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Misc



139. If the roots of the quadratic equation $x^2 + px + q = 0$ are $\tan 21^\circ$ and $\tan 24^\circ$; respectively then find the value of $3 + q - p$?

यदि $\tan 21^\circ$ तथा $\tan 24^\circ$ समीकरण $x^2 + px + q = 0$ के मूल हैं, तो $3 + q - p$ का मान क्या होगा?

[A] 1

[B] 3

[C] 2

[D] 4

$$\tan(21^\circ + 24^\circ) = \tan 45^\circ$$

$$\tan 21^\circ + \tan 24^\circ = -p$$

$$\tan 21^\circ \cdot \tan 24^\circ = q$$

$$\frac{\tan 21^\circ + \tan 24^\circ}{1 - \tan 21^\circ \cdot \tan 24^\circ} = 1$$

$$\frac{-p}{1-q} = 1$$

$$-p = 1 - q$$

$$q - p = 1$$

140. The roots of the equation $12x^2 + mx + 5 = 0$ will be in the ratio 3:2, if m equals:

समीकरण $12x^2 + mx + 5 = 0$ के मूल 3:2 के अनुपात में होंगे, यदि m बराबर है:

[A] $\frac{1}{12}$

[B] $\pm \frac{5}{15} \sqrt{10}$

☒ [C] $\pm 5\sqrt{10}$

[D] $\pm \frac{5}{\sqrt{10}}$

Roots $\rightarrow 3\alpha, 2\alpha$

$$6\alpha^2 = \frac{5}{12}$$

$$\alpha^2 = \frac{5}{72}$$

$$\alpha = \pm \frac{\sqrt{5}}{6\sqrt{2}}$$

$$5\alpha = -\frac{m}{12}$$
$$5x \pm \frac{\sqrt{5}}{6\sqrt{2}} = -\frac{m}{12}$$
$$\pm 5\sqrt{10} = m$$

141. What is the condition that the roots of the equation $ax^2 + bx + c = 0$ are in the ratio $c:1$?

क्या शर्त है कि समीकरण $ax^2 + bx + c = 0$ की मूलों का अनुपात $c:1$ में हैं?

☒ [A] $b^2 = a(c + 1)^2$

[C] $a^2 = b(c + 1)^2$

☒ [C] $b^2 = a(c - 1)^2$

[D] $ab^2 = (c + 1)^2$

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

$$\text{roots} \rightarrow c\alpha, \alpha$$

$$\alpha \cdot (c+1) = -\frac{b}{a}$$

$$\alpha = \frac{-b}{(c+1) \cdot a}$$

~~$$c \cdot \alpha^2 = \frac{c}{a}$$~~

~~$$\alpha^2 = \frac{1}{a} \Rightarrow \frac{b^2}{(c+1)^2 \cdot a^2} = \frac{1}{a}$$~~
$$b^2 = (c+1)^2 \cdot a$$

142. Under what condition one of the roots of equation $x^2+px+q=0$ is the square of other?

किस स्थिति में समीकरण $x^2+px+q=0$ के मूलों में से एक अन्य का वर्ग है?

[A] $1+q+q^2=3pq$

[B] $1+p+p^2=3pq$

[C] $p^3+q+q^2=3pq$

[D] $q^3+p+p^2=3pq$

$$(a+a^2)^3 = (-p)^3$$

root $\rightarrow a, a^2$

$$a \times a^2 = q$$

$$a^3 = q$$

$$\Rightarrow a^3 + a^6 + 3a^3(a+a^2) = -p^3$$

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

$$p^3 + q + q^2 = 3pq$$

143. If a and b are the roots of the quadratic equation $(x - m)(x - n) = k$, then what will be the roots of the equation $(x - a)(x - b) + k = 0$?

यदि a और b द्विघात समीकरण $(x - m)(x - n) = k$ के मूल हैं, तो समीकरण $(x - a)(x - b) + k = 0$ के मूल क्या होंगे?

[RRB Group D-2022]

[A] $a+1, b+1$

[C] m, n

[B] m, b

[D] a, n

$$1. x^2 - (m+n)x + (mn-k) = 0$$

$$a+b = m+n$$

$$ab = (mn-k)$$

$$ab+k = mn$$

$$x^2 - (a+b)x + ab+k = 0$$

$$x^2 - (m+n)x + mn = 0$$

$$\Rightarrow x = m, n$$

144. If the roots of the equation $x^2 + mx + n = 0$ are increased by the same quantity k , then they become the roots of the equation $x^2 + nx + m = 0$. What is the value of $(m+n)$?

