MATHS

BOOKS - MCGROW HILL EDUCATION MATHS (HINGLISH)

QUADRATIC EQUATIONS

Solved Examples Concept Based Single Correct Answer Type Questions

1. Solution set of

$\sqrt{3-x} = -x^2 - x - 1, x \in R$ is

A. $(-1, \infty)$

B. (0,1)

C. $(-1, 3/4)$

D. ϕ

Answer: D

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2. Number of solution of $x - \frac{5}{x-2} = 2 - \frac{5}{x-2}$ is

A. 0

B. 1

C. 2

D. infinite

Answer: A

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3. The number of real solutions of $x^2 + 5lxl + 4 =$ is

A. 0

B. 1

C. 2

D. 4

Answer: A

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4. If $\frac{1}{3-4i}$ is a root of $ax^2+bx+c=0, (a, b, c \in R, a \neq 0)$ then

A. b + 6c =0

B. b = 6c

C. a + 25 c = 0

D. $b^2 = 6c$

Answer: A

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5. If 1 - p is a root of the quadratic equation $x^2 + px + 1 - p = 0$, then its roots are

A. 0,1

B. $-1, 1$

C. $0, \ -1$

D. $-2, 1$

Answer: C

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6. The set of values of p for which the roots of the equation $3x^2 + 2x + p(p-1) = 0$ are of opposite signs is:

A. $(-\infty, 0)$

B. (0,1)

C. $(1, \infty)$

D. $(2, \infty)$

Answer: B

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7. If α, β are the roots of (x-a) (x-b)+c=0,$c \neq 0$, then roots of $(\alpha\beta - c)x^2 + (\alpha + \beta)x + 1 = 0$ are

A. 1/a,1/b

B. $-\frac{1}{a}, -\frac{1}{b}$

C. $\frac{1}{a}, -\frac{1}{b}$

D. $-\frac{1}{a}, \frac{1}{b}$

Answer: B

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8. If α, β are roots $x^2 + px + q = 0$ then value of $\alpha^3 + \beta^3$ is

A. $3pq + p^3$

B. $3pq - p^3$

C. 3pq

D. $p^3 - 3pq$

Answer: B

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9. If $a \in R$ and both the roots of $x^2 - 6ax + 9a^2 + 2a - 2 = 0$ exceed 3, then a lies in the in-terval

A. $(1, \infty)$

B. $(2, \infty)$

C. $(11/9, \infty)$

D. ϕ

Answer: D

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10. If $x = \sqrt{7 - 4\sqrt{3}}$, then $x + \frac{1}{x}$ is equal to :

A. 2

B. $3\sqrt{7}$

C. 4

D. $4\sqrt{7}$

Answer: C

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11. Suppose α, β are roots of $ax^2 + bx + c = 0$ then roots of $a(x-2)^2 - b(x-2)(x-3) + c(x-3)^2 = 0$ are

A. $\frac{2+\alpha}{1+\beta}, \frac{2+\beta}{1+\alpha}$

B. $\frac{2+\alpha}{3+\beta}, \frac{3+\alpha}{2+\beta}$

C. $\frac{2+3\alpha}{2+\alpha}, \frac{2+3\beta}{2+\beta}$

D. $\frac{2+3\alpha}{1+\alpha}, \frac{2+3\beta}{1+\beta}$

Answer: D

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12. If $x, y, z \in R$ then the least value of the expression $E = 3x^2 + 5y^2 + 4z^2 - 6x + 20y - 8z - 3$ is

A. -15

B. -30

C. -45

D. -60

Answer: B

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13. The number real of roots of $\sqrt{x-3}\left(x^2+7x+10\right)=0$, where $x \in R$ is

A. 0

B. 1

C. 2

D. 3

Answer: B

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14. Suppose $a \in R$, If$3x^2+2\left(a^2+1\right)x+\left(a^2-3a+2\right)=0$ possesses roots of opposite signs, then a lies in t he interval :

A. $(-\infty, -1)$

B. $(-1, 1)$

C. (1,2)

D. (2,3)

Answer: C

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15. Suppose $a^2 = 5a - 8$ and $b^2 = 5b - 8$, then equation whose roots are $\frac{a}{b}$ and $\frac{b}{a}$ is

A. $6x^2 - 5x + 6 = 0$

B. $8x^2 - 9x + 8 = 0$

C. $9x^2 - 8x + 9 = 0$

D. $8x^2 + 9x + 8 = 0$

Answer: B

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16. Sum of the roots of the equation $x^2 + |2x - 3| - 4 = 0$ is

A. 2

B. -2

C. $\sqrt{2}$

D. $-\sqrt{2}$

Answer: C

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17. If $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$ has equal root, then a, b, c are in

A. A.P.

B. G.P.

C. H.P.

D. A.G.P.

Answer: C

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18. Let $a, b, c \in R$ and $a \neq 0$ be such that $(a+c)^2 < b^2$,then the quadratic equation $ax^2 + bx + c = 0$ has

A. real and distinct roots

B. real and equal roots

C. purely imaginary roots

D. none of these

Answer: A

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19. If both the roots of the quadratic equation $x^2 + 2(a+2) + x + 9a - 1 = 0$ are negative, then a lies in the set

A. $[1, \infty]$

B. $(1/9, 1] \cup [4, \infty)$

C. $(-2, 4) \cup (6, \infty)$

D. ϕ

Answer: B

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20. If α and β be the roots of the equation $x^2 + px - 1/(2p^2) = 0$, where $p \in R$. Then the minimum value of $\alpha^4 + \beta^4$ is

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Solved Examples Level 1 Single Correct Answer Type Questions

1. The number of real solutions of $x + \sqrt{x} + \sqrt{x-2} = 3$

A. 0

B. 1

C. 2

D. 4

Answer: A

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2. In the graph of $y = ax^2 + bx + c$ as shown which one of the following is true?

A. $a < 0$

B. $c > 0$

C. $b^2 - 4ac > 0$

D. $b > 0$

Answer: D

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3. Let α and β be the roots of equation $px^2 + qx + r = 0, p \neq 0$.If p, q, r are in A.P. and $\frac{1}{\alpha} + \frac{1}{\beta} = 4$, then the value of $|\alpha - \beta|$ is :

A. $\frac{1}{9}\sqrt{61}$

B. $\frac{2}{9}\sqrt{17}$

C. $\frac{1}{9}\sqrt{34}$

D. $\frac{2}{9}\sqrt{13}$

Answer: D

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4. If $\tan 25^\circ$ and $\tan 20^\circ$ are roots of the quadratic equation $x^2 + 2px + q = 0$, then 2p - q is equal to

A. -2

B. -1

C. 0

D. 1

Answer: B

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5. Suppose $0 < \alpha < \beta, \text{ and } 2\alpha + \beta = \pi/2$. If $\tan\alpha, \tan\beta$ are roots of $ax^2 + bx + c = 0$, then

A. $\tan\alpha = \dfrac{c-a}{b}$

B. $\tan\beta = \dfrac{c+a}{b}$

C. $\tan\alpha = \dfrac{b}{c-a}$

D. $\tan\beta = -\dfrac{b}{c+a}$

Answer: A

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6. The value of 'k' for which one root of the equation $x^2 - (k+1)x + k^2 + k - 8 = 0$ exceeds 2 and the other is less than 2, are given by:

A. $3 < a < 10$

B. $a \geq 10$

C. $-2 < a < 3$

D. $a \leq -2$

Answer: C

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7. The least integral value α of x such that $\frac{x-5}{x^2+5x-14} > 0$, satisfies

A. $\alpha^2 + 3\alpha - 4 = 0$

B. $\alpha^2 - 5\alpha + 4 = 0$

C. $\alpha^2 - 7\alpha + 6 = 0$

D. $\alpha^2 + 5\alpha - 6 = 0$

Answer: D

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8. if p and q are non zero real numnbers and $\alpha^3 + \beta^3 = -p\ \alpha\beta = q$ then a quadratic equation whose roots are $\frac{\alpha^2}{\beta}, \frac{\beta^2}{\alpha}$ is

A. $px^2 - qx + p^2 = 0$

B. $qx^2 + px + q^2 = 0$

C. $px^2 + qx + p^2 = 0$

D. $qx^2 - px + q^2 = 0$

Answer: B

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9. The set of values of α for which the quadratic equation

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

has two roots on the number line symmetrically placed about the point 1

is

A. {-1, 0}

B. {0,2}

C. ϕ

D. {0,1}

Answer: C

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10. Suppose $k \in R$ and the quadratic equation $x^2 - (k-3)x + k = 0$

has at least one positive roots, then k lies in the set :

A. $(-\infty, 0) \cup [9, 16]$

B. $(-\infty, 0) \cup [16, 8]$

C. $(-\infty, 0) \cup [9, \infty]$

D. $(-\infty, 0) \cup (1, \infty)$

Answer: C

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11. Two non-integer roots of the equation

$$\left(x^2+3x\right)^2-\left(x^2+3x\right)-6=0 \qquad (1)$$ are

A. $\frac{1}{2}(-3+\sqrt{11}), \frac{1}{2}(-3-\sqrt{11})$

B. $\frac{1}{2}(-3+\sqrt{7}), \frac{1}{2}(-3-\sqrt{7})$

C. $\frac{1}{2}(-3+\sqrt{21}), \frac{1}{2}(-3-\sqrt{21})$

D. none of these

Answer: C

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12. Two non-integer roots of

$$\left(\frac{3x-1}{2x+3}\right)^4 - 5\left(\frac{3x-1}{2x+3}\right)^2 + 4 = 0 \quad (1) \text{ are}$$

A. $-5/7,\ -2/5$

B. $-2/5, 7/5$

C. $5/7, 7/5$

D. $-2/5, 3/5$

Answer: A

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13. Sum of the roots of the equation is $4^x - 3\left(2^{x+3}\right) + 128 = 0$

A. 5

B. 6

C. 7

D. 8

Answer: C

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14. The only real value of x satisfying the equation is

$$6\sqrt{\frac{x}{x+4}} - 2\sqrt{\frac{x+4}{x}} = 11 \quad \text{(1) where } x \in R$$

A. $4/35$

B. $-4/35$

C. $16/3$

D. none of these

Answer: D

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15. $2\left(x^2+\frac{1}{x^2}\right)-9\left(x+\frac{1}{x}\right)+14=0$

A. 1

B. 2

C. 3

D. 4

Answer: C

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16. The non -integral roots of $x^4-3x^3-2x^2+3x+1=0$ (1) are

A. $\frac{1}{2}(3+\sqrt{13}),\frac{1}{2}(3-\sqrt{13})$

B. $\frac{1}{2}(3-\sqrt{13}),\frac{1}{2}(-3-\sqrt{13})$

C. $\frac{1}{2}(3+\sqrt{17}),\frac{1}{2}(3-\sqrt{17})$

D. none of these

Answer: A

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17. If α, β are the roots of $x^2 + px + q = 0 and \gamma, \delta$ are the roots of $x^2 + px + r = 0$, then $\frac{(\alpha - \gamma)(\alpha - \delta)}{(\beta - \gamma)(\beta - \delta)} = 1$ b. q c. r d. $q + r$

A. a,b

B. b,c

C. c,a

D. a,b,c

Answer: D

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18. Number of real solution of (x-1)(x+1)(2x+1)(2x-3)=15 (1) is

A. 0

B. 2

C. 3

D. 4

Answer: B

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19. if $2 = I\sqrt{3}$ be a root of the equation $x^2 + px + q = 0$, where p and q are real, then find p and q

A. $p = -2, q = \sqrt{3}$

B. $p = -4, q = 7$

C. $p = 3, q = 2$

D. $p = -4, q = 2$

Answer: B

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20. The number of solutions of $\sqrt{3x^2 + x + 5} = x - 3$ is

A. 0

B. 1

C. 2

D. 4

Answer: A

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21. The number of solutions of $\sqrt{4 - x} + \sqrt{x + 9} = 5$ (1) is

A. 0

B. 1

C. 2

D. 3

Answer: C

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22. Suppose $a \in R$ and α, β are roots of $x^2 + 4ax + 5a^2 - 6a = 0$.

