X MCQs (POLYNOMIALS) RD SHARMA Solutions

1) If α, β are the zeroes of the polynomial $f(x) = x^2+x+1$, then $\frac{1}{\alpha}+\frac{1}{\beta} =$

(a) 1 (b) −1 (c) 0 (d) None of these

Solutions :-

Let $f(x) = x^2+x+1$ be of the form ax^2+bx+c; where $a = 1, b = 1, c = 1$

Then, $\alpha+\beta = -\frac{b}{a} = -1$

$$\alpha\beta = \frac{c}{a} = 1$$

Thus, $\frac{1\times\beta}{\alpha\times\beta}+\frac{1\times\alpha}{\beta\times\alpha} = \frac{\beta+\alpha}{\alpha\beta} = \frac{-1}{1} = -1$ (b)

2) If α, β are the zeroes of the polynomial $p(x) = 4x^2+3x+7$, then $\frac{1}{\alpha}+\frac{1}{\beta}$ is equal to

(a) $\frac{7}{3}$ (b) $-\frac{7}{3}$ (c) $\frac{3}{7}$ (d) $-\frac{3}{7}$

Solutions:-

Let $p(x) = 4x^2+3x+7$ be of the form ax^2+bx+c; where $a = 4, b = 3, c = 7$

Then $\alpha+\beta = -\frac{b}{a} = -\frac{3}{4}$

$$\alpha\beta = \frac{c}{a} = \frac{7}{4}$$

Then, $\frac{1}{\alpha}+\frac{1}{\beta} = \frac{\beta+\alpha}{\alpha\beta} = -\frac{3}{4}\div\frac{7}{4} = \frac{-3}{\cancel{4}_1}\times\frac{\cancel{4}^1}{7} = -\frac{3}{7}$ (d)

3) If one zero of the polynomial $f(x) = (k^2+4)x^2+13x+4k$ is reciprocal of the other, then $k =$

(a) 2 (b) −2 (c) 1 (d) −1

Solutions:-

Let $f(x) = (k^2+4)x^2+13x+4k$ be of the form ax^2+bx+c; where $a = k^2+4$; $b = 13$; $c = 4k$ and α and $\frac{1}{\alpha}$ be the zeroes.

Then, product of zeroes, $\cancel{\alpha}^1\times\frac{1}{\cancel{\alpha}_1} = \frac{c}{a}$

$$\Rightarrow 1 = \frac{4k}{k^2+4}$$

$\Rightarrow k^2+4 = 4k$

$\Rightarrow k^2-4k+4=0$

$\Rightarrow (k-2)^2=0$

$\therefore k=2$ (a)

4) If the sum of the zeroes of the polynomial $f(x)=2x^3-3kx^2+4x-5$ is 6, then the value of k is

(a) 2 (b) 4 (c) -2 (d) -4

Solution:-

Let $f(x)=2x^3-3kx^2+kx-5$ be of the form ax^3+bx^2+cx+d; where $a=2$, $b=-3k$, $c=k$, $d=-5$ and α, β and γ be the zeroes.

Sum of zeroes, $\alpha+\beta+\gamma = -\frac{b}{a}$

$$\Rightarrow \quad 6=\frac{3k}{2} \Rightarrow 3k=12$$

$$\therefore k=4 \text{ (b)}$$

5) If α and β are the zeroes of the polynomial $f(x)=x^2+px+q$, then a polynomial having $\frac{1}{\alpha}$ and $\frac{1}{\beta}$ is its zeroes is

(a) x^2+qx+p (b) x^2-px+q (c) qx^2+px+1 (d) px^2+qx+1

Solution:-

Sum of zeroes, $\alpha+\beta = -\frac{\text{Coefficient of } x}{\text{Coefficient of } x^2} = -p$

Product of zeroes, $\alpha\beta = \frac{\text{Constant term}}{\text{Coefficient of } x^2} = q$

for new polynomial:

Sum of zeroes, $\frac{1}{\alpha}+\frac{1}{\beta} = \frac{\alpha+\beta}{\alpha\beta} = \frac{-p}{q}$

Product of zeroes, $\frac{1}{\alpha}\times\frac{1}{\beta} = \frac{1}{\alpha\beta} = \frac{1}{q}$

$\therefore$ The required polynomial is $x^2-(\text{Sum of zeroes})x+\text{product of zeroes}$

$$= x^2+\frac{p}{q}x+\frac{1}{q} = qx^2+px+1 \text{ (c)}$$

6) If α, β are the zeroes of the polynomial $f(x)=x^2-p(x+1)-c$, then $(\alpha+1)(\beta+1)=$