यदि समीकरण $x^2 + mx + n = 0$ के मूलों को समान मात्रा k से बढ़ाया जाता है, तो वे समीकरण $x^2 + nx + m = 0$ के मूल बन जाते हैं। $(m+n)$ का मान क्या है?

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[A] -4

[B] -2

[C] 2

[D] 4

e.H.W.

145. If the quadratic equation $7x^2 + kx - 3 = 0$ has a solution $x = \frac{2}{3}$, then the value of k satisfies which of the following equations? *put*

यदि द्विघात समीकरण $7x^2 + kx - 3 = 0$ का एक हल $x = \frac{2}{3}$ है, तो k का मान निम्नलिखित में किस समीकरण को संतुष्ट करता है?

[RRB Group D-2022]

[A] $12k^2 + 4k - 1 = 0$ [B] $6k^2 - 3k - 1 = 0$

[C] $12k^2 - 4k - 1 = 0$ [D] $6k^2 - 5k + 1 = 0$

$\frac{7 \times 4}{9} + \frac{k}{3} - 3 = 0$
 $\frac{28}{9} + \frac{k}{3} - 3 = 0$
 $\frac{28}{9} + \frac{k}{3} - \frac{27}{9} = 0$
 $\frac{1}{9} + \frac{k}{3} = 0$
 $\frac{k}{3} = -\frac{1}{9}$
 $k = -\frac{1}{3}$

146. What is the value of k for which $(k^2 - 5k + 4)x^2 + (k^2 - 3k - 4)x + (k^2 - 4k) = 0$ is an identity?

k का वह मान क्या है जिसके लिए $(k^2 - 5k + 4)x^2 + (k^2 - 3k - 4)x + (k^2 - 4k) = 0$ एक सर्वसमिका है?

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[A] -1

[C] 1

[B] 0

[D] 4

$$Ax^2 + Bx + C = 0$$

$$k = +1, +4$$

$$k = -1, +4$$

$$k = 0, +4$$

#

147. Reduce the equation $x^4 - 13x^2 + 36 = 0$ into a quadratic equation and find the roots of the reduced quadratic equation.

समीकरण $x^4 - 13x^2 + 36 = 0$ को द्विघात समीकरण में लघुकृत करें और लघुकृत द्विघात समीकरण के मूल ज्ञात करें।

(RRB NTPC GRADUATE LEVEL CBT-1 2025)

[A] 9, 4

[B] 12, 3

[C] 18, 2

[D] 6, 6

$$1. (x^2)^2 - 13x^2 + 36 = 0$$

$$x^2 = +4, +9$$

$$a^{-n} = \frac{1}{a^n}$$

$$ax^2 + bx + c = 0$$

148. Find the roots of $x^{-4} - 10x^{-2} + 9 = 0$.

$x^{-4} - 10x^{-2} + 9 = 0$ के मूल ज्ञात करें।

(RRB NTPC GRADUATE LEVEL CBT-1 2025)

[A] $\pm 1, \pm \frac{1}{4}$

[B] $\pm 1, \pm \frac{2}{3}$

[C] $\pm 1, \pm \frac{1}{5}$

~~[B] $\pm 1, \pm \frac{1}{3}$~~

$$x^{-2} = +1, +9$$

$$\frac{1}{x^2} = 1, 9 \Rightarrow x^2 = 1, \frac{1}{9}$$

$$x = \pm 1, \pm \frac{1}{3}$$

$$1 \cdot (x^{-2})^2 - 10 \cdot (x^{-2}) + 9 = 0$$

$$x^2 = 1$$

149. Find the possible value of x.

x का संभावित मान ज्ञात कीजिए।

$$x^4 - 17x^2 + 60 = 0$$

(RRB NTPC GRADUATE LEVEL CBT-1 2025)

[A] $-\sqrt{6}$

[B] $-\sqrt{2}$

[C] $-\sqrt{3}$

[D] $-\sqrt{12}$

$x = \pm\sqrt{12}, \pm\sqrt{5}$

1. $(x^2)^2 - 17x^2 + 60 = 0$

$x^2 = +12, +5$

150. Factorise the polynomial $x^4 - 10x^2 + 22$ into product of two quadratic polynomials.

बहुपद $x^4 - 10x^2 + 22$ को दो द्विघात बहुपदों के गुणनफल में गुणनखंडित करें।

(RRB NTPC GRADUATE LEVEL CBT-1 2025)