The maximum possible distance between α and β is

A. 6

B. 5

C. 3

D. 1

Answer: A

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23. Find the value of a for which one root of the quadratic equation $(a^2 - 5a + 3)x^2 + (3a - 1)x + 2 = 0$ is twice as large as the other.

A. $-2/3$

B. $1/3$

C. $-1/3$

D. $2/3$

Answer: D

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24. The range of the function $f(x) = \frac{x^2 + x + 2}{x^2 + x + 1}, x \in R,$ is $(1, \infty)$ (b) $\left(1, \frac{11}{7}\right)$ $\left(1, \frac{7}{3}\right)$ (d) $\left(1, \frac{7}{5}\right)$

A. $(1, \infty)$

B. $(1, 3/2)$

C. (1,7/3]

D. (1,7/5]

Answer: C

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25. If $f(x) = x^2 + 2bx + 2c^2$ and $g(x) = -x^2 - 2cx + b^2$, such that $\min f(x) > \max g(x)$, then the relation between b and c, is

A. no relation

B. $0 < c < b/2$

C. $|c| < \frac{|b|}{\sqrt{2}}$

D. $|c| > \sqrt{2}|b|$

Answer: D

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26. If a, b are roots of the equation $x^2 + qx + 1 = 0$ and $c, d$are roots of $x^2 + px + 1 = 0$, then the value of $(a - c)(b - c)(a + d)(b + d)$ will be

A. $p^2 - q^2$

B. $q^2 - p^2$

C. $q^2 + p^2$

D. none of these

Answer: B

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27. Solve for x: $4^x - 3^{x - \frac{1}{2}} = 3^{x + \frac{1}{2}} - 2^{2x - 1}$.

A. $5/2$

B. 2

C. $3/2$

D. 1

Answer: C

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28. If $x^2 + 2ax + 10 - 3a > 0$ for all $x \in R$ then

A. $a < -5$

B. $-5 < a < 2$

C. $a > 5$

D. $2 < a < 5$

Answer: B

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29. The number of solutions of $\sqrt{x+1} - \sqrt{x-1} = 1 \qquad (x \in R)$ is

A. 1

B. 2

C. 4

D. infinite

Answer: A

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30. If a, b, c are real and $a \neq b$, then the roots ofthe equation, $2(a-b)x^2 - 11(a+b+c)x - 3(a-b) = 0$ are :

A. real and equal

B. real and unequal

C. purely imaginary

D. none of these

Answer: B

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31. Let $a > 0, b > 0$ and $c < 0$. Then, both the roots of the equation $ax^2 + bx + c = 0$

A. are real and negative

B. have negative real parts

C. have positive real parts

D. none of these

Answer: B

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32. both roots of the equation $(x - a)(x - b) + (x - b)(x - c) + (x - c)(x - a) = 0$ are

A. positive

B. negative

C. real

D. none of these

Answer: C

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33. If the roots of the equation $\left(4a - a^2 - 5\right)x^2 - (2a - 1)x + 3a = 0, a \in R,$ are real and lie on opposite sides on unity, then the a lies in the interval :

A. (1,5)

B. (1,4)

C. $(3, \infty)$

D. $(- \infty, 4)$

Answer: B

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34. Let α, β be the roots of the equation $ax^2 + bx + c = 0$. A root of the equation $a^3x^2 + abcx + c^3 = 0$ is (i) $\alpha + \beta$ (ii) $\alpha^2 + \beta$ (iii)$\alpha^2 - \beta$ (iv) $\alpha^2\beta$

A. $\alpha\beta, \alpha + \beta$

B. $\alpha^2\beta, \alpha\beta^2$

C. $\alpha\beta, \alpha^2\beta^2$

D. α^3, β^3

Answer: B

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35. If $P(x) = ax^2 + bx + c$, $Q(x) = -ax^2 + dx + c$ where $ac \neq 0$ then $P(x).Q(x) = 0$ has

A. no real root

B. exactly two real roots

C. at least two real roots

D. none of these

Answer: C

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36. If the product of the roots of the equation $x^2 - 5kx + 2e^{4\ln k} - 1 = 0$ is 31, then sum of the root is

A. -10

B. 5

C. -8

D. 10`

Answer: D

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37. α, β be the roots of the equation $x^2 - px + r = 0$ and $\frac{\alpha}{2}, 2\beta$ be the roots of the equation $x^2 - qx + r = 0$ then value of r is

A. $\frac{2}{9}(p-q)(2q-p)$

B. $\frac{2}{9}(q-p)(2p-q)$

C. $\frac{2}{9}(q-2p)(2q-p)$

D. $\frac{2}{9}(2p-q)(2q-p)$

Answer: D

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38. Sum of all the values of x satisfying the equation

$\log_{17} \log_{11}\left(\sqrt{x+11} + \sqrt{x}\right) = 0$ (1) is

A. 25

B. 36

C. 171

D. 0

Answer: A

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39. If $\frac{1}{\sqrt{\alpha}}$ and $\frac{1}{\sqrt{\beta}}$ are the roots of equation $ax^2 + bx + 1 = 0($ $a \neq 0, (a, b \in R))$, then the equation $x\left(x + b^3\right) + \left(a^3 - 3abx\right) = 0$ has roots -

A. $\alpha^{3/2}$ and $\beta^{3/2}$

B. $\alpha\beta^{-3/2}$ and $\alpha^{1/2}\beta$

C. $\sqrt{\alpha\beta}$ and $\alpha\beta$

D. $\alpha^{-3/2}$ and $\beta^{-3/2}$

Answer: A

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40. If p and q are the roots of $x^2 + px + q = 0$, then find p.

A. p = 1

B. p = 1 or 0

C. p = - 2

D. p = - 2 or 0

Answer: B

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41. $\sqrt{x+1} - \sqrt{x-1} = \sqrt{4x-1}$

A. no solution

B. one solution

C. two solutions

D. more than two solutions

Answer: A

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42. The sum of all the real roots of the equation $|x-2|^2 + |x-2| - 2 = 0$ is

A. 7

B. 4

C. 1

D. none of these

Answer: B

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43. Let α and β be roots of the equation $X^2 - 2x + A = 0$ and let γ and δ be the roots of the equation $X^2 - 18x + B = 0$. If $\alpha < \beta < \gamma < \delta$ are in arithmetic progression then find the valus of A and B.

A. (-3,77)

B. (77,-3)

C. (-3,-77)

D. none of these

Answer: A

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44. In a triangle PQR, $\angle R = \pi/2$. If tan (P/2) and tan (Q/2) are the roots of the equations $ax^2 + bx + c = 0$ where $a \neq 0$, then

A. a + b = c

B. b + c = a

C. a + c = b

D. b = c

Answer: A

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45. If α and $\beta(\alpha < \beta)$ are the roots of the equation $x^2 + bx + c = 0$, where $c < 0 < b$, then

A. $0 < \alpha < \beta$

B. $\alpha < 0 < \beta < |\alpha|$

C. $\alpha < \beta < 0$

D. $\alpha < 0 < |\alpha| < \beta$

Answer: B

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46. For the equation $3x^2 + px + 3 = 0, p > 0,$ if one of the root is square of the other, then p is equal to $1/3$ b. 1 c. 3 d. $2/3$

A. 44199

B. 1

C. 3

D. 44230

Answer: C

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47. If α, β are the roots of equation $ax^2 + bx + c = 0$, then what are the roots of equation $cx^2 - bx + a = 0$

A. $1/\alpha, 1/\beta$

B. $-1/\alpha, \ -1/\beta$

C. $1/\sqrt{\alpha}, 1/\sqrt{\beta}$

D. $-1/\sqrt{\alpha},\ -1/\sqrt{\beta}$

Answer: B

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48. If $b > a$, then the equation $(x-a)(x-b)-1=0$, has

A. both roots in [a,b]

B. both roots in $(-\infty, a)$

C. both roots in (b, ∞)

D. one root in $(-\infty, a)$ and other in (b, ∞)

Answer: D

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49. Let α, β be the roots of $x^2 - x + p = 0$ and γ, δ be the roots of $x^2 - 4x + q = 0$. If $\alpha, \beta, \delta, \gamma$ are in G.P then the integral values of p and q respectively , are

A. $-2, \ -32$

B. $-2, 3$

C. $-6, 3$

D. $-6, \ -32$

Answer: A

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50. I a, b and c are not all equal and α and β be the roots of the equation $ax^2 + bx + c = 0$, then value of $\left(1 + \alpha + \alpha^2\right)\left(1 + \beta + \beta^2\right)$ is

A. 0

B. positive

C. negative

D. non-negative

Answer: B

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51. If a,b,c are in A.P. and if the equations

$(b-c)x^2+(c-a)x+(a-b)=0$ (1)

and $2(c+a)x^2+(b+c)x=0$ (2) have a common root, then

A. a^2, b^2, c^2 are in A.P.

B. a^2, c^2, b^2 are in A.P.

C. c^2, a^2, b^2 are in A.P.

D. none of these

Answer: B

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52. Evaluate $x = \sqrt{6 + \sqrt{6 + \sqrt{6 + \infty.}}}$

A. 3

B. 2

C. 1

D. none of these

Answer: A

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53. Two complex numbers α and β are such that $\alpha + \beta = 2$ and $\alpha^4 + \beta^4 = 272$, then the quadractic equation whose roots are α and β is

A. $x^2 - 2x - 16 = 0$

B. $x^2 - 2x + 12 = 0$

C. $x^2 - 2x - 8 = 0$

D. none of these

Answer: C

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54. If $\alpha \neq \beta$ but $\alpha^2 = 5\alpha - 3, \beta^2 = 5\beta - 3$, then find the equation whose roots are $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$.

