc+ca=\frac{4-1}{2}=\frac{3}{2}$

$\frac{1}{a}+\frac{1}{b}+\frac{1}{c}=\frac{ab+bc+ca}{abc}=\frac{1}{2}$

20. **(C)**

$$\begin{array}{r} ab \\ -ba \\ \hline 36 \end{array}$$

$10a+b-10b-a=0$

$9(a-b)=36$

$\therefore\ a-b=4$

$\therefore\ a=4, 5, 6, 7, 8, 9$

$\therefore$ 6 cases

Section – B

21. **(D)**

$\frac{2}{x}+\frac{3}{y}+\frac{4}{z}=\frac{1}{5}$ .....(1)

& $\frac{4}{x}+\frac{3}{y}+\frac{2}{z}=1$ .....(2)

Add: $\frac{6}{x}+\frac{6}{y}+\frac{6}{z}=\frac{6}{5}$

$\therefore$ $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}=\frac{1}{5}$ .....(3)

Equation (1) – equation (3) $\Rightarrow \frac{1}{x}+\frac{2}{y}+\frac{3}{z}=0$

22. **(C)**

$x^3+y^3+(-1)^3=3xy(-1)$

$\therefore\ x=y=-1$ OR $x+y-1=0$

23. **(A)**

$a_n - 6a_{n-1} + 3a_{n-2} = 0$

$a_{24} - 6a_{23} + 3a_{22} = 0$

$a_{24} - 3a_{23} = 3a_{23} - 3a_{22}$

$\frac{a_{24} - 3a_{23}}{a_{23} - a_{22}} = 3$

24. **(A)**

One root is $1 = \alpha$

$\alpha\beta = \frac{c-a}{a-b} \Rightarrow \beta = \frac{c-a}{a-b}$

$\therefore\ \alpha = \beta \ \Rightarrow\ 1 = \frac{c-a}{a-b} \ \Rightarrow\ 2a = b + c$

25. **(A)**

$a = k + 4$ is divisible by 7

$b = k + 2n$ is divisible by 7

$\Rightarrow\ b - a = 2n - 4$ is divisible by 7

$\Rightarrow\ 2n - 4 = 0$ or 7 or 14 …

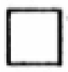
For minimum integral value of *n*,

$2n - 4 = 14$

$\Rightarrow\ n = 9$

Section – C

26. **(C)**



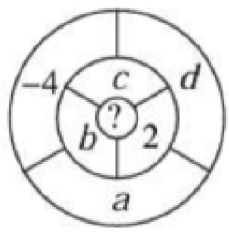
27. **(D)**

Let the numbers in the four regions that are neighbours to –4 be *a*, *b*, *c* and *d* as shown in the diagram.

The question tells us that $a + b + c + d = -4$.

However, we also know that $a + b + c + d + ? = 2$ and hence ? = 6.

(Note: The values $a = d = -4$ and $b = c = 2$ give a complete solution to the problem).



28. **(B)**

Looks at each segment. In the first segment, the arrows the both pointing to the right. In the second segment, the first arrow is up and the second is down. The third segment repeats the first segment. In the fourth segment, the arrows are up and then down. Because this is an alternating series, the two arrows pointing right will be repeated, so option (B) is the only possible choice.

29. **(A)**

Looks carefully at the number of dots in each domino. The first segment goes from five to three to one. The second segment goes from one to three to five. The third segment repeats the first segment.

30. **(B)**

$3 \times 2 \times 2 = 12$