Nishant Jindal

17) $x^2+px+12=0 \to \boxed{x=4}$

$4^2+4p+12=0$ $\quad 4p=-28$

$\boxed{p=-7}$

$x^2+px+q=0$ has

Eql Roots → $D=0$

$p^2=4q$

$(-7)^2=4q$

$q=49/4$

19) $x^2-4x-\log_2 a=0$

Root = Real → $D\geq 0$

$(-4)^2+4\times 1\times \log_2 a\geq 0$

$4+\log_2 a\geq 0$

$\log_2 a\geq -4$

$a\geq 2^{-4} \Rightarrow a\geq \frac{1}{16}$

Q.17 If one root of equation $x^2 + px + 12 = 0$ is 4 , while the equation $x^2 + px + q = 0$ has equal roots then the value of q is-

(A) 49/4 (B) 4/49 (C) 4 (D) None of these

Q.18 If roots of the equation $(a-b)x^2 + (c-a)x + (b-c) = 0$ are equal, then a, b, c are in -

(A) A.P. (B) H.P. (C) G.P. (D) None of these

Q.19 If the roots of $x^2 - 4x - \log_2 a = 0$ are real, then-

(A) $a \geq \frac{1}{4}$ (B) $a \geq \frac{1}{8}$ (C) $a \geq \frac{1}{16}$ (D) None of these

Q.20 If the roots of both the equations $px^2 + 2qx + r = 0$ and $qx^2 - 2\sqrt{prx} + q = 0$ are real, then -

(A) $p = q, r \neq 0$ (B) $2q = \pm\sqrt{pq}$ (C) $p/q = q/r$ (D) None of these

Q20 $px^2+2qx+r=0$

$qx^2-2\sqrt{pq}\,x+q=0$

$a-b+b-c+c-a=0 \Rightarrow$ (coff Sum $=0$)

$x=1$ $\quad \boxed{\alpha=1=\beta}$

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

$1\times 1=\frac{b-c}{a-b} \Rightarrow b-c=a-b$

$2b=a+c$

$\boxed{a,b,c\ AP}$

Nishant Jindal

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$qx^2-2\sqrt{pq}\,x+q=0$

$px^2+2qx+r=0 \rightarrow D\geq 0$

$4q^2-4\times p\times r\geq 0$

$\boxed{q^2\geq pr}$

$qx^2-2\sqrt{pr}\,x+q=0$ $\quad D\geq 0$

$4pr-4q\times q\geq 0$

$\boxed{q^2\leq pr}$

$q^2=pr$

$q\times q=pr$

$\boxed{\frac{q}{r}=\frac{p}{q}}$

Nishant Jindal

21) $(P-2)x^2+2(P-2)x+2=0$

Root not Real

$\underline{D<0}$

$4(P-2)^2-4\times(P-2)(2)<0$

$4(P-2)\{(P-2)-2\}<0$

$4(P-2)(P-4)<0$

$+ \quad - \quad +$

$2 \quad 4$

$2<P<4$

$P\in(2,4)$

Q.21 The roots of the equation $(p-2)x^2 + 2(p-2)x + 2 = 0$ are not real when-

(A) $p \in [1,2]$ (B) $p \in [2,3]$ (C) $p \in (2,4)$ (D) $p \in [3,4]$

Q.22 If the roots of the equation $x^2 - 10x + 21 = m$ are equal then m is-

(A) 4 (B) 25 (C) -4 (D) 0

Q.23 For what value of a, the difference of roots of the equation $(a-2)x^2 - (a-4)x - 2 = 0$ is equal to 3

(A) 3,3/2 (B) 3,1 (C) 1,3/2 (D) None of these

Q.24 If α, β are roots of the equation $x^2 + px - q = 0$ and γ, δ are roots of $x^2 + px + r = 0$, then the value of $(\alpha-\gamma)(\alpha-\delta)$ is-

(A) $p + r$ (B) $p - r$ (C) $q - r$ (D) $q + r$

22) $x^2-10x+21=m$

Root Eq^l → $D=0$

23) $(a-2)x^2-(a-4)x-2=0$

DOR: 3 then a=?

$\frac{\sqrt{D}}{a}=3$ (given)

$\frac{\sqrt{(a-4)^2+4(a-2)2}}{(a-2)}=3$

$\sqrt{(a-4)^2+4(a-2)\times 2}=3(a-2)$

$(a-4)^2+8(a-2)=9(a-2)^2$

SAG "a"

Nishant Jindal

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Root not Real.

$D<0$

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$4(P-2)\{(P-2)-2\}<0$

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+ − +

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(24) $x^2+px-q=0 \to \alpha, \beta$

$\boxed{\alpha^2+p\alpha}-q=0$

$x^2+px+r=0 \to \gamma, \delta$

$\gamma+\delta=-p,\ \gamma\delta=r$

Demand.