A. $3x^2 - 25x + 3 = 0$

B. $x^2 - 5x + 3 = 0$

C. $x^2 + 5x - 3 = 0$

D. $3x^2 - 19x + 3 = 0$

Answer: D

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55. If $a \neq b$ and differences between the roots of the equations $x^2 + ab + b = 0$ and $x^2 + bx = a = 0$ is the same then (A) $a + b + 4 = 0$ (B) $a + b - 4 = 0$ (C) $a - b + 4 = 0$ (D) $a - b - 4 = 0$

A. a + b + 4 = 0

B. a + b - 4 = 0

C. a - b + 4 = 0

D. a - b - 4 = 0

Answer: A

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56. Product of real roots of the equation $t^2x^2 + |x| + 9 = 0$ a. is always +ve b. is always-ve c. does not exist d. none of these

A. positive

B. negative

C. zero

D. does not exist.

Answer: D

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57. If f(x) = $\frac{x^2 - 2x + 4}{x^2 + 2x + 4}, x \in R$ then range of function is

A. $[0, \infty)$

B. {1/3, 3]

C. $[3, \infty)$

D. [0,3]

Answer: B

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58. The value of 'k' for which one root of the equation $x^2 - (k+1)x + k^2 + k - 8 = 0$ exceeds 2 and the other is less than 2, are given by:

A. $3 < a < 10$

B. $a > 0$

C. $-2 < a < 3$

D. $a \leq -2$

Answer: C

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

A. 3

B. 12

C. $\frac{49}{4}$

D. 4

Answer: C

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60. Suppose a is an integer and x_1 and x_2 are positive real roots of $x^2 + (2a - 1)x + a^2 = 0$, then value of $\left|\sqrt{x_1} - \sqrt{x_2}\right|$ is

A. 1

B. 2

C. a

D. 1-4a

Answer: A

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61. If a, b are two real number satisfying the relation $2a^2 - 3a - 1 = 0$ and $b^2 + 3b - 2 = 0$ and $ab \neq 1$, then value of $\frac{ab + a + 1}{b}$ is

A. -1

B. 0

C. 1

D. 2

Answer: C

Watch Video Solution

62. If α, β are roots of $x^2 - 2x - 1 = 0$, then value of $5\alpha^4 + 12\beta^3$ is

A. 153

B. 169

C. 183

D. none of these

Answer: B

Watch Video Solution

63. Suppose a, b, c are the lengths of three sides of a $\Delta ABC, a > b > c, 2b = a + c$ and b is a positive integer . If $a^2 + b^2 + c^2 = 84$, then value of b is

A. 7

B. 6

C. 5

D. 4

Answer: C

View Text Solution

64. A root of the equation $(a+b)(ax+b)(a-bx) = \left(a^2x - b^2\right)(a+bx)$ is

A. $\frac{a+2b}{2a+b}$

B. $\frac{2a+b}{a+2b}$

C. $-\frac{a-2b}{a+2b}$

D. $-\frac{a+2b}{2a+b}$

Answer: D

Watch Video Solution

65. Q. Let p and q real number such that $p \neq 0, p^2 \neq q$ and $p^2 \neq -q$. if α and β are non-zero complex number satisfying $\alpha + \beta = -p$ and $\alpha^3 + \beta^3 = q$, then a quadratic equation having $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$ as its roots is

A. $\left(p^3+q\right)x^2 - \left(p^3+2q\right)x + \left(p^3+q\right) = 0$

B. $\left(p^3+q\right)x^2 - \left(p^3-2q\right)x + \left(p^3+q\right) = 0$

C. $(p^3 - q)x^2 - (5p^3 - 2q)x + (p^3 - q) = 0$

D. $(p^3 - q)x^2 - (5p^3 + 2q)x + (p^3 - q) = 0$

Answer: B

Watch Video Solution

66. Suppose $a, b, \in R$. If the roots of $x^2 - ax + b = 0$ are real and distinct and differ by at most 1, then 4b lies in the interval

A. $(a^2 - 1, a^2)$

B. $[a^2 - 1, a^2)$

C. $(a^2 - 1, \infty)$

D. (a^2, ∞)

Answer: B

View Text Solution

67. If a is the minimum root of the equation $x^2 - 3|x| - 2 = 0$, then value of -1/a is

A. $\left(\sqrt{17} - 3\right)/4$

B. $\left(\sqrt{17} + 3\right)/4$

C. 2

D. -3

Answer: A

Watch Video Solution

68. Let $f(x) = \dfrac{x^2 - 2x + 3}{x^2 - 2x - 8}, x \in R - \{-2, 4\}$ The range of f is

A. $\left(\dfrac{-2}{9}, 1\right]$

B. $R - \left(\dfrac{-2}{9}, 1\right)$

C. $\left(-\infty, \dfrac{-2}{9}\right]$

D. $R - \left(\dfrac{-2}{9}, 1\right]$

Answer: D

View Text Solution

69. Suppose a, b, care three non-zero real numbers. The equation $x^2 + (a+b+c)x + \left(a^2+b^2+c^2\right) = 0$

A. two negative real roots

B. two positive real roots

C. two real roots with opposite signs

D. no real roots

Answer: D

Watch Video Solution

70. Suppose a,b $\in$ R. If the equation $x^2 - (2a+b)x + \left(2a^2+b^2-b+1/2\right) = 0$ has two real roots, then

A. $a = \frac{1}{2}, b = -1$

B. $a = -\frac{1}{2}, b = 1$

C. $a = 2, b = 1$

D. $a = -2, b = -1$

Answer: A

Watch Video Solution

71. The equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ has (A) infinite number of real roots (B) no real roots (C) exactly one real root (D) exactly four real roots

A. no real roots

B. exactly one real root

C. exactly four real roots

D. infinite number of real roots

Answer: A

Watch Video Solution

72. If $x^2 - 3x + 2$ is a factor of $x^4 - ax^2 + b$ then the equation whose roots are a and b is

A. $x^2 - 9x - 20 = 0$

B. $x^2 - 9x + 20 = 0$

C. $x^2 + 9x - 20 = 0$

D. $x^2 + 9x + 20 = 0$

Answer: B

Watch Video Solution

73. Let for $a \neq a_1 \neq 0$, $f(x) = ax^2 + bx + c$,$g(x) = a_1x^2 + b_1x + c_1$ and $p(x) = f(x) - g(x)$. If $p(x) = 0$ only for $x = -1$ and $p(-2) = 2$ then the value of $p(2)$.

A. 3

B. 9

C. 6

D. 18

Answer: D

Watch Video Solution

74. If a + b + c = 0 and $a \neq c$ then the roots of the equation $(b+c-a)x^2+(c+a-b)x+(a+b-c)=0$, are

A. both rational

B. both irrational

C. both purely imaginary

D. one rational and one irrational

Answer: A

Watch Video Solution

75. if $\alpha\&\beta$are the roots of the quadratic equation $ax^2+bx+c=0$, then the quadratic equation $ax^2-bx(x-1)+c(x-1)^2=0$ has roots

A. $\frac{1}{\alpha},\frac{1}{\beta}$

B. $\frac{1}{\alpha},\beta$

C. $\frac{\alpha}{1+\alpha},\frac{\beta}{1+\beta}$

D. $\alpha,\frac{1}{\beta}$

Answer: C

Watch Video Solution

76. If $3p^2=5p+2$ and $3q^2=5q+2$ then the equation whose roots $3p-2p$ and $3q-2p$ is

A. $x^2 - 5x + 100 = 0$

B. $3x^2 - 5x - 100 = 0$

C. $3x^2 + 5x + 100 = 0$

D. $5x^2 - x + 7 = 0$

Answer: B

Watch Video Solution

77. The number of real roots of $(x+3)^4 + (x+5)^4 = 16$

A. 1

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

78. If $a, b, c \in R$ and the quadratic equation $x^2 + (a+b)x + c = 0$ has no real roots then

A. 2

B. -2

C. 0

D. none of these

Answer: C

Watch Video Solution

79. The value of

$$6 + \log_{3/2}\left(\frac{1}{3\sqrt{2}}\sqrt{4 - \frac{1}{3\sqrt{2}}\sqrt{4 - \frac{1}{3\sqrt{2}}\sqrt{4 - \frac{1}{3\sqrt{2}}\ldots}}}\right)$$ is _____.

A. 2

B. 3

C. 4

D. 8

Answer: C

Watch Video Solution

80. The sum of the roots of the equation $x + 1 - 2\log_2(2^x + 3) + 2\log_4\left(10 - 2^{-x}\right) = 0$ is

A. $\log_2 11$

B. $\log_2 12$

C. $\log_2 13$

D. $\log_2 14$

Answer: A

View Text Solution

Solved Examples Level 2 Straight Objective Type Questions

1. Suppose $a, b, c, d \in R$ and $2ac = b + d$. Consider the quadratic equations $x^2 + 2ax + b = 0$ and $x^2 + 2cx + d = 0$. Then

A. none of these equations have real roots

B. both the equations have real roots

C. exactly one of the equation has real roots

D. at least one of the equation has real roots

Answer: D

View Text Solution

2. If the roots of the equation $\frac{1}{x+a} + \frac{1}{x+b} = \frac{1}{c}$ are equal in magnitude but opposite in sign, then their product, is

A. $\frac{1}{2}(a^2+b^2)$

B. $-\frac{1}{2}(a^2+b^2)$

C. $\frac{1}{2}ab$

D. $-\frac{1}{2}ab$

Answer: B

Watch Video Solution

3. If a,b are the roots of $x^2-10cx-11d=0$ and c,d are roods of $x^2-10ax-11b=0$ then value of a+b+c+d is:

A. 1210

B. -1

C. 2530

D. -11

Answer: A

Watch Video Solution

4. If α and β are the roots of the equation $ax^2 + bx + c = 0$, then the value of $\alpha^3 + \beta^3$

A. $\frac{3abc + b^3}{a^3}$

B. $\frac{a^3 + b^3}{3abc}$

C. $\frac{3abc - b^3}{a^3}$

D. $\frac{-\left(3abc + b^3\right)}{a^3}$

Answer: C

Watch Video Solution

5. Suppose $a \in I$ and the equation (x - a) (x - 5) = 3 has integral roots, then the set of values which a can take is :

A. ϕ

B. {-11,-13}

C. {3,7}

D. {-3,-7}

Answer: C

View Text Solution

6. If the ratio of the roots of $x^2 + bx + c = 0$ and $x^2 + qx + r = 0$ is same then

A. $br^2 = qc^2$

B. $cq^2 = rb^2$

C. $q^2c^2 = b^2r^2$

D. $bq = rc$

Answer: B

Watch Video Solution

7. If a and $b(\neq 0)$ are the roots of the equation $x^2+ax+b=0$ then the least value of x^2+ax+b is

A. $2/3$

B. $9/4$

C. $-9/4$

D. 1

Answer: C

Watch Video Solution

8. If a + b + c = 0 then the quadratic equation $3ax^2+2bx+c=0$ has

A. at least one root in [0,1]

B. one root in [2.3] and other is [-2,-1]

C. imaginary roots

D. none of these

Answer: A

Watch Video Solution

9. If $a < b < c < d$, then the eqution $3(x-a)(x-c)+5(x-b)(x-d)=0$ has

A. real and distinct roots

B. real and equal roots

C. purely imaginary roots

D. none of these

Answer: A

View Text Solution

10. For real x, the function $(x-a)(x-b)/(x-c)$ will assume all real values provided $a > b > c$ b. `a c > bd. a

A. $a < b < c$

B. $b < c < a$

C. $c < a < b$

D. none of these

Answer: A

Watch Video Solution

11. Let a, b, c be real numbers, $a \neq 0$. If α is a zero of $a^2x^2 + bx + c = 0, \beta$ is the zero of $a^2x^2 - bx - c = 0$ and $0, \alpha < \beta$ then prove that the equation $a^2x^2 + 2bx + 2c = 0$ has a root γ that always satisfies $\alpha < \gamma < \beta$.