(a) $c-1$ (b) $1-c$ (c) c (d) $1+c$

Solution :-

Let the polynomial $f(x) = x^2 - px - p - c$ be of the form $ax^2 + bx + c$; where $a = 1, b = -p, c = -p - c$

Then, $\alpha + \beta = -\frac{b}{a} = p$

$$\alpha\beta = \frac{c}{a} = -p - c$$

$\therefore (\alpha+1)(\beta+1) = \alpha\beta + (\alpha+\beta) + 1 = \cancel{-p} - c + \cancel{p} + 1 = 1 - c$ (b)

7) If α, β are the zeroes of the polynomial $f(x) = x^2 - p(x+1) - c$ such that $(\alpha+1)(\beta+1) = 0$, then $c =$

(a) 1 (b) 0 (c) -1 (d) 2

Solution:-

Let the polynomial $f(x) = x^2 - px - p - c$ be of the form $ax^2 + bx + c$; where $a = 1, b = -p, c = -p - c$.

Then, $\alpha + \beta = -\frac{b}{a} = p$

$$\alpha\beta = \frac{c}{a} = -p - c$$

$$\therefore (\alpha+1)(\beta+1) = 0$$

$$\Rightarrow \alpha\beta + (\alpha+\beta) + 1 = 0$$

$$\Rightarrow \cancel{-p} - c + \cancel{p} + 1 = 0$$

$$\therefore c = 1 \text{ (a)}$$

8) If $f(x) = ax^2 + bx + c$ has no real zeroes and $a + b + c < 0$, then

(a) $c = 0$ (b) $c > 0$ (c) $c < 0$ (d) none of these

Solution:-

Since $f(x)$ has no real zeroes, $b^2 - 4ac < 0 \quad \rightarrow (1)$

Given $a + b + c < 0$

$$\Rightarrow b < -a - c$$

$$\Rightarrow b < -(a+c)$$

From (1), $(a+c)^2 - 4ac < 0$

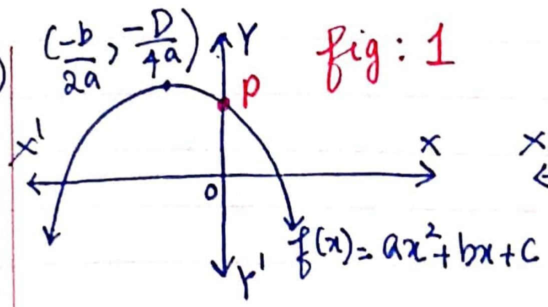
$$\Rightarrow a^2 + c^2 + 2ac - 4ac < 0$$

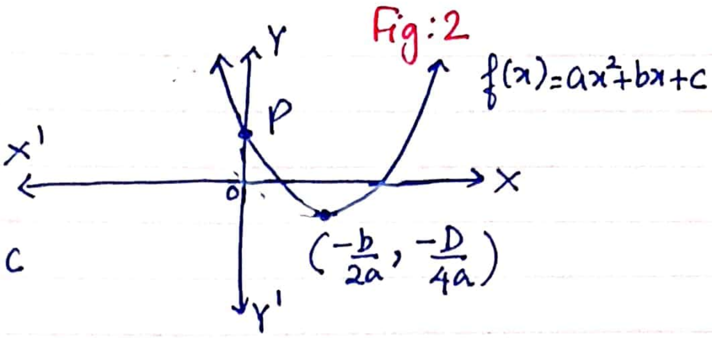
$$\Rightarrow a^2 + c^2 - 2ac < 0$$

$$\Rightarrow (a-c)^2 < 0$$

$$a - c < 0$$

$$a < c \text{ (d)}$$

9) 



The diagram 1 shows the graph of the polynomial $f(x) = ax^2+bx+c$, then

(a) $a<0$, $b<0$ and $c>0$ (b) $a<0$, $b<0$ and $c<0$

(c) $a<0$, $b>0$ and $c>0$ (d) $a<0$, $b>0$ and $c<0$

Solution:-

Since the parabola is opening downwards, $a<0$.

Also, vertex $\left(-\frac{b}{2a}, -\frac{D}{4a}\right)$ lies in the II quadrant.

Then, $-\frac{b}{2a} < 0$

$\Rightarrow \quad b<0$

Now, Take a point P, where $f(x)$ cuts at Y-axis.