$(\alpha-\gamma)(\alpha-\delta)$

$\alpha^2-\gamma\alpha+\gamma\delta-\alpha\delta$

$\alpha^2-\alpha(\gamma+\delta)+\gamma\delta$

$\boxed{\alpha^2+p\alpha}+r$

$q+r$

Nishant Jindal

Q If α, β are Root of $ax^2+bx+c=0$

then find value of $(a\alpha+b)^{-2}+(a\beta+b)^{-2}=?$

$ax^2+bx+c=0$ → α, β $\quad (\alpha+\beta)=-\frac{b}{a}$, $\alpha\cdot\beta=\frac{c}{a}$

then α & β will satisfy Eqn.

$a\alpha^2+b\alpha+c=0 \Rightarrow a\alpha^2+b\alpha=-c$

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

$a\beta^2+b\beta+c=0$ → S|y $\boxed{a\beta+b=-\frac{c}{\beta}}$

Demand $=(a\alpha+b)^{-2}+(a\beta+b)^{-2}$

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

Rk.

$\boxed{1)\ \alpha^2+\beta^2=(\alpha+\beta)^2-2\alpha\beta}$

Nishant Jindal

Q If α, β are Roots of $ax^2+bx+c=0$

then $a\left(\frac{\alpha^2}{\beta}+\frac{\beta^2}{\alpha}\right)+b\left(\frac{\alpha}{\beta}+\frac{\beta}{\alpha}\right)=?$

Demand $\rightarrow \frac{a\alpha^2}{\beta}+\frac{a\beta^2}{\alpha}+\frac{b\alpha}{\beta}+\frac{b\beta}{\alpha}$

$$\frac{(a\alpha^2+b\alpha)}{\beta}+\frac{a\beta^2+b\beta}{\alpha}$$

$$\Rightarrow \frac{-c}{\beta}+\frac{-c}{\alpha}=-c\left(\frac{1}{\alpha}+\frac{1}{\beta}\right)=-c\frac{(\alpha+\beta)}{\alpha\beta}=-\frac{c\times\left(-\frac{b}{\cancel{a}}\right)}{\frac{c}{\cancel{a}}}=\frac{b\cancel{c}}{\cancel{c}}=b.$$

Pichhle Qs.

$\underline{a\alpha^2+b\alpha+c=0} \Rightarrow a\alpha^2+b\alpha=-c$

$\underline{a\beta^2+b\beta+c=0} \Rightarrow a\beta^2+b\beta=-c$

Nishant Jindal

Q If $\alpha^2+3=5\alpha$ & $\beta^2=5\beta-3$

then $\alpha+\beta=?$

$$\boxed{\begin{aligned}\alpha^2-5\alpha+3&=0\\ \beta^2-5\beta+3&=0\end{aligned}}$$

Kaafi Matching Matching

ULTA socha

Eqn $x^2-5x+3=0 < \begin{matrix}\alpha\\ \beta\end{matrix}$

$\Rightarrow \alpha+\beta=\frac{-(-5)}{1}=5$

Nishant Jindal

Q If α, β are Roots of $x^2-2x+5=0$ then form a Q Eqn whose Roots are $\alpha^3+\alpha^2-\alpha+22$ & $\beta^3+4\beta^2-7\beta+35$

$$3)\overline{4}(1$$
$$\frac{3}{1} \Rightarrow \boxed{4 = 3\times 1 + 1}$$

1) $x^2-2x+5=0 \to \alpha, \beta$

α, β will Satisfy Eqn.

$\alpha^2-2\alpha+5=0$

$\beta^2-2\beta+5=0$

New Roots

$\alpha^2-2\alpha+5)\ \alpha^3+\alpha^2-\alpha+22\ (\alpha+3$

$\alpha^3-2\alpha^2+5\alpha$

$3\alpha^2-6\alpha+22$

$3\alpha^2-6\alpha+15$

7

$\beta^2-2\beta+5)\ \beta^3+4\beta^2-7\beta+35\ (\beta+6$

$\beta^3-2\beta^2+5\beta$

$6\beta^2-12\beta+35$

$6\beta^2-12\beta+30$

$+5$

New Roots $\alpha^3+\alpha^2-\alpha+22$ & $\beta^3+4\beta^2-7\beta+35$

$=(\alpha+3)\boxed{(\alpha^2-2\alpha+5)}+7$ & $\boxed{(\beta^2-2\beta+5)}(\beta+6)+5$

$=(\alpha+3)\times 0+7$ & $0\times(\beta+6)+5$

New Root $=7$ & 5

$x^2-(7+5)x+7\times 5=0$

$x^2-12x+35=0$

Nishant Jindal

Q $f(x) = x^4 + 3x^3 - 8x^2 - 9x - 10$

then $f\left(\frac{5+\sqrt{3}}{1+\sqrt{3}}\right) = ?$

Demand $\frac{5+\sqrt{3}}{1+\sqrt{3}} = x$ Put Karo.