A. $\gamma = \frac{!}{2}(\alpha + \beta)$

B. $\gamma = \alpha + \frac{1}{2}\beta$

C. $\gamma = \alpha + \beta$

D. $\alpha < \gamma < \beta$

Answer: D

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12. If α and β are the ral roots of $x^2 + px + q = 0$ and α^4, β^4 are the roots of $x^2 - rx + s = 0$. Then the equation $x^2 - 4qx + 2q^2 - r = 0$ has always $(\alpha \neq \beta, p \neq 0, p, q, r, s \in R)$:

A. two imaginary roots

B. two positive roots

C. two negative roots

D. one positive and one negative root

Answer: D

Watch Video Solution

13. The equation $x^{\frac{3}{4}(\log_2 x)^2+\log_2 x-\frac{5}{4}} = \sqrt{2}$ has :

A. exactly two real roots

B. no real root

C. one irrational root

D. none of these

Answer: C

Watch Video Solution

14. Let f(x) be a quadratic expression which is positive for all ral x and g(x) = f(x) + f'(x) + f''(x), then for any real x,

A. $g(x) < 0$

B. $g(x) > 0$

C. $g(x) = 0$

D. $g(x) \geq 0$

Answer: B

Watch Video Solution

15. If α, β are the roots of the quadratic equation $ax^2 + bx + c = 0$, then the quadratic equation whose roots are α^3, β^3 is

A. $a^3y^3 + (b^3 - 3abc)y + c^3 = 0$

B. $a^3y^2 + (3abc - b^3)y - c^3 = 0$

C. $a^2y^2 + 2aby + c^2 = 0$

D. none of these

Answer: A

Watch Video Solution

16. If $a, b, c \in R$ and the equations $ax^2 + bx + c = 0$ and $x^3 + 3x + 2 = 0$ have two common roots, then

A. a = b = - c

B. a = - b = c

C. a = b = c

D. none of these

Answer: C

View Text Solution

17. Let a, b, c be non-zero real numbers such that ; $\int_0^1 (1 + \cos^8 x)(ax^2 + bx + c)dx = \int_0^2 (1 + \cos^8 x)(ax^2 + bx + c)dx$ then the quadratic equation $ax^2 + bx + c = 0$ has -

A. no root in (0,2)

B. at least one root in (1,2)

C. a double root (0,2)

D. none of these

Answer: B

Watch Video Solution

18. The number of real solutions of the equation

$27^{1/x} + 12^{1/x} = 2.8^{1/x}$, is

A. 0

B. 1

C. infinite

D. none of these

Answer: A

Watch Video Solution

19. If $0 < a < b < c < d$, then the quadratic equation $ax^2 + [1 - a(b + c)]x + abc - d = 0$ A) Real and distinct roots out of which one lies between c and d B) Real and distinct roots out of which one lies between a and b C) Real and distinct roots out of which one lies between b and c (D) non -real roots

A. real and distinct roots out of which oen lies be- tween c and d

B. real and distinct roots out of which one lies be-tween an and b

C. real and distinct roots out of which one lies be-tween b and c

D. non-real roots

Answer: A

Watch Video Solution

20. If the equation $ax^2 + 2bx - 3c = 0$ has no real roots and $\frac{3c}{4} < a + b$, then

A. (0,b)

B. (-1,b)

C. $\left(-\infty, \ -b^2/3a \right)$

D. $\left(-\infty, \ -b/12a \right)$

Answer: C

Watch Video Solution

21. Suppose a, b, c $\in R$ and $a \neq b$. If $ax + \frac{b}{x} + c, x \in R - \{0\}$, assume all real values, then a and be satisfy the relation

A. $ab \leq 0$

B. $ab \geq 0$

C. $ab \geq 1$

D. $ab \leq 1$

Answer: A

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Solved Examples Numerical Answer Type Questions

1. The number of real solution of $\sqrt{x+8}+\sqrt{x-1}=9$ is _____

Watch Video Solution

2. If the roots of $x^2-bx+c=0$ are two consecutive integral multiples of 5, then $\sqrt{b^2-4c}$ is equal to _____

Watch Video Solution

3. Suppose, $a, b, c<0$. If each pair of three quadratic equations.

$x^2-ax+2=0$ (1)

$x^2-bx+3=0$ (2)

$x^2-cx+6=0$ (3)

have a common root , then a + b + c is equal to _____

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4. Suppose α, β are the roots of $x^2 - px + 2.89 = 0$ and γ be a root of $x^2 + px + 2.89 = 0$, then $(\gamma + \alpha)(\gamma + \beta)$ is equal to _____

Watch Video Solution

5. Suppose a,$b, c \in R$. If the equations $ax^2 + bx + c = 0$ and $4x^2 + 4x + 5.52 = 0$ have a common root, then $\frac{c}{a}$ is equal to _____

Watch Video Solution

6. Suppose $f(x) = 2x^2 - 7x + 2029$ is such that f decreases in the interval $(-\infty, a)$ increases in the interval $[a, \infty)$, then a is equal to _____

Watch Video Solution

7. Suppose 8,2 are roots of $x^2 + ax + \beta = 0$ and 3, 3 are roots of $x^2 + ax + b = 0m$. If α, β are roots of $x^2 + ax + b = 0$, then $\alpha^2 + \beta^2$ = _____

View Text Solution

8. Find the range of $f(x) = \frac{x^2 + 14x + 9}{x^2 + 2x + 3}$, where x $\in$ R.

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9. If α, β are the roots of the equation $6x^2 - 5x + 1 = 0$, then the value of $\frac{1}{\pi}\left[\tan^{-1}(\alpha) + \tan^{-1}(\beta)\right]$ is _____

Watch Video Solution

10. Suppose α, β are roots of $x^2 - 2x + 4 = 0$ If $\alpha^4 + \beta^4 = k$, then |k| is equal to _____

Watch Video Solution

11. Roots of equation $x^5 - 5x^4 + 9x^3 - 9x^2 + 5x - 1 = 0$ are

Watch Video Solution

12. Suppose α and β are the roots of $x^2 + 7x + 3 = 0$. suppose $\frac{2\alpha}{3 - 4\alpha}$ and $\frac{2\beta}{3 - 4\beta}$ are roots of $ax^2 + bx + c = 0$where $a, b, c \in Z, z \neq 0$ and (a,b,c) = 1 , then a + b + c = _____

View Text Solution

13. Let $S = \{x \in R : \sqrt{x + 2} - \sqrt{x - 2} = \sqrt{4x - 2}\}$ If α = the number of elements in S, then $|\alpha + \sqrt{3}i / 2|^2$ _____

View Text Solution

14. Let $S = \{x \in R : 5^{2x+1} + 20x^2 + 29x + 6 = (11)(5^x) + (x)(5^{x+2})\}$ The number of integers lying is S is _____

View Text Solution

15. Let α and β are roots $x^2 - 7.32x - 3 = 0$ and let $A_n = \alpha_n + \beta_n$, then $\frac{A_{36} - 3A_{35}}{A_{36}}$ is equal to _____

View Text Solution

16. The sum of two numbers is 22 and product is 120. The numbers are:

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17. If a, b and c are three distinct real numbers, and

$$\frac{(x-b)(x-c)}{(a-b)(a-c)} + \frac{(x-c)(x-a)}{(b-c)(b-a)} + \frac{(x-a)(x-b)}{(c-a)(c-b)} = Ax^2 + Bx + C$$

then $\frac{A-2B+4C}{2A-B+C}$ is equal to _____

View Text Solution

18. The smallest value of a for which both the roots of the equation $x^2-10ax+25\left(a^2-a+1\right)=0$ are real, distinct and have value at least 5 is _____

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Exercise Concept Based Single Correct Answer Type Questions

1. The number of real solutions of $x^2-2x+2+|x-1|=0$ is

A. 0

B. 1

C. 2

D. infinite

Answer: A

View Text Solution

2. If roots of $7x^2 - 11x + k = 0, k \neq 0$ are reciprocal of each other, then k is equal to

A. -1

B. $7/1$

C. 7

D. $\frac{11}{7}$

Answer: C

Watch Video Solution

3. If $a + b \neq 0$ and the roots of $x^2 - px + q = 0$ differ by -1, then $p^2 - 4q$ equals :

A. -1

B. 0

C. 1

D. 2

Answer: C

Watch Video Solution

4. If the equations $x^2 - ax + b = 0$ and $x^2 + bx - a = 0$ have a common root, then

A. a = b

B. a + b = - 1

C. a - b = - 1

D. a - b = 1

Answer: D

Watch Video Solution

5. If both roots of the equation $x^2 + x + a = 0$ exceeds 'a' then

A. $(-\infty, -1)$

B. $(-\infty, -2)$

C. (0,1)

D. $(1, \infty)$

Answer: B

Watch Video Solution

6. [The number of real solutions of x^(2)-4|x|-2=0 is [(a) 1, (b) 2 (c) 3, (d) 4]]

A. 1

B. 2

C. 3

D. 4

Answer: B

Watch Video Solution

7. If α and β are the roots of the equation $x^2 + px + \frac{3p}{4} = 0$ such that $|\alpha - \beta| = \sqrt{10}$ then p belongs to the set

A. {-2,5}

B. {-3,2}

C. {2,-5}

D. {3,-5}

Answer: A

Watch Video Solution

8. The number of solutions of $\sqrt{5+x}+\sqrt{x}=2$ is

A. 0

B. 1

C. 2

D. infinite

Answer: A

View Text Solution

9. [Suppose a in R .The set of values of a for which the quadratic equation $x^2-2(a+1)x+a^2-4a+3=0$ has two negative roots is [(a) (-oo,-1), (b) (1,3) (c) (-oo,1)uu(3,oo), (d) phi]]

A. $(-\infty,\ -1)$

B. (1,3)

C. $(-\infty, 1)\cup(3,\infty)$

D. ϕ

Answer: D

Watch Video Solution

10. Suppose $\alpha > 0, \beta > 0$ and $\alpha + \beta = \pi/4$. If tan $\alpha, \tan\beta$ are roots of $x^2 - ax + b = 0$, then

A. a + b = 1

B. $a + b = 1, 0 < b < 1$

C. a = b

D. $0 < a + b < 2$

Answer: B

View Text Solution

11. If $b > a$, then the equation $(x-a)(x-b)-1=0$, has

A. both roots in $(-\infty, a)$

B. both roots in (a,b]

C. one root in $(-\infty, a)$ and other root in (b, ∞)

D. one root in $(-\infty, a)$ and other root in [a,b]

Answer: C

Watch Video Solution

12. If the quadratic equation $x^2+2(k+1)x+9k-5=0$ has exactly one positive root, then k lies in the set

A. $[5/9, \infty)$

B. $(-\infty, 1) \cup (6, \infty)$

C. $(-\infty, 5/9]$

D. [1,6]

Answer: C

View Text Solution

13. If $k \in R$ lies between the roots of $ax^2 + 2bx + c = 0$, then

A. $ak^2 + 2bk + c < 0$

B. $a^2k^2 + 2abk + ac < 0$

C. $a^2k^2 + 2abk + ac > 0$

D. $ak^2 + 2bk + c > 0$

Answer: B

Watch Video Solution

14. [(d) ak^(2)+2bk+cgt0 (4) If both the roots of the quadratic equation x^(2)-4ax+2a^(2)-3a+5 are less than 2, then a lies in the set (a) (9/2,oo) (b) (-oo,9/2) (c) (-1,oo) (d) (2,oo)]

A. $(9/2, \infty)$

B. $(-\infty, 9/2)$

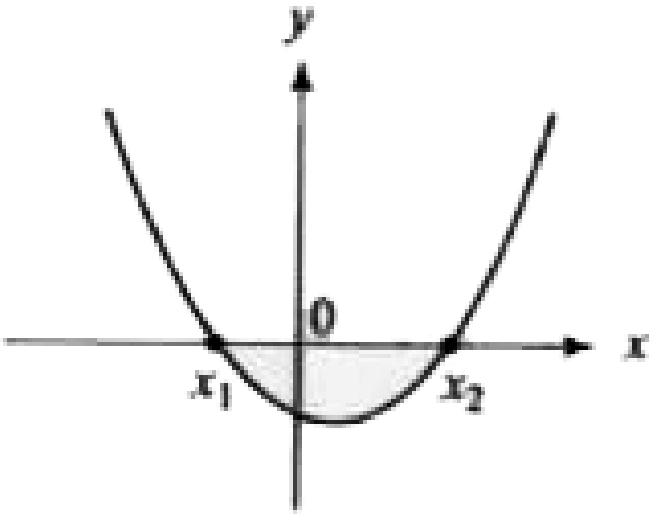
C. $(-1, \infty)$

D. $(2, \infty)$

Answer: B

Watch Video Solution

15. Shows graph of $y = ax^2 + bx + c$. Then which one of the following is not true.



A. $a > 0$

B. $c < 0$

C. $b^2 - 4ac > 0$

D. $b > 0$

Answer: D

Watch Video Solution

16. Greatest value of the expression $\frac{8}{9x^2 - 6x + 5}$ is

A. 2

B. 5

C. $8\frac{1}{3}$

D. 9. 2

Answer: A

Watch Video Solution

17. If $a, b, c \in \{1, 2, 3, 4\}$ the number of quadratic equation of the form $ax^2 + bx + c = 0$ which have non-real complex roots is :