[A] $(x^2 - 4 + \sqrt{3})(x^2 - 4 - \sqrt{3})$

[B] $(x^2 - 3 + \sqrt{3})(x^2 - 3 - \sqrt{3})$

[C] $(x^2 - 2 + \sqrt{3})(x^2 - 2 - \sqrt{3})$

☒ [D] $(x^2 - 5 + \sqrt{3})(x^2 - 5 - \sqrt{3})$

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

$$\left[(x^2)^2 - 2 \times 5 \times x^2 + 25 \right] - 3$$

$$(x^2 - 5)^2 - \sqrt{3}^2$$

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

Cubic Equation

$$ax^3 + bx^2 + cx + d = 0$$

where $a \neq 0$

Roots $\rightarrow [\alpha, \beta, \gamma] \equiv x$

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

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

$$\alpha\beta\gamma = \frac{-d}{a}$$

151. The product of the zeroes of the cubic polynomial ax^3+bx^2+cx+d is:

त्रिघात बहुपद ax^3+bx^2+cx+d के शून्यकों का गुणनफल है:

(MP CONSTABLE 2018) $= \bigcirc$

[A] $\frac{-b}{a}$

[B] $\frac{c}{a}$

[C] $\frac{-d}{a}$ ✓

[D] $\frac{-c}{a}$

$$\alpha \cdot \beta \cdot \gamma = \frac{-d}{a}$$

152. What is the product of the roots of the equation $kx^3 - 5x^2 - 12x + k = 0$?

समीकरण $kx^3 - 5x^2 - 12x + k = 0$ के मूलों का गुणनफल कितना है?

(RRB NTPC GRADUATE LEVEL CBT-1 2025)

[A] 1

[D] $-\frac{1}{12}$

☒ [B] -1

[D] $\frac{1}{12}$

$$\alpha\beta\gamma = -\frac{k}{k}$$

153. Find the sum of roots for the equation $2x^3 + 7x^2 - 9x + 12$.

समीकरण $ax^3 + bx^2 + cx + d$ के लिए मूलों का योगफल ज्ञात करें।

(RRB NTPC GRADUATE LEVEL CBT-1 2025)

[A] $\frac{9}{7}$

[B] $\frac{9}{2}$

✓ [C] $-\frac{7}{2}$

[D] $-\frac{2}{7}$

$$\alpha + \beta + \gamma = -\frac{b}{a} = -\frac{7}{2}$$

154. Sum and product of all roots of $4x^3 - 8x^2 - 13x + 19 = 0$ is:

$4x^3 - 8x^2 - 13x + 19 = 0$ के सभी मूलों का योग और गुणनफल ज्ञात कीजिए।

(RRB NTPC GRADUATE LEVEL CBT-1 2025)

~~[A] $4, \frac{-19}{2}$~~

~~[C] $3, \frac{-17}{2}$~~

[B] $1, \frac{-17}{4}$

☒ [D] $2, \frac{-19}{4}$

$$\alpha + \beta + \gamma = \frac{-(-8)}{4} = 2$$

$$\alpha\beta\gamma = \frac{-19}{4}$$

155. If the cubic equation $a^3 - 4a^2 + 5a - 2 = 0$ has the root x, y, z then find the value of $x + y + z$.

यदि घन समीकरण $a^3 - 4a^2 + 5a - 2 = 0$ का मूल x, y, z है तो $x + y + z$ का मान ज्ञात कीजिए।

(SSC CGL 2025 PRE)

[A] 5

[B] 6

[C] 7

[D] 4

$$\downarrow$$
$$-\frac{b}{a} = -\frac{(-4)}{1}$$

157. Given the cubic equation: $x^3 - 3x^2 + 4x - 12 = 0$. Find the sum of the products of the roots taken two at a time.