Wait & Solve first

$x = \frac{5+\sqrt{3}}{1+\sqrt{3}} \times \frac{1-\sqrt{3}}{1-\sqrt{3}}$

$= \frac{5-5\sqrt{3}+\sqrt{3}-3}{-2} = \frac{2-4\sqrt{3}}{-2}$

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

$(x+1)^2 = (2\sqrt{3})^2$

$x^2+2x+1 = 12 \Rightarrow \boxed{x^2+2x-11=0}$

$$
\begin{array}{r|l|l}
x^2+2x-11 & x^4+3x^3-8x^2-9x-10 & x^2+x+1 \\
 & \underline{x^4+2x^3-11x^2} & \\
 & x^3+3x^2-9x & \\
 & \underline{x^3+2x^2-11x} & \\
 & x^2+2x-10 & \\
 & \underline{x^2+2x-11} & \\
 & 1 &
\end{array}
$$

$f(x) = x^4+3x^3-8x^2-9x-10$

$= \cancel{(x^2+2x-11)}(x^2+x+1) + 1$

$= 0 \times (x^2+x+1) + 1 = +1$

Nishant Jindal

Symmetric Roots

1) $f(\alpha,\beta) = f(\beta,\alpha)$ then fxn is symm fxn.

& Roots are symm Roots

2) $f(\alpha,\beta) = \underline{\underline{\alpha^2+\beta^2}}$ (given)

U ask Urself → $f(\beta,\alpha) = \beta^2+\alpha^2$
$f(\beta,\alpha) = f(\alpha,\beta)$ } $\alpha^2+\beta^2$ is Symm. Expression

Ex: $f(\boxed{\alpha},\beta) = \underline{\dfrac{\alpha^2}{\beta} + \dfrac{\beta^2}{\alpha}}$ is Sym Exp. or Not?

U ask Urself $f(\beta,\alpha) = \underline{\dfrac{\beta^2}{\alpha} + \dfrac{\alpha^2}{\beta}} = f(\alpha,\beta)$

$\therefore \dfrac{\beta^2}{\alpha} + \dfrac{\alpha^2}{\beta}$ is a Symm Exp.

Nishant Jindal

Q If α, β are Roots of $x^2+5x+2=0$ $\langle^{\alpha}_{\beta}$ $\boxed{\begin{array}{l}\alpha+\beta=-5\\ \alpha\beta=2\end{array}}$

then find Eq^n whose Roots are $2\alpha-1, 2\beta-1$.

M1 as New Roots $\to 2\alpha-1, 2\beta-1$

New $Eq^n \to x^2-(SOR)x+POR=0$

$\Rightarrow x^2-(2\alpha-1+2\beta-1)x+(2\alpha-1)(2\beta-1)=0$

$\Rightarrow x^2-(2(\alpha+\beta)-2)x+4\alpha\beta-2\alpha-2\beta+1=0$

$\Rightarrow x^2-(2(\alpha+\beta)-2)x+4\alpha\beta-2(\alpha+\beta)+1=0$

$x^2-(2\times-5-2)x+4\times2-2(-5)+1=0$

$x^2+12x+19=0$

M2 $2\alpha-1, 2\beta-1$ Symm

let $y=2\alpha-1$

$\alpha=\frac{y+1}{2}$ $x^2+5x+2=0$

$\alpha^2+5\alpha+2=0$

$\left(\frac{y+1}{2}\right)^2+5\left(\frac{y+1}{2}\right)+2=0$

$\frac{(y+1)^2}{4}+\frac{5(y+1)}{2}+2=0$

$(y+1)^2+10(y+1)+8=0$

$y^2+2y+1+10y+18=0$

$y^2+12y+19=0 \to x^2+12x+19=0$

Nishant Jindal

Q α, β are Roots of $x^2+5x+2=0$

find Eq^n whose Roots are $\frac{\alpha-1}{\alpha+1}, \frac{\beta-1}{\beta+1}$

Symm

$y = \frac{\alpha-1}{\alpha+1}$

$\Rightarrow \alpha y + y = \alpha - 1$

$\Rightarrow y+1 = \alpha - \alpha y$

$y+1 = \alpha(1-y)$

$\alpha = \frac{y+1}{1-y}$

$\alpha^2+5\alpha+2=0$

$\left(\frac{y+1}{1-y}\right)^2 + 5\left(\frac{y+1}{1-y}\right) + 2 = 0$

$(y+1)^2 + 5(y+1)(1-y) + 2(1-y)^2 = 0$

$\Rightarrow y^2+2y+1+5-5y^2+2-4y+2y^2=0$

$\Rightarrow -2y^2-2y+8=0$

$x^2+x-4=0$

$x^2+5x+2=0 \rightarrow \alpha, \beta$

find Eq^n whose Roots

1) $\alpha+1, \beta+1$

2) $5\alpha-3, 5\beta-3$

3) $\alpha+\frac{1}{\beta}, \beta+\frac{1}{\alpha}$