A. 27

B. 35

C. 52

D. 56

Answer: C

View Text Solution

18. The number of real roots of the equation $(x-1)^2 + (x-2)^2 + (x-3)^2 = 0$ is

A. 0

B. 2

C. 3

D. infinite

Answer: A

Watch Video Solution

19. If $0 < a < b < c$ and the roots α, β of the equation $ax^2 + bx + c = 0$ are imaginary, then

A. $|\alpha| = \sqrt{\frac{c}{a}}$

B. $|\beta| = \sqrt{\frac{a}{c}}$

C. $\alpha + \beta = 0$

D. $\alpha - \beta = -b/2a$

Answer: A

Watch Video Solution

20. If $a > 0$ and both the roots of $ax^2 + bx + c = 0$ are more than 1, then

A. $a + b + c > 0$

B. $a + b + 4c = 0$

C. $a + b + c < 0$

D. $a + 4b + c = 0$

Answer: A

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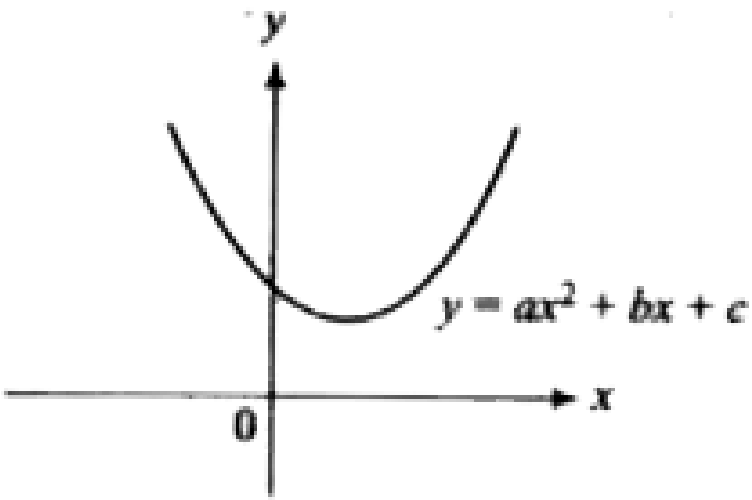
Exercise Level 1 Single Correct Answer Type Questions

1. If fig. 3.21 graph of $y = ax^2 + 2bx + c$ is given Which one of the following is not true ?



A. $a > 0$

B. $b > 0$

C. $c > 0$

D. $b^2 < ac$

Answer: B

Watch Video Solution

2. If $ax^2 + 2bx + c = 0$ and $ax^2 + 2cx + b = 0, b \neq c$ have a common root, then $\frac{a+b+c}{a}$ is equal to

A. -2

B. -1

C. $3/4$

D. $-1/4$

Answer: C

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3. Suppose $a, b, c \in R$ $a \neq 0$and $4a - 6b + 9c < 0$. if $ax^2 + bx + c = 0$ does not have real roots, then $\frac{b+c}{a}$ is less than

A. 0

B. 1

C. -1

D. -2

Answer: C

View Text Solution

4. If α, β be the roots of $4x^8 - 16x + c = 0, c \in R$ such that $1 < \alpha < 2$ and $2 < \beta < 3$, then the number of integral values of c is

A. 2

B. 3

C. 4

D. 9

Answer: D

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5. If equations $x^2 + ax + 12 = 0.\ x^2 + bx + 15 = 0 and x^2 + (a+b)x + 36 = 0,$ have a common positive root, then find the values of $a and b.$

A. $(-7, -8)$

B. (-8,-7)

C. (7,8)

D. (8,7)

Answer: A

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6. Suppose $a, b \in R.$ If the equation $\frac{a}{x} = \frac{1}{x-b} + \frac{1}{x+b}$ is not satisfied by any real value of x, then

A. $0 < a < b < 2$

B. $0 < a < 2$

C. $0 < b < 2$

D. $0 < b < a < 2$

Answer: B

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7. Suppose $a \in R, a \neq -1/2$. Let α, β be roots of $(2a+1)x^2 - ax + a - 2 = 0 If \alpha < 1 < \beta$, then

A. $\frac{1}{7}\left(6 - 2\sqrt{23}\right) < a < 1$

B. $\frac{-1}{2} < a < \frac{1}{2}$

C. $\frac{1}{2} < a < \frac{1}{7}\left(6 + 2\sqrt{3}\right)$

D. none of these

Answer: B

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8. Suppose α, β are roots of $8x^2 - 10x + 3 = 0$, then $\sum_{n=0}^{\infty} (\alpha^n + \beta^n)$ is

A. $7/4$

B. $3/7$

C. 6

D. 7

Answer: C

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9. Suppose $a, b, c \in R, a \neq 0. If a + |b| + 2c = 0,$ then roots of $ax^2 + bx + c = 0$ are

A. real and distinct

B. real and equal

C. purely imaginary

D. non-real complex numbers

Answer: A

Watch Video Solution

10. Suppose $0 < b < c$ and $f(x) = \frac{x^2 - bc}{2x - (b + c)}, x \in R,$ then f(x) cannot lie in

A. (b,c)

B. $(- \infty, b)$

C. (c, ∞)

D. $(0, b) \cup (b, c)$

Answer: A

View Text Solution

11. If α and β are the roots of $x^2 + px + q = 0$ and $\gamma, \delta$are the roots of $x^2 + rx + x = 0$, then evaluate $(\alpha - \gamma)(\beta - \gamma)(\alpha - \delta)(\beta - \delta)$ in

terms of p,q,r and s .

A. $(r-p)^2-(q-s)^2$

B. $(r-p)^2-(q-s)^2$

C. $(r-p)^2+(q-s)^2-2rp(r-p)(q-s)$

D. none of these

Answer: D

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12. [The number of real solutions of x^(2)-4|x|-2=0 is [(a) 1, (b) 2 (c) 3, (d) 4]]

A. 4

B. 2

C. 1

D. 0

Answer: D

Watch Video Solution

13. The number of real solutions of $x^2 - 3|x| + 2 = 0$ is

A. 4

B. 2

C. 1

D. 0

Answer: A

Watch Video Solution

14. If $2 + \sqrt{5}$ is root of $x^2 - px + q = 0$ where p and q are real, then the ordered pair (p,q) is equal to

A. (4,9)

B. (9,4)

C. (3,3)

D. (2,3)

Answer: A

View Text Solution

15. If the quadratic equation $2x(2) - px + q = 0$ where p and q are real, then the ordered pair (p,q) is equal to

A. -3

B. -2

C. -1

D. 0

Answer: B

View Text Solution

16. if a,b, c, d and p are distinct real number such that $(a^2+b^2+c^2)p^2-2p(ab+bc+cd)+\left(b^2+c^2+d^2\right)<0$ then a, b, c, d are in

A. are in A.P.

B. are in G.P.

C. are in H.P.

D. none of these

Answer: B

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17. The number of values of a for which equations $x^3+ax+1=0andx64+ax^2+1=-$ have a common root is 0 b. 1 c. 2 d. Infinite

A. 0

B. 1

C. 2

D. infinitely many

Answer: A

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18. The number of values of a for which equations $x^3 + ax + 1 = 0 and x64 + ax^2 + 1 = -$ have a common root is 0 b. 1 c. 2 d. Infinite

A. 2

B. 0

C. -2

D. none of these

Answer: B

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19. The roots of the equation $\left|x^2 - x - 6\right| = x + 2$ are

A. $-2, 1, 4$

B. 0,2,4

C. 0,1,4

D. $-2, 2, 4$

Answer: D

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20. The number of real roots of the equation $|x|^2 - 3|x| + 2 = 0$, is

A. 4

B. 1

C. 2

D. infinite

Answer: A

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21. The least value of $n \in N$ for which $(n-4)x^2 + 8x + n + 2 > 0 \forall x \in R$, is

A. 11

B. 10

C. 8

D. 7

Answer: D

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22. Let f(x) be a quadratic expression such that $f(x) < 0 \forall x \in R$. If g(x) f'(x) + f''(x) then for $x \in R$.

A. $g(x) < 0$

B. $g(x) \leq 0$

C. $g(x) > 0$

D. $g(x) \geq 0$

Answer: A

View Text Solution

23. If x + 1 is a factor of $x^4 + (p-3)x^3 - (3p-5)x^2 + (2p-9)x + 12$, then value of p is

A. -2

B. 5

C. 4

D. -1

Answer: B

Watch Video Solution

24. If both the roots of the equation are negative $x^2-(p-4)x+2e^{2\ln p}-4=0$ then p belongs to

A. $(-\sqrt{2},4)$

B. $(2\sqrt{2},4)$

C. $(4,\infty)$

D. none of these

Answer: D

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25. [Let f and g be two real valued functions and S={x|f(x)=0} and T= {x|g(x)=0}, then S nn T represent the set of roots of [(a) f(x)g(x)=0, (b) f(x)^(2)+g(x)^(2)=0 (c) f(x)+g(x)=0, (d) (f(x))/(g(x))=0]]

A. $f(x)g(x) = 0$

B. $f(x)^2 + g(x)^2 = 0$

C. $f(x) + g(x) = 0$

D. $\frac{f(x)}{g(x)} = 0$

Answer: B

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26. [If domain of f(x)=sqrt(x^(2)+bx+4) is R, then maxi- mum possible integral value of b is [(a) 2, (b) 3 (c) 4, (d) 5]]

A. 2

B. 3

C. 4

D. 5

Answer: C

Watch Video Solution

27. If $p \in (-1, 1)$, then roots of the quadratic equation $(p-1)x^2 + px + \sqrt{1-p^2} = 0$ are

A. purely imaginary

B. non-real complex combers

C. real and equal

D. real and distinct

Answer: D

View Text Solution

28. If a,b,c are positive real numbers, then the number of positive real roots of the equation $ax^2 + bx + c = 0$ is

A. 0

B. 1

C. 2

D. infinite

Answer: A

Watch Video Solution

29. If the roots of the equation $x^2 + p^2 = 8x + 6p$ are real, then p belongs to be interval

A. [2,8]

B. [-8,2]

C. [-2,8]

D. [-8,-2]

Answer: C

View Text Solution

30. If the sum of the roots of the equation $(a+1)x^2 = (2a+3)x + (3a+4) = 0$ is -1, then find the product of the roots.

A. 1

B. 4

C. 2

D. -2

Answer: B

Watch Video Solution

31. If 3 - 4i is a root of $x^2 - px + q = 0$ where p, q $\in R$. then value $\frac{2p-q}{p+q}$ is

A. $-12/31$

B. $-13/31$

C. $-15/31$

D. none of these

Answer: B

Watch Video Solution

32. If x = 1 + i is a root of $x^3 - ix + 1 - i = 0$, then the quadratic equation whose roots are the remain - ing two roots of $x^3 - ix + 1 - i = 0$ is

A. $x^2 + (1+i)x + 1 + I = 0$

B. $x^2 + (1+i)x + I = 0$

C. $x^2 + 2(1+i)x - 2 = 0$

D. none of these

Answer: B

View Text Solution

33. If α and β be the roots of the eqution $x^2 + px - \frac{1}{2p^2} = 0$, where p $\in R$. Then the minimum possible value of $\alpha^2 + \beta^2$ is

A. 2

B. $2\sqrt{2}$

C. $2 + \sqrt{2}$

D. none of these

Answer: A

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34. The equation $\sqrt{x+3-4\sqrt{x-1}}+\sqrt{x+8-6\sqrt{x-1}}=$ hs

A. no solution

B. exactly one solution

C. exactly two solutions

D. more than two solutions

Answer: D

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35. The equation $\left[x-x^2-1\right|=\left|2x-3-x^2\right]$ has

A. no solution

B. exactly one solution

C. exactly two solutions

D. more than two solutions

Answer: B

View Text Solution

36. If $\sin \alpha, \cos \alpha$ are the roots of the equation $ax^2 + bx + c = 0, (a \neq 0)$, then

A. $a^2 - b^2 + 2ac = 0$

B. $a^2 + b^2 - 2ac = 0$

C. $(a - c)^2 = b^2 + c^2$

D. none of these

Answer: A

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37. If x is real and $k = \dfrac{x^2 - x + 1}{x_2 + x + 1}$, then $k \in [1/3, 3]$ (b) $k \geq 3$ (c) $k \leq 1/3$ (d) none of these

A. $1/3 \leq k \leq 3$

B. $k \geq 5$

C. $k \leq 0$

D. none of these

Answer: A

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38. If the equation $x^2 + bx + ca = 0$ and $x^2 + cx + ab = 0$ have a common root and $b \neq c$, then their other roots will satisfy the equation

A. $x^2 + (b + c)x + bc = 0$

B. $x^2 - ax + bc = 0$

C. $x^2 + ax + bc = 0$

D. none of these

Answer: C

View Text Solution

39. If the inequality $\left(mx^2+3x+4+2x\right)/\left(x^2+2x+2\right)<5$ is satisfied for all $x \in R$, then find the value of m.

A. $m<5$

B. $m>5$

C. $m<71/24$

D. $m<71/24$

Answer: C

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40. Suppose, a, b, c are three distinct real numbers. Let P (x) = $\frac{(x-b)(x-c)}{(a-b)(a-c)}+\frac{(x-c)(x-a)}{(b-c)(b-a)}+\frac{(x-a)(x-b)}{(c-a)(c-b)}$.

When simplified, P (x) becomes

A. 1

B. x

C. x^2

D. none of these

Answer: A

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41. If $ax^2 + bx + c, a, b, c \in R, a \neq 0$ has real zero and $a - b + c < 0$, then value of ac is

A. positive

B. zero

C. negative

D. non-negative

Answer: A

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42. If α, β are the roots of the equation $x^2 - 2x - a^2 + 1 = 0$ and γ, δ are the roots of the equation $x^2 - 2(a+1)x + a(a-1) = 0$ such that $\alpha, \beta \varepsilon n(\gamma, \delta)$ find the value of a.

A. $(-1/4, 1)$

B. $(-1, 1)$

C. $(0, \infty)$

D. $(\sqrt{2}, \infty)$

Answer: A

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43. If α, β are the roots of the equation $ax^2 + 2bx + c = 0$ and $\alpha + h, \beta + h$ are the roots of the equation

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

A. $\frac{b^2 - ac}{B^2 - AC} = \frac{a}{A}$

B. $b^2 - ac = b^2 - AC$

C. $h = \frac{bA - aB}{2Aa}$

D. $h = \frac{ac + aC}{Aa + Bb}$

Answer: C

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44. The quadratic equation $x^2 + 7x = 14\left(q^2 + 1\right)$, where q is an integer has

A. real and distinct roots

B. integral roots

C. imaginary roots

D. none of these

Answer: A

View Text Solution

45. Let a,b,c $\in R$ and $a > 0$. If the quadratic equation $ax^2 + bx + c = 0$ has two real roots α and β such that $\alpha > -1$ and $\beta > 1$, then show that $1 + \left|\frac{b}{a}\right| + \frac{c}{a} > 0$

A. less than 2

B. less than 1

C. less than 0

D. less than -1

Answer: D

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46. Let $a, b, c \in R$ and $a \neq 0$ be such that $(a+c)^2 < b^2$,then the quadratic equation $ax^2 + bx + c = 0$ has

A. imaginary roots

B. real roots

C. two real roots lying between (-1,1)

D. none of these

Answer: B

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47. The integral values of a for which the quadratic equation $(x-a)(x-10)+1=0$ has integeral roots are

A. $-1, 3$

B. 2,3

C. 12,3

D. $-8, \ -12$

Answer: C

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48. The number of real solution fo $4^{x+1.5} + 9^{x+0.5} = \frac{10}{6^x}$ is

A. zero

B. one

C. two

D. infinite

Answer: C

View Text Solution

49. Number of solutions to the equation $2^{\sin^2 x} + 5.2^{\cos^2 x} = 7,$ in the interval $[-\pi, \pi],$ is

A. zero

B. 1

C. finitely many

D. infinitely many

Answer: D

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50. The number of values of k for which the equation $x^2 - 2x + k = 0$ has two distinct roots lying in the interval (0,1) is

A. 0

B. 1

C. 2

D. infinitely many

Answer: A

View Text Solution

51. If roots of the equation $ax^2 + bx + c = 0$ are $\frac{\alpha}{\alpha - 1}$ and $\frac{\alpha + 1}{\alpha}$ and then $(a + b + c)^2$ equals

A. $4ac - b^2$

B. $b^2 - 4ac$

C. $c^2 + a^2 - 2b^2$

D. none of these

Answer: B

Watch Video Solution

52. Let x be an integer and $x^2 + x + 1$ is divisible by 3. When is x divided by 3. it leaves remainder

A. 0

B. 1

C. 2

D. any of (a), (b) and (c)

Answer: B

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53. If α, β are roots of the equation $x^2 + ax + b = 0$, then maximum value of $-x^2 + ax + b + \frac{1}{4}(\alpha - \beta)^2$ is

A. $\frac{1}{4}(a^2 - 4b)$

B. $\frac{1}{4}(b^2 - 4a)$

C. $\frac{a^2}{2}$

D. none of these

Answer: A

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54. If both the roots of the equation $x^2 + bx + c = 0$ lie in the interval (0,1) , then

A. $b = -1, c = 2$

B. $b > -2, c < 1$

C. $b = -5, c < 2$

D. none of these

Answer: D

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55. Let a, b, c $\in R$ be such that a + b + c $< 0, a - b + c < 0$ and $c > 0$. If α and β are roots of the equation $ax^2 + bx + c = 0$, then value of $[\alpha] + [\beta]$ is

A. 2

B. 1

C. -1

D. 0

Answer: C

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56. Find the valuesof m for which exactly one root of the equation $x^2 - 2mx + m^2 - 1 = 0$ lies in the interval $(-2, 4)$

A. $-1 < m < 3$

B. $1 < m < 5$

C. $1 < m < 3$

D. $-1 < m < 5$

Answer: A

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57. The value of $\sqrt{8+2\sqrt{8+2\sqrt{8+2\sqrt{8+....}}}}$ is

A. 10

B. 6

C. 8

D. none of these

Answer: D

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58. The number of solutions of the equation $\sin\left(\frac{\pi x}{2\sqrt{3}}\right) = x^2 - 2\sqrt{3}x + 4$

A. 1

B. 2

C. 0

D. infinite

Answer: A

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59. The number of solutions of $|x + 2| = 2(3 - x)$ is

A. 1

B. 2

C. 3

D. 0

Answer: B

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60. If the equation $ax^2 + bx + c = 0(a < 0)$ has two roots α and β such that $\alpha < -3$ and $\beta > 3$, then

A. $c > 0$

B. c = 0

C. $c < 0$

D. c = a - b

Answer: C

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61. Two non-integer roots of $\left(x^2-5x\right)^2-7\left(x^2-5x\right)+6=0$ are

A. $\frac{1}{2}(5+\sqrt{29}), \frac{1}{2}(5-\sqrt{29})$

B. $\frac{1}{2}(-5+\sqrt{29}), \frac{1}{2}(-5+\sqrt{29})$

C. $\frac{1}{2}(-5+\sqrt{14}), \frac{1}{2}(-5-\sqrt{41})$

D. none of these

Answer: A

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62. The number of real roots of $\left(\frac{x-1}{x+1}\right)^4-13\left(\frac{x-1}{x+1}\right)^2+36=0, x \neq -1$ is

A. 0

B. 2

C. 3

D. 4

Answer: D

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63. The number of negative roots of $9^{x+2} - 6\left(3^{x+1}\right) + 1 = 0$ is

A. 0

B. 1

C. 2

D. 4

Answer: B

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64. The number of roots of $81\left(\frac{2x-5}{3x+1}\right)^4 - 45\left(\frac{2x-5}{3x+1}\right)^2 + 4 = 0, x \neq 1/3$ is

A. 1

B. 2

C. 3

D. 4

Answer: C

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65. $\left(x^2+3x+2\right)^2 - 8\left(x^2+3x\right) - 4 = 0$

A. 0

B. 2

C. 3

D. 4

Answer: D

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66. The number of roots of the equation $\sqrt{\frac{x}{x-3}} + \sqrt{\frac{x-3}{x}} = \frac{5}{2}, x \neq 0, x \neq 3$ is

A. 0

B. 2

C. 3

D. 4

Answer: B

View Text Solution

67. $4\left(x-\frac{1}{x}\right)^2+8\left(x+\frac{1}{x}\right)=29$ is

A. 0

B. 2

C. 4

D. infinite

Answer: B

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68. Irrational roots of the equaiton $2x^4+9x^3+8x^2+9x+2=0$ are

A. $-2-\sqrt{3}, 2+\sqrt{3}$

B. $2-\sqrt{3}, 2+\sqrt{3}$

C. $-2+\sqrt{3}, \ -2-\sqrt{3}$

D. none of these

Answer: C

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69. Sum of the roots of the equaiton $4\left(x-\frac{1}{x}\right)^2-4\left(x-\frac{1}{x}\right)+1=0$ is

A. 5

B. 1

C. $-5/2$

D. -1

Answer: B

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70. The number of irrational roots of the equation

$(x-1)(x-2)(3x-2)(3x+1)=21$ is

A. 0

B. 2

C. 3

D. 4

Answer: B

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71. Product of roots of the equation $x - \sqrt{3x - 6} = 2$ is

A. 2

B. 5

C. 7

D. 10

Answer: D

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72. Number of roots of the equation $2\sqrt{2x+1} = 2x - 1$ is 0 (b) 1 (c) 2 (d) 3

A. 1

B. 2

C. 3

D. 4

Answer: A

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73. Product of roots of the equation $\sqrt{13 - x^2} = x + 5$ is

A. -6

B. 7

C. 6

D. -7

Answer: C

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74. The number of roots of the equation $\sqrt{x^2-4}-(x-2)=\sqrt{x^2-5x+6}$ is

A. 0

B. 1

C. 2

D. 3

Answer: D

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75. The product of the roots of the equaiton $\sqrt{x^2-4x+3}+\sqrt{x^2-7x+12}=3\sqrt{x-3}$ is

A. 15

B. -15

C. 20

D. -20

Answer: A

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76. Suppose a and b satisfy the equations $18a^2+77a+2=0$ and $2b^2+77b+18=0$ then value of $\frac{ab+a+1}{b}$ is

A. -25

B. $-25/6$

C. $6/25$

D. $-1/25$

Answer: B

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77. Suppose α, β are roots of $x^2 - 7x + 8 = 0,$ with $\alpha > \beta,$ then value of $\frac{16}{\alpha} + 3\beta^2 - 19\beta$ is

A. -10

B. 10

C. -23

D. 17

Answer: A

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78. If α is a root of $x^4 + x^2 - 1 = 0$, the value of $\left(\alpha^6 + 2\alpha^4\right)^{2012}$ is

A. 0

B. -1

C. 1

D. none of these

Answer: C

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79. Sum and product of all the roots of the equation $\left(x^2 - x - 1\right)\left(x^2 - x - 2\right)\left(x^2 - x - 3\right)\ldots\left(x^2 - x - 2012\right) = 0$ is

A. $2012, 2012!$

B. $-2012, 2012!$

C. $-2012, \ -2012!$

D. $2012, \ -2012!$

Answer: A

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80. Suppose three distinct non-zero real numbers satisfy $a^2(a+k) = b^2(b+k) = c^2(c+k)$, where k is some real number, then value of $\frac{1}{a} + \frac{1}{b} + \frac{1}{c}$ is

A. 0

B. k

C. $-k$

D. 2k

Answer: A

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Exercise Level 2 Single Correct Answer Type Questions

1. If $\alpha \in \left(0, \frac{\pi}{2}\right)$ then $\sqrt{x^2+x} + \frac{(\tan\alpha)^2}{\sqrt{x^2+x}}$ is always greater than or equal to

A. $2\tan\alpha$

B. 2

C. 1

D. $\sec^2\alpha$

Answer: A

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2. If $a, b \in R$, and the equation $x^2 + (a-b)x - a - b + 1 = 0$ has real roots for all $b \in R$, then a lies in the in terval

A. $(1, \infty)$

B. $(0, \infty)$

C. $(-\infty, 1)$

D. $(-1, 1)$

Answer: A

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3. If α and $\beta(\alpha < \beta)$ are the roots of the equation $x^2 + bx + c = 0$, where $c < 0 < b$, then

A. $0 < \alpha < \beta$

B. $\alpha < 0 < \beta < |\alpha|$

C. $\alpha < \beta < 0$

D. none of these

Answer: B

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4. $a, b, c, \in R, a \neq 0$ and the quadratic equation $ax^2 + bx + c = 0$ has no real roots, then which one of the following is not true?

A. $c + c(a + b + c) > 0$

B. $c - c(a + b - c) > 0$

C. $(a + b)^2 - 4c < 0$

D. $c(a + b + c) < 0$

Answer: D

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5. If [x] denotes the greatest integer $\leq x$, then number of solutions of the equation $x^2 - 2 - 2[x] = 0$ is

A. 4

B. 2

C. 3

D. none of these

Answer: D

Watch Video Solution

6. If [x] denotes the greatest integer $\leq x$, and , b are two odd integers, then number of solution of $[x]^2 + a[x] + b = 0$ is

A. 1

B. 0

C. 2

D. infinite

Answer: B

View Text Solution

7. If $0 < \alpha < \beta < \gamma < \frac{\pi}{2}$, then the equation $\frac{1}{x - \sin\alpha} + \frac{1}{x - \sin\beta} + \frac{1}{x - \sin\gamma} = 0$ has

A. two distinct real roots

B. two equal roots

C. two imaginary roots

D. one real and one imaginary root.

Answer: A

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8. If root of the equation $x^2 + ax + b = 0 are \alpha, \beta$, then the roots of $x^2 + (2\alpha + a)x + \alpha^2 + a\alpha + b = 0$ are

A. $1, \beta - \alpha$

B. $0, \alpha - \beta$

C. $0, \beta - \alpha$

D. 0,1

Answer: C

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9. Let a, b, c be the sides of a triangle. No two of them are equal and $\lambda \in R$ If the roots of the equation $x^2 + 2(a+b+c)x + 3\lambda(ab+bc+ca) = 0$ are real, then (a) $\lambda < \frac{4}{3}$ (b) $\lambda > \frac{5}{3}$ (c) $\lambda \in \left(\frac{1}{5}, \frac{5}{3}\right)$ (d) $\lambda \in \left(\frac{4}{3}, \frac{5}{3}\right)$

A. $(-\infty, 4/3)$

B. $(5/3, \infty)$

C. $(1/3, 5/3)$

D. $(4/3, 5, 3)$

Answer: A

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10. If $\tan\theta$ and $\cot\theta$ are roots of $x^2 + 2ax + b = 0$, then least value of |a| is

A. $\frac{1}{2}$

B. 1

C. 2

D. cannot be found.

Answer: B

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11. |[alpha]+[beta]+[gamma]|, where [.]` denotes the integer function, is equal to

A. 1

B. 2

C. -2

D. -3

Answer: D

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12. If $\tan A$ and $\tan B$ are the roots of the quadratic equation $x^2 - px + q = 0$ then value of $\sin^2(A+B)$

A. $\frac{p^2}{p^2+q^2}$

B. $\frac{p^2}{(q+p)^2}$

C. $\frac{p^2}{(1-q)^2+p^2}$

D. $1 - \frac{p^2}{(1-q)^2}$

Answer: C

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13. The equation $\sqrt{x+3-4\sqrt{x-1}}+\sqrt{x+8-6\sqrt{x-1}}=$ hs

A. no solution

B. only one solution

C. only two solutions

D. infinite number of solutions

Answer: A

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14. The number of irrational solutions of the equation $\sqrt{x^2+\sqrt{x^2+11}}+\sqrt{x^2-\sqrt{x^2+11}}=4$, is

A. 0

B. 2

C. 4

D. infinite

Answer: B

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15. Let a, b, c, p, q be five different non-zero real numbers and x,y,z be three numbers satisfying the system of equations

$\frac{x}{a}+\frac{y}{a-p}+\frac{z}{a-q}=1$

$\frac{x}{b}+\frac{y}{b-p}+\frac{z}{b-q}=1$ and $\frac{x}{c}+\frac{y}{c-p}+\frac{z}{c-p}=1$ then x equals

A. $\frac{abc}{pq}$

B. $\frac{pq}{abc}$

C. $\frac{abc}{p+q}$

D. none of these

Answer: A

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16. Let $f(x) = ax^2 + bx + c$,where a, b, c $\in$ R . Suppose $|f(x)| \leq 1 \forall x \in [0, 1],$ then |a| cannot exceed

A. 5

B. 6

C. 7

D. 8

Answer: D

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17. If $a(p+q)^2 + 2bpq + c = 0$ and $a(p+r)^2 + 2bpr + c = 0$, then |q - r| equals

A. $\frac{2}{|a|}\sqrt{(2a+b)bp^2 - ac}$

B. $\frac{2}{|a|}\sqrt{p^2 - 4ac}$

C. $p^2 + \frac{c}{a}$

D. none of these

Answer: A

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18. if $b^2 \geq 4ac$ for the equation $ax^4 + bx^2 + c = 0$ then roots of the equation will be real if

A. $a > 0, b < 0, c > 0,$ or $a < 0, b > 0, c < 0$

B. $a > 0, b > 0, c > 0,$ or $a < 0, b < 0, c < 0$

C. $a > 0, b < 0, c > 0,$ or $a > 0, b > 0, c < 0$

D. none of these

Answer: A

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19. If $x^2 + mx + 1 = 0$ and $(b - c)x^2 + (c - a)x + (a - b) = 0$ have both roots common, then

A. m = - 2

B. m = - 1

C. m = 0

D. m = 1

Answer: A

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20. If $x, y, z \in R, x + y + z = 4$ and $x^2 + y^2 + z^2 = 6,$ then the maximum possible value of z is

A. 1

B. 2

C. $\frac{3}{2}$

D. $\frac{4}{3}$

Answer: B

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Exercise Level 2 Numerical Answer Type Questions

1. Let α, β be non-real roots of $\left(x^2+x-3\right)\left(x^2+x-2\right)-12=0$ then $\alpha^{73}+\beta^{70}$= _____

Watch Video Solution

2. Suppose α, β are irrational roots of $x^5-5x^4+9x^3+5x-1=0$ If $\alpha^2+\beta^2+\alpha\beta(\alpha+\beta)=20k,$ then k = _____

View Text Solution

3. Suppose α, β, γ are roots of $x^3 + qx + r = 0$. If $(\alpha - \beta)^2 + (\beta - \gamma)^2 + (\gamma - \alpha)^2$ = - e, then q = _____

Watch Video Solution

4. Suppose $f(x) = (x - a)(x - b) - \frac{1}{2}(b - a)$, where a $b \in R$. If the minimum value of f(x) is -8.75 , then |b - a + 1| is equal to _____

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5. Let $f(x) = \frac{x^2 + 4x + 1}{x^2 + x + 1}, x \in R$

If $m \leq f(x) \leq M \forall x \in R$, then $\frac{1}{2}$ (M - m) = _____

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6. If $a, b > 0$, then the least value of $\frac{a^2 - ab + b^2}{(a + b)^2}$ is _____

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7. Let p, q be integers and let α, β be the roots of the equations $x^2 - x - 1 = 0$ where $\alpha \neq \beta$. For n = 0,1,2, . . . let $a_n = p\alpha^n + q\beta^n$. If $a_4 = 28$, then p $+ \frac{1}{8}q$ is equal to _____

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8. Let α, β be roots of $x^2 + x + 1 = 0$, then the equation whose roots are$(\alpha)^{10}$ and $(\beta)^{13}$is

Watch Video Solution

9. Let $S = \left\{x \in R : \sqrt{x^2 + 19x} - \sqrt{x} + \sqrt{x + 19} = x + 6.08\right\}$, then $\sum_{x \in S} x =$ _____

View Text Solution

10. Suppose $a, b \in Q$ and $3 - \sqrt{5}$ is a root of $x^2 + ax + b = 0$, then $a^2 - 4b - 18.8 =$ _____

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11. If $y = x + \frac{1}{x}, (x \neq 0)$ reduces the polynomial $(x^2 - 5x + 1)(x^2 - 3x + 1) = 6x^2 toy^2 + Ay + B$, then A - B is equal to _____

Watch Video Solution

12. Suppose, $a, b, c \in R, a > 0$. Let α, β be roots of $ax^2 + bx + c$ such that $\alpha < -5$ and $\beta > 5$. If $-\frac{4}{5}\left|\frac{b}{a}\right| - \frac{4}{25}\frac{c}{a} > k$, then k cannot be less than _____

View Text Solution

13. If the equations $x^5 + ax + 1 = 0$ and $x^6 + ax^2 + 1 = 0$ have a common root , then the value of ' -3a ' is equal to _____.

Watch Video Solution

14. If 3 + 4i is a root of $x^2 + px + q = 0$, where p, q $\in R$, then $\frac{1}{13}$ (2p + q) is equal to _____

View Text Solution

15. Suppose $p \neq q$ and difference between the roots of $x^2 + 2px + q = 0$ is twice the difference between the roots of $x^2 + qx + \frac{1}{4}p = 0$ then |p + q + 4| is equal to _____

Watch Video Solution

16. If the equation formed by decreasing each root of $ax^2 + bx + c = 0$ by 1 is $2x^2 + 6x + 2 = 0$, then the value of a, b and c is _____

View Text Solution

17. Suppose a, b, c $\in R, a \neq 0$ .If one root of $ax^2 + bx + c = 0$ is the fourth power of the other, then $\left(a^4c\right)^{1/5} + \left(ac^4\right)^{1/5} + b =$ _____

Watch Video Solution

18. Let a, b be roots of $x^2 + 2x + 5.71 = 0$. Let $A_n be \alpha^n + \beta^n$, where $n \in N$. If $A_{n+1} + kA_{n-1} -$ then k is equal to _____

View Text Solution

19. Let $f(x) = \frac{x^2 + x + 1}{x^2 + 3x + 3} x x \in R$. Let m be the mid-point of the range of f(x) , then 3m + 2 . 31 is equal to _____

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Questions From Previous Years Aieee Jee Main Papers

1. If $\alpha \neq \beta$ but $\alpha^2 = 5\alpha - 3, \beta^2 = 5\beta - 3$, then find the equation whose roots are $\frac{\alpha}{\beta}$ and $\frac{\beta}{\alpha}$.

A. $3x^2 - 25x + 3 = 0$

B. $x^2 - 5x + 3 = 0$

C. $x^2 + 5x - 3 = 0$

D. $3x^2 - 19x + 3 = 0$

Answer: D

Watch Video Solution

2. If $a \neq b$ and differences between the roots of the equations $x^2 + ab + b = 0$ and $x^2 + bx = a = 0$ is the same then (A) $a + b + 4 = 0$ (B) $a + b - 4 = 0$ (C) $a - b + 4 = 0$ (D) $a - b - 4 = 0$

A. a + b + 4 = 0

B. a +b - 4 = 0

C. a - b + 4 = 0

D. a - b - 4 = 0

Answer: A

Watch Video Solution

3. If a, b, c $\in R$ and 2a + 3b + 6c = 0, then the equation $ax^2 + bx + c = 0$ has

A. at least one root in [0,1]

B. at least one root in [2,3]

C. at least one root in [-1,0]

D. at least one root in $[-\infty, 1]$

Answer: A

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4. Product of real roots of the equation $t^2x^2 + |x| + 9 = 0$ a. is always +ve b. is always-ve c. does not exist d. none of these

A. positive

B. negative

C. zero

D. does not exist.

Answer: D

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5. Find the value of a for which one root of the quadratic equation $(a^2 - 5a + 3)x^2 + (3a - 1)x + 2 = 0$ is twice as large as the other.

A. $-\frac{2}{3}$

B. $\frac{1}{3}$

C. $-\frac{1}{3}$

D. $\frac{2}{3}$

Answer: D

Watch Video Solution

6. If the sum of the roots of the quadratic equation $ax^2 + bx + c = 0$ is equal to the sum of the square of their reciprocals, then $\frac{a}{c}, \frac{b}{a}$ and $\frac{c}{b}$ are in

A. G.P.

B. H.P.

C. A.G.P.

D. A.P.

Answer: B

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7. The number of real solutions of the equation $|x|^2 - 3|x| + 2 = 0$

A. 4

B. 1

C. 3

D. 2

Answer: A

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8. Let two numbers have A.M.=9 and G.M. =4 Then these numbers are the roots of the quadratic equation

A. $x^2 + 18x - 16 = 0$

B. $x^2 - 18x + 16 = 0$

C. $x^2 + 18x + 16 = 0$

D. $x^2 - 18x - 16 = 0$

Answer: B

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9. If $(1 - p)$ is a root of quadratic equation $x^2 + px + (1 - p) = 0,$ then find its roots.

A. $0, \ -1$

B. $-1, 1$

C. 0,1

D. $-1, 2$

Answer: A

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

A. 3

B. 12

C. $\frac{12}{4}$

D. 4

Answer: C

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11. If $2a + 3b + 6c = 0,$ then prove that at least one root of the equation $ax^2 + bx + c = 0$ lies in the interval (0,1).

A. (2,3)

B. (1,2)

C. (0,1)

D. (1,3)

Answer: C

Watch Video Solution

12. If, in a $\triangle PQR$, right angled at R, $\tan\left(\frac{P}{2}\right)$ and $\tan\left(\frac{Q}{2}\right)$ are the roots of the equation $ax^2 + bx + c = 0, a \neq 0,$ then

A. b = c

B. b = a + c

C. a = b + c

D. c = a + b

Answer: D

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13. If the sum of the squares of the roots of the equation $x^2 - (a-2)x - (a+1) = 0$ is least, then the value of a, is

A. 3

B. 2

C. 1

D. 0

Answer: C

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14. If the roots of the equation $x^2 - bx + c = 0$ are two consecutive integers, then find the value of $b^2 - 4$.

A. 2

B. 1

C. -2

D. 3

Answer: B

Watch Video Solution

15. If both the roots of the quadratic equation $x^2 - 2kx + k^2 + k - 5 = 0$ are less than 5 , then k lies in the interval

A. $(-\infty, 4)$

B. [4,5]

C. (5,6)

D. $(6, \infty)$

Answer: A

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16. If the equation $a_n x^n + a_{n-1} x^{n-1} + .. + a_1 x = 0, a_1 \neq 0, n \geq 2,$ has a positive root $x = \alpha$ then the equation $n a_n x^{n-1} + (n-1) a_{n-1} x^{n-2} + ... + a_1 = 0$ has a positive root which is

A. greater than or equal to α

B. equal to α

C. greater than α

D. smaller than α

Answer: D

Watch Video Solution

17. If the roots of the quadratic equation $x^2 + px + q = 0$ are $\tan 30^0 and tan 15^0$, respectively, then find the value of $2 + q - p$.

A. 1

B. 2

C. 3

D. 0

Answer: C

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18. All the values of m for whilch both the roots of the equation $x^2 - 2mx + m^2 - 1 = 0$ are greater than -2 but less than 4 lie in the interval `-23c. -1

A. $1 < m < 4$

B. $-2 < m < 0$

C. $m > 3$

D. $-1 < m < 5$

Answer: D

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19. If x is real , the maximum value of $\frac{3x^2 + 9x + 17}{3x^2 + 9x + 7}$ is

A. $\frac{17}{7}$

B. $\frac{1}{4}$

C. 41

D. 1

Answer: C

Watch Video Solution

20. If the difference between the roots of the equation $x^2 + ax + 1 = 0$ is less then $\sqrt{5}$, then find the set of possible value of a.

A. (-3,3)

B. $(-3, \infty)$

C. $(3, \infty)$

D. $(-\infty, -3)$

Answer: A

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21. The quadratic equations $x^26x + a = 0andx^2cx + 6 = 0$ have one root in common. The other roots of the first and second equations are integers in the ratio 4 : 3. Then the common root is (1) 1 (2) 4 (3) 3 (4) 2

A. 1

B. 4

C. 3

D. 2

Answer: D

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22. If the roots of the equation $bx^2 + cx + a = 0$ be imaginary, then for all real values of x, the expression $3b^2x^2 + 6bcx + 2c^2$ is (1) greater than 4ab (2) less than 4ab (3) greater than $4ab$ (4) less than $4ab$

A. greater then - 4ab

B. less then -4ab

C. greater than 4ab

D. less than 4ab

Answer: A

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23. If α and β are the roots of the equation $x^2 - x + 1 = 0$, $\alpha^{2009} + \beta^{2009}$ is equal to

A. 1

B. 2

C. -2

D. -1

Answer: A

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24. Let for $a \neq a_1 \neq 0$, $f(x) = ax^2 + bx + c$,$g(x) = a_1x^2 + b_1x + c_1$ and $p(x) = f(x) - g(x)$. If $p(x) = 0$ only for $x = -1$ and $p(-2) = 2$ then the value of $p(2)$.

A. 3

B. 9

C. 6

D. 18

Answer: D

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25. The solution of the equation $e^{\sin x} - e^{-\sin x} - 4 = 0$

A. no real roots

B. exactly one real root

C. exactly four real roots

D. infinite number of real roots

Answer: A

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26. If the equation $x^2 + 2x + 3 = 0$ and $ax^2 + bx + c = 0, a, b, c \in R$ have a common root, then $a : b : c$ is

A. $3 : 2 : 1$

B. $1 : 3 : 2$

C. $3 : 1 : 2$

D. $1 : 2 : 3$

Answer: D

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27. If α and β are the roots of the equation $x^2 + px + \frac{3p}{4} = 0$ such that $|\alpha - \beta| = \sqrt{10}$ then p belongs to the set

A. {2,-5}

B. {-3,2}

C. {-2,5}

D. [-3,5}

Answer: C

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28. if p and q are non zero real numnbers and $\alpha^3 + \beta^3 = -p\ \alpha\beta = q$ then a quadratic equation whose roots are $\frac{\alpha^2}{\beta}, \frac{\beta^2}{\alpha}$ is

A. $px^2 - qx + p^2 = 0$

B. $qx^2 + px + q^2 = 0$

C. $px^2 + qx + p^2 = 0$

D. $qx^2 - px + q^2 = 0$

Answer: B

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29. The value of 'k' for which one root of the equation $x^2 - (k+1)x + k^2 + k - 8 = 0$ exceeds 2 and the other is less than 2, are given by:

A. $3 < a < 10$

B. $a > 10$

C. $-2 < a < 3$

D. $a \leq -2$

Answer: C

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30. The least integral value α of x such that $\frac{x-5}{x^2+5x-14} > 0$, satisfies

A. $\alpha^2 + 3\alpha - 4 = 0$

B. $\alpha^2 - 5\alpha + 4 = 0$

C. $\alpha^2 - 7\alpha + 6 = 0$

D. $\alpha^2 + 5\alpha - 6 = 0$

Answer: D

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31. Let α and β be the roots of equation $px^2 + qx + r = 0, p \neq 0$.If p, q, r are in A.P. and $\frac{1}{\alpha} + \frac{1}{\beta} = 4$, then the value of $|\alpha - \beta|$ is :

A. $\frac{1}{9}\sqrt{61}$

B. $\frac{2}{9}\sqrt{17}$

C. $\frac{1}{\sqrt{34}}$

D. $\frac{2}{9}\sqrt{13}$

Answer: D

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32. If the equation $ax^2 + bx + c = 0$ and $2x^2 + 3x + 4 = 0$ have a common root, then a : b : c

A. $1:2:3$

B. $2:3:4$

C. $4:3:2$

D. $3:2:1$

Answer: B

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33. The sum of the roots of the equation $x^2 + |2x - 3| + 4 = 0$, is

A. 2

B. -2

C. $\sqrt{2}$

D. $-\sqrt{2}$

Answer: C

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34. If α and β are roots of the equation $x^2 - 4\sqrt{2}kx + 2e^{4Ink} - 1 = 0$ for some k,and $\alpha^2 + \beta^2 = 66,$ then $\alpha^3 + \beta^3$ is equal to

A. $248\sqrt{2}$

B. $280\sqrt{2}$

C. $-32\sqrt{2}$

D. $-280\sqrt{2}$

Answer: B

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35. The number of solutions of $\sqrt{3x^2 + x + 5} = x - 3$ is

A. has no solution

B. exactly one solution

C. exactly one solutions

D. exactly four soultions

Answer: A

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36. Let α and β be the roots of equation $x^2 - 6x - 2 = 0$. If $a_n = \alpha^n - \beta^n$, f or $n \geq 1$, then the value of $\frac{a_{10} - 2a_8}{2a_9}$ is equal to: (1) 6 (2) -6 (3) 3 (4) -3

A. 6

B. -6

C. 3

D. -3

Answer: C

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37. If $2+3i$ is one of the roots of the equation $2x^3-9x^2+kx-13=0, k\varepsilon R