त्रिघात समीकरण $x^3 - 3x^2 + 4x - 12 = 0$ दिया गया है। एक समय में लिए गए दो मूलों के गुणनफल का योग ज्ञात कीजिए।

(RRB NTPC GRADUATE LEVEL 2025 CBT-1)

[A] 12

[B] -3

[C] 4

[D] 3

$$\alpha\beta + \beta\gamma + \gamma\alpha = \frac{c}{a} = \frac{4}{1}$$

158. If α, β and γ are the roots of the equation $4x^3 - 8x^2 - 13x + 19 = 0$ find $\Sigma \alpha^2 \beta^2 \gamma$.

यदि समीकरण $4x^3 - 8x^2 - 13x + 19 = 0$ के मूल α, β और γ हैं, तो $\Sigma \alpha^2 \beta^2 \gamma$ ज्ञात करें।

(RRB NTPC GRADUATE LEVEL CBT-1 2025)

~~[A]~~ $\frac{247}{16}$
[C] $\frac{152}{13}$

[B] $\frac{-247}{16}$
[D] $\frac{19}{2}$

$$\Sigma = 8cm$$

$$\alpha + \beta + \gamma = \Sigma \quad (1)$$

$$\alpha\beta + \beta\gamma + \gamma\alpha = \Sigma \alpha \cdot \beta$$

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

$$= \alpha\beta\gamma \cdot (\alpha\beta + \beta\gamma + \gamma\alpha)$$

$$= -\frac{19}{4} \times -\frac{13}{4}$$

$$= \frac{247}{16}$$

X



159. The roots of the equation $ax^3 - 24x^2 + 188x - 480 = 0$ are three consecutive even natural numbers. The value of a is _____.

समीकरण $x^3 - 24x^2 + 188x - 480 = 0$ के मूल तीन क्रमागत सम प्राकृत संख्याएं हैं। a का मान _____ है।

(RRB JE 2025)

[A] 2

[C] 3

☒ [B] 1

[D] 4

$$\overset{6}{\alpha} + \overset{8}{\beta} + \overset{10}{\gamma} = 24$$

$$\alpha \cdot \beta \cdot \gamma = 480$$
$$6 \times 8 \times 10$$

160. If α , β and γ are the zeros of the polynomial $f(x) = ax^3 + bx^2 + cx + d$, then $\alpha^2 + \beta^2 + \gamma^2$ is equal to

यदि α , β और γ बहुपद $f(x) = ax^3 + bx^2 + cx + d$ के शून्यक हैं, तो $\alpha^2 + \beta^2 + \gamma^2$ के बराबर है

(CDS 2018)

[A] $\frac{b^2 - ac}{a^2}$

[C] $\frac{b^2 + 2ac}{b^2}$

[B] $\frac{b^2 - 2ac}{a}$

~~[D] $\frac{b^2 - 2ac}{a^2}$~~

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

$$= \frac{b^2}{a^2} - 2 \times \frac{c}{a}$$

$$= \frac{b^2 - 2ca}{a^2}$$

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

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

$$\alpha\beta\gamma = -\frac{d}{a}$$

162. If p, q and r are the roots of equation $12x^3 - 999x + 3572 = 0$, then $(p+q)^3 + (q+r)^3 + (r+p)^3 = ?$
 p, q और r समीकरण $12x^3 - 999x + 3572 = 0$ के मूल हैं तब $(p+q)^3 + (q+r)^3 + (r+p)^3$ का मान ज्ञात करें?

[A] 999

[B] 763

[C] 893

[D] 805

$$(-r)^3 + (-p)^3 + (-q)^3$$

$$p + q + r = 0$$

$$= -(p^3 + q^3 + r^3)$$

$$= -3pqr$$

$$= -3 \times -\frac{3572}{12}$$

$$= 893$$

163. If 2 is a zero of the polynomial $p(x) = x^3 + 3x^2 - 6x - a$, then what is the sum of the squares of the other zeros of the polynomial?

यदि 2, बहुपद $p(x) = x^3 + 3x^2 - 6x - a$ का एक शून्यक है, तो बहुपद के अन्य शून्यकों के वर्गों का योग क्या है? $1+16$

(CDS-1 2024)

[A] 10

[C] 21

☒ [B] 17
[D] 37

$$1. x^3 + 3x^2 - 6x - 8 = 0$$

$$8 + \cancel{1} - \cancel{12} - a = 0$$

$$a = 8$$

$$\alpha + \alpha + \beta = -3$$

$$\alpha + \beta = -5$$

$$-1, -4$$

$$\alpha \cdot \beta = 4$$

$$-1 \times -4$$

$$\cancel{\alpha} \times \cancel{\alpha} \times \beta = \cancel{8}$$