Then, $x=0$ in $y = ax^2+bx+c$

$\Rightarrow y = c$

Since P lies on the +ve side of y-axis, $c>0$

$\therefore \quad a<0$, $b<0$ and $c>0$ (a)

10) The diagram 2 shows the graph of the polynomial $f(x) = ax^2+bx+c$ for which

(a) $a<0$, $b>0$ and $c>0$ (b) $a>0$, $b<0$ and $c>0$

(c) $a<0$, $b<0$ and $c<0$ (d) $a>0$, $b>0$ and $c<0$

Solution:-

Since the parabola is opening upwards, $a>0$

Also, vertex $\left(-\frac{b}{2a}, -\frac{D}{4a}\right)$ lies in the IV quadrant

Then $-\frac{b}{2a} > 0$

$-b>0$

$\Rightarrow b<0$

Now, Take a point P on Y axis.

Then put $x=0$ in $y = ax^2+bx+c \Rightarrow y = c$

Since P lies on the +ve side of y-axis, $c>0$

$\therefore a>0$, $b<0$ and $c>0$

11) If the product of zeroes of the polynomial $f(x) = ax^3 - 6x^2 + 11x - 6$ is 4, then $a =$

(a) $\frac{3}{2}$ (b) $-\frac{3}{2}$ (c) $\frac{2}{3}$ (d) $-\frac{2}{3}$

Solution:-

Let $f(x) = ax^3 - 6x^2 + 11x - 6$ be of the form $Ax^3 + Bx^2 + Cx + D$;
where $A = a, B = -6, C = 11, D = -6$

Then, product of zeroes $= \alpha\beta\gamma = -\frac{D}{A}$

$$\Rightarrow 4 = \frac{6}{a}$$

$$\Rightarrow a = \frac{6}{4} = \frac{3}{2} \text{ (a)}$$

12) If zeroes of the polynomial $f(x) = x^3 - 3px^2 + qx - r$ are in A.P, then

(a) $2p^3 = pq - r$ (b) $2p^3 = pq + r$ (c) $p^3 = pq - r$ (d) None of these

Solution:-

Let $f(x) = x^3 - 3px^2 + qx - r$ be of the form $Ax^3 + Bx^2 + Cx + D$;
Where $A = 1, B = -3p, C = q, D = -r$ and the zeroes be $a-d, a, a+d$.

Sum of zeroes, $a - \cancel{d} + a + a + \cancel{d} = \frac{-B}{A} = 3p$

$$3a = 3p$$

$$\underline{a = p} \longrightarrow (1)$$

Sum of product of zeroes taken two at a time

$$= (a-d)a + a(a+d) + (a-d)(a+d) = \frac{C}{A} = q$$

$$\Rightarrow a^2 - \cancel{ad} + a^2 + \cancel{ad} + a^2 - d^2 = q$$

$$\Rightarrow 3a^2 - d^2 = q$$

$$\Rightarrow 3p^2 - d^2 = q$$

$$\Rightarrow -d^2 = q - 3p^2$$

$$\therefore d^2 = 3p^2 - q \longrightarrow (2)$$

Product of zeroes $= (a-d)a(a+d) = -\frac{D}{A}$

$$\Rightarrow (a^2 - d^2)a = r$$

$$\Rightarrow (p^2 - 3p^2 + q)p = r$$

$$\Rightarrow p^3 - 3p^3 + pq = r$$

$$\Rightarrow -2p^3 = r - pq \Rightarrow 2p^3 = pq - r \text{ (a)}$$

13) If the product of two zeroes of the polynomial $f(x) = 2x^3 + 6x^2 - 4x + 9$ is 3, then its third zero is

(a) $\frac{3}{2}$ (b) $-\frac{3}{2}$ (c) $\frac{9}{2}$ (d) $-\frac{9}{2}$

Solution:-

Let the given polynomial $f(x)$ be of the form $ax^3 + bx^2 + cx + d$; where $a = 2, b = 6, c = -4, d = 9$ and α, β and γ be the zeroes.

product of zeroes, $\alpha\beta\gamma = \frac{-d}{a}$

$$\Rightarrow 3 \times \gamma = \frac{-9}{2}$$

$$\therefore \text{The third zero, } \gamma = \frac{-\cancel{9}^{3}}{\cancel{3}_{1} \times 2} = -\frac{3}{2} \text{ (b)}$$

14) If the polynomial $f(x) = ax^3 + bx - c$ is divisible by the polynomial $g(x) = x^2 + bx + c$, then $ab =$ ___

(a) 1 (b) $\frac{1}{c}$ (c) -1 (d) $-\frac{1}{c}$

Solution:-

On dividing $f(x)$ by $g(x)$,

$$\begin{array}{r|l} & ax - ab \\ \hline x^2+bx+c & \cancel{ax^3} + 0x^2 + bx - c \\ & \underset{(-)}{\cancel{ax^3}} \underset{(-)}{+ abx^2} \underset{(-)}{+ acx} \\ \hline & -\cancel{abx^2} + x(b - ac) - c \\ & \underset{(+)}{-\cancel{abx^2}} \underset{(+)}{- ab^2x} \underset{(+)}{- abc} \\ \hline & x(b - ac + ab^2) + abc - c \end{array}$$

Since $f(x)$ is divisible by $g(x)$, remainder $= 0$

On comparing the remainder with $0x + 0$,

$$abc - c = 0$$

$$ab\cancel{c}^{1} = \cancel{c}^{1}$$

$$\therefore ab = 1 \text{ (a)}$$

15) In the above question. Q.No 14) $ac =$ ___

(a) b (b) $2b$ (c) $2b^2$ (d) $-2b$

Solution:-

$$b - ac + ab^2 = 0$$

$$\Rightarrow b - ac + ab \times b = 0$$

$$\Rightarrow b - ac + 1 \times b = 0 \quad [\because ab = 1]$$

$$\Rightarrow 2b - ac = 0$$

$$\Rightarrow 2b = ac$$

$$\therefore ac = 2b \text{ (b)}$$

16) If one root of the polynomial $f(x) = 5x^2 + 13x + k$ is reciprocal of the other, then the value of k is

(a) 0 (b) 5 (c) $1/6$ (d) 6

Solution:-

Let the zeroes be α and $\frac{1}{\alpha}$ and $f(x)$ be of the form ax^2+bx+c; where $a=5$, $b=13$, $c=k$.

product of zeroes, $\alpha \times \frac{1}{\alpha} = \frac{c}{a}$

$$\Rightarrow 1 = \frac{k}{5}$$

$$\therefore k = 5 \text{ (b)}$$

17) If α, β, γ are the zeroes of the polynomial $f(x) = ax^3+bx^2+cx+d$ then $\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma} =$

(a) $-\frac{b}{d}$ (b) $\frac{c}{d}$ (c) $-\frac{c}{d}$ (d) $-\frac{c}{a}$

Solution:-

$$\frac{1^{\times\beta\gamma}}{\alpha_{\times\beta\gamma}}+\frac{1^{\times\alpha\gamma}}{\beta_{\times\alpha\gamma}}+\frac{1^{\times\alpha\beta}}{\gamma_{\times\alpha\beta}} = \frac{\beta\gamma+\alpha\gamma+\alpha\beta}{\alpha\beta\gamma} = \frac{\frac{c}{\cancel{a}}}{\frac{-d}{\cancel{a}}} = -\frac{c}{d} \text{ (c)}$$

18) If α, β, γ are the zeroes of the polynomial $f(x) = ax^3+bx^2+cx+d$, then $\alpha^2+\beta^2+\gamma^2 =$

(a) $\frac{b^2-ac}{a^2}$ (b) $\frac{b^2-2ac}{a}$ (c) $\frac{b^2+2ac}{b^2}$ (d) $\frac{b^2-2ac}{a^2}$

Solution:-

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

$$(\alpha+\beta+\gamma)^2 = \alpha^2+\beta^2+\gamma^2+2(\alpha\beta+\beta\gamma+\gamma\alpha)$$

$$\left(-\frac{b}{a}\right)^2 = \alpha^2+\beta^2+\gamma^2+2\times\frac{c}{a}$$

$$\alpha^2+\beta^2+\gamma^2 = \frac{b^2}{a^2} - \frac{2c^{\times a}}{a_{\times a}} = \frac{b^2-2ac}{a^2} \text{ (d)}$$

19) If α, β, γ are the zeroes of the polynomial $f(x) = x^3-px^2+qx-r$, then $\frac{1}{\alpha\beta}+\frac{1}{\beta\gamma}+\frac{1}{\gamma\alpha} =$

(a) $\frac{r}{p}$ (b) $\frac{p}{r}$ (c) $-\frac{p}{r}$ (d) $-\frac{r}{p}$

Solution:-

Let $f(x) = x^3 - px^2 + qx - r$ be of the form ax^3+bx^2+cx+d,
where $a=1, b=-p, c=q, d=-r$

$$\frac{1}{\alpha\beta}+\frac{1}{\beta\gamma}+\frac{1}{\gamma\alpha} = \frac{\gamma+\alpha+\beta}{\alpha\beta\gamma} = \frac{-\frac{b}{a}}{\frac{-d}{a}} = \frac{b}{d} = \frac{p}{r} \text{ (b)}$$

20) If α, β are the zeroes of the polynomial $f(x) = ax^2+bx+c$, then $\frac{1}{\alpha^2}+\frac{1}{\beta^2} =$

(a) $\frac{b^2-2ac}{a^2}$ (b) $\frac{b^2-2ac}{c^2}$ (c) $\frac{b^2+2ac}{a^2}$ (d) $\frac{b^2+2ac}{c^2}$

Solution:-

$$\alpha+\beta = -\frac{b}{a}$$

$$\alpha\beta = \frac{c}{a}$$

$$\frac{1}{\alpha^2}+\frac{1}{\beta^2} = \frac{\beta^2+\alpha^2}{\alpha^2\beta^2} = \frac{(\alpha+\beta)^2-2\alpha\beta}{(\alpha\beta)^2} = \frac{\left(\frac{-b}{a}\right)^2 - 2\times\frac{c}{a}}{\left(\frac{c}{a}\right)^2}$$

$$= \frac{\frac{b^2}{a^2} - \frac{2c\times a}{a\times a}}{\frac{c^2}{a^2}} = \frac{b^2-2ac}{\cancel{a^2}} \times \frac{\cancel{a^2}}{c^2} = \frac{b^2-2ac}{c^2} \text{ (b)}$$

21) If two of the zeroes of the cubic polynomial ax^3+bx^2+cx+d are each equal to zero, then the third zero is

(a) $-d/a$ (b) c/a (c) $-b/a$ (d) b/a

Solution:-

Let the zeroes be α, β and γ.

ATQ, $\alpha=\beta=0$

Then, $\alpha+\beta+\gamma = -\frac{b}{a}$

$0+0+\gamma = -\frac{b}{a}$

Thus the third zero is $-\frac{b}{a}$ (c)

22) If two zeroes of x^3+x^2-5x-5 are $\sqrt{5}$ and $-\sqrt{5}$, then its third zero is

(a) 1 (b) −1 (c) 2 (d) −2

Solution :-

Since $\sqrt{5}$ and $-\sqrt{5}$ are the zeroes of $p(x) = x^3 + x^2 - 5x - 5$, $(x - \sqrt{5})$ and $(x + \sqrt{5})$ are its factors.

Consequently, $x^2 - 5$ is a factor of $p(x)$

On dividing $p(x)$ by $x^2 - 5$, $\frac{x^3 + x^2 - 5x - 5}{x^2 - 5} = \frac{x^2(x+1) - 5(x+1)}{x^2 - 5}$

$$= \frac{\cancel{(x^2-5)}(x+1)}{\cancel{x^2-5}} = x + 1$$

Thus the third zero is −1. (b)

23) The product of the zeroes of $x^3 + 4x^2 + x - 6$ is

(a) −4 (b) 4 (c) 6 (d) −6

Solution:-

Let the given polynomial be of the form $ax^3 + bx^2 + cx + d$.

Then, product of zeroes $= \frac{-\text{constant term}}{\text{co-efficient of } x^3} = \frac{-(-6)}{1}$

$= 6$ (c)

24) What should be added to the polynomial $x^2 - 5x + 4$, so that 3 is the zero of the resulting polynomial?

(a) 1 (b) 2 (c) 4 (d) 5

Solution:-

Since 3 is the zero of the resulting polynomial, $x - 3$ is a factor of it.

On dividing,

$$\begin{array}{r|l} & x - 2 \\ \hline x - 3 & \cancel{x^2} - 5x + 4 \\ & \underset{(-)}{}\cancel{x^2} \underset{(+)}{-} 3x \\ \hline & -\cancel{2x} + 4 \\ & \underset{(+)}{-}\cancel{2x} \underset{(-)}{+} 6 \\ \hline & -2 \end{array}$$

Thus the required polynomial to be added is 2 (b)

25) What should be subtracted to the polynomial $x^2 - 16x + 30$, so that 15 is the zero of the resulting polynomial?

Solution :-

Since 15 is the zero of the resulting polynomial,

$(x-15)$ is a factor of it.
On dividing,

$$\begin{array}{r|l} & x-1 \\ \hline x-15 & x^2-16x+30 \\ & \underline{\cancel{x^2} \overset{(+)}{-} 15x} \\ & \quad -x+30 \\ & \quad \underline{\cancel{-x} + 15} \\ & \quad\quad 15 \end{array}$$

Thus the required polynomial to be subtracted is 15 (c)

26) A quadratic polynomial, the sum of whose zeroes is 0 and one zero is 3, is
(a) x^2-9 (b) x^2+9 (c) x^2+3 (d) x^2-3

Solution :-
Let α, β be the zeroes of the required quadratic polynomial and $\alpha = 3$

ATQ, $\alpha+\beta = 0$
$\Rightarrow 3+\beta = 0$
$\beta = -3$

$\alpha\beta = 3\times-3 = -9$

$\therefore$ The required polynomial is $x^2-(\alpha+\beta)x+\alpha\beta$
$= x^2-9$ (a)

27) If two zeroes of the polynomial x^3+x^2-9x-9 are 3 and -3, then its third zero is
(a) -1 (b) 1 (c) -9 (d) 9

Solution :-
Since 3 and -3 are the zeroes of $p(x) = x^3+x^2-9x-9$, $(x-3)$ and $(x+3)$ are its factors.
Consequently, x^2-9 is a factor of $p(x)$.
On dividing, $\dfrac{x^3+x^2-9x-9}{x^2-9} = \dfrac{x^2(x+1)-9(x+1)}{x^2-9}$
$= \dfrac{(x^2-9)(x+1)}{x^2-9} = x+1$

Thus the third zero is -1 (a)

28) If $\sqrt{5}$ and $-\sqrt{5}$ are zeroes of the polynomial $x^3+3x^2-5x-15$, then its third zero is
(a) 3 (b) -3 (c) 5 (d) -5

Solution :-
Let $p(x) = x^3+3x^2-5x-15$.

Since $\sqrt{5}$ and $-\sqrt{5}$ are the zeroes of $p(x)$, then $(x-\sqrt{5})$ and $(x+\sqrt{5})$ are the factors of $p(x)$.
Consequently, x^2-5 is also a factor of $p(x)$.
On dividing, $\frac{x^3+3x^2-5x-15}{x^2-5} = \frac{x^2(x+3)-5(x+3)}{x^2-5}$

$$= \frac{\cancel{(x^2-5)}(x+3)}{\cancel{x^2-5}} = x+3$$

Thus the third zero is -3 (b)

29) If $(x+2)$ is a factor of $x^2+ax+2b$ and $a+b=4$, then
(a) $a=1, b=3$ (b) $a=3, b=1$ (c) $a=-1, b=5$ (d) $a=5, b=-1$

Solution:-

Let $p(x) = x^2+ax+2b$
Since $(x+2)$ is a factor of $p(x)$, $p(-2)=0$

$$\Rightarrow (-2)^2+a(-2)+2b=0$$
$$\Rightarrow 4-2a+2b=0$$
$$\div 2 \Rightarrow 2-a+b=0$$
$$\Rightarrow -a+b=-2$$

Given, $a+b=4$

$(+)$, $2b=2$

$b=1$

$a=3$

$\therefore a=3, b=1$ (b)

30) The polynomial which when divided by $-x^2+x-1$ gives a quotient $x-2$ and remainder 3 is
(a) x^3-3x^2+3x-5 (b) $-x^3-3x^2-3x-5$ (c) $-x^3+3x^2-3x+5$
(d) x^3-3x^2-3x+5.

Solution:-

Using division algorithm,
dividend = divisor × quotient + remainder

$$= (-x^2+x-1)(x-2)+3$$
$$= -x^3+2x^2+x^2-2x-x+2+3$$
$$= -x^3+3x^2-3x+5 \text{ (c)}$$

31) The number of polynomials having zeroes -2 and 5 is
(a) 1 (b) 2 (c) 3 (d) more than 3

Solution:-

more than 3 (d). Infinite no. of polynomials are possible.
We know that any quadratic polynomial can be written as $k(ax^2+bx+c)$ where k is any real number and zeroes will not change

32) If one of the zeroes of the quadratic polynomial $(k-1)x^2+kx+1$ is -3, then the value of k is
(a) $4/3$ (b) $-4/3$ (c) $2/3$ (d) $-2/3$

Solution:-

Let $p(x) = (k-1)x^2+kx+1$.

Since -3 is a zero of $p(x)$, then $p(-3)=0$

$$\Rightarrow (k-1)(-3)^2+k(-3)+1=0$$
$$\Rightarrow 9k-9-3k+1=0$$
$$\Rightarrow 6k-8=0$$
$$\Rightarrow k = \frac{8}{6} = \frac{4}{3} \text{ (a)}$$

33) The zeroes of the quadratic polynomial $x^2+99x+127$ are
(a) both positive (b) both negative (c) both equal
(d) one positive and one negative

Solution:-

both negative (b)

We know that in a quadratic polynomial ax^2+bx+c, if $a>0, b>0, c>0$ or $a<0, b<0, c<0$, then the polynomial has always all negative zeroes.

34) If the zeroes of the quadratic polynomial $x^2+(a+1)x+b$ are 2 and -3, then
(a) $a=-7, b=-1$ (b) $a=5, b=-1$ (c) $a=2, b=-6$ (d) $a=0, b=-6$

Solution:-

Let $p(x) = x^2+(a+1)x+b$

Since 2 is a zero of $p(x)$, then $p(2)=0$

$$\Rightarrow 2^2+(a+1)\times 2+b=0$$
$$\Rightarrow 4+2a+2+b=0$$
$$\Rightarrow 2a+b=-6 \longrightarrow (1)$$

Since -3 is a zero of $p(x)$, then $p(-3)=0$

$$\Rightarrow (-3)^2+(a+1)\times -3+b=0$$
$$\Rightarrow 9-3a-3+b=0$$
$$\Rightarrow -3a+b=-6 \longrightarrow (2)$$

$(1)-(2)$, $-a = 0$
$a = 0$
$b = -6$ (d)

35) Given that one of the zeroes of the Cubic polynomial ax^3+bx^2+cx+d is zero, the product of the other two zeroes is

(a) $-c/a$ (b) c/a (c) 0 (d) $-b/a$

Solution:-

Let the zeroes be α, β and γ and $\alpha = 0$

Then $\alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{a}$

$$\Rightarrow 0 + \beta\gamma + 0 = \frac{c}{a}$$

$$\Rightarrow \beta\gamma = \frac{c}{a}$$

. Thus product of the other two zeroes is $\frac{c}{a}$ (b)

36) The zeroes of the quadratic polynomial x^2+ax+a ; $a \neq 0$

(a) cannot both be positive (b) cannot both be negative

(c) are always unequal (d) are always equal.

Solution:-

Cannot both be positive (a)

We know that for a quadratic polynomial Ax^2+Bx+C, if $A>0, B>0, C>0$ or $A<0, B<0, C<0$, then the zeroes are all negative and if $A>0, C<0$ or $A<0, C>0$, then the polynomial has always zeroes of opposite sign.

Here, if $a<0$, then $A>0$ and $C<0$, then zeroes are of opposite sign

Also, if $a>0$, then $A>0$ and $C>0$, then zeroes are negative.

Hence zeroes cannot both be positive.

37) If one of the zeroes of the Cubic polynomial x^3+ax^2+bx+c is -1, then the product of other two zeroes is

(a) $b-a+1$ (b) $b-a-1$ (c) $a-b+1$ (d) $a-b-1$

Solution:-

Let $p(x) = x^3+ax^2+bx+c$ and α, β, γ be the zeroes ; $\alpha = -1$

Since -1 is a zero, $p(-1) = 0 \Rightarrow (-1)^3 + a(-1)^2 + b(-1) + c = 0$

$$\Rightarrow -1 + a - b + c = 0$$

$$\Rightarrow c = b - a + 1 \longrightarrow (1)$$

Then, $\alpha\beta\gamma = -\frac{c}{1} \Rightarrow (-1)\beta\gamma = -c \Rightarrow \beta\gamma = c = b-a+1$ [from eq:(1)]

Thus product of other two zeroes $= b-a+1$ (a)

38) Given that two of the zeroes of the cubic polynomial ax^3+bx^2+cx+d are 0, the third zero is
(a) $-b/a$ (b) b/a (c) c/a (d) $-d/a$

Solution:-

Let the zeroes be α, β and γ; $\alpha = \beta = 0$

$$\alpha+\beta+\gamma = -\frac{b}{a}$$

$$\Rightarrow 0+0+\gamma = -\frac{b}{a} \quad \Rightarrow \gamma = -\frac{b}{a}$$

Thus third zero $= -\frac{b}{a}$ (a)

39) If one zero of the quadratic polynomial x^2+3x+k is 2, then the value of k is
(a) 10 (b) -10 (c) 5 (d) -5

Solution:-

Let $p(x) = x^2+3x+k$.
Since 2 is a zero of $p(x)$, $p(2)=0$

$$\Rightarrow 2^2+3\times2+k=0$$
$$\Rightarrow 4+6+k=0$$
$$k=-10 \text{ (b)}$$

40) If the zeroes of the quadratic polynomial ax^2+bx+c; $c \neq 0$ are equal, then
(a) c and a have opposite signs (b) c and b have opp. signs
(c) c and a have the same sign (d) c and b have the same sign.

Solution:-

The zeroes of the given quadratic polynomial ax^2+bx+c, are equal, if a and c have the same sign, while b can be positive/negative but not zero. (c)

41) If one of the zeroes of a quadratic polynomial of the form x^2+ax+b is the negative of the other, then it
(a) has no linear term and constant term is negative
(b) has no linear term and constant term is positive
(c) can have a linear term but the constant term is negative
(d) can have a linear term but the constant term is positive.

Solution:-

if the zeroes are negative of the other,

Sum of zeroes $= \dfrac{-\text{Coefficient of } x}{\text{Coefficient of } x^2}$

$0 = \dfrac{-a}{1} \Rightarrow a = 0$, no linear term

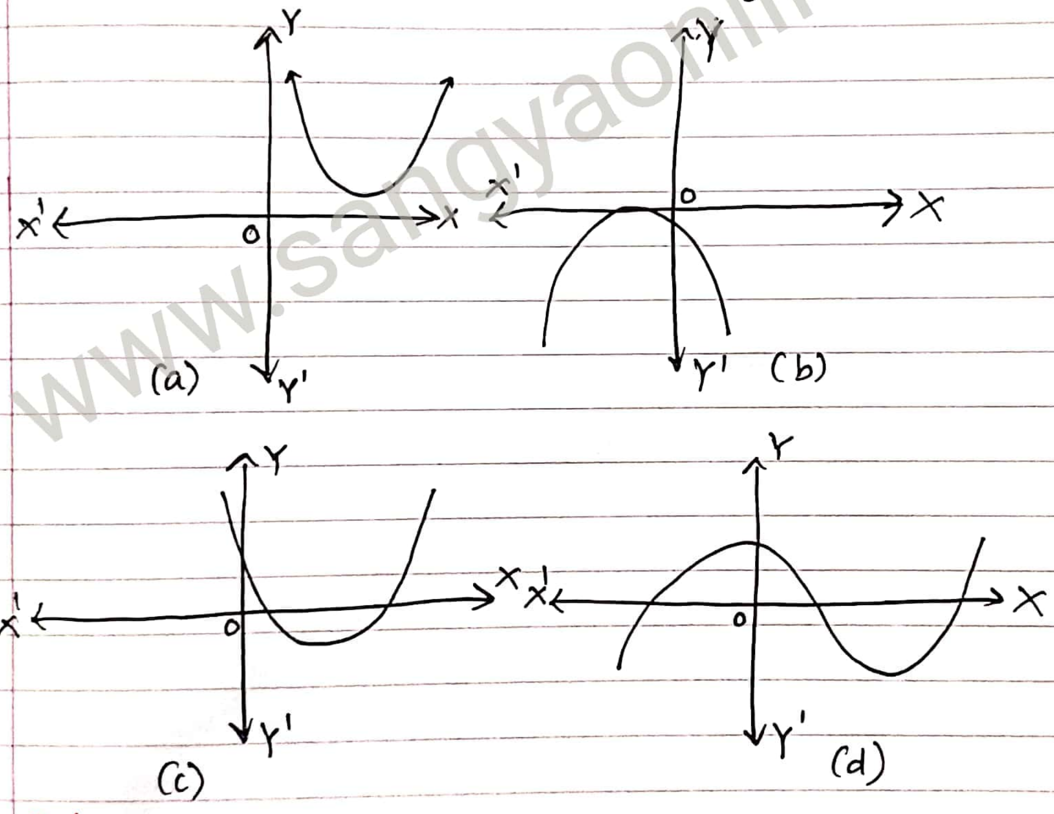
Product of zeroes $= \dfrac{\text{Constant term}}{\text{Coefficient of } x^2} < 0$

$\Rightarrow \dfrac{b}{1} < 0$

$\Rightarrow b < 0$, constant term is negative

Thus has no linear term and constant term is negative (a)

42) Which of the following is not the graph of a quadratic polynomial



Solution:-

The curve of a quadratic polynomial intersects the x-axis at atmost two points but in option (d), the curve intersects the x-axis at three points.

Thus it does not represent the quadratic polynomial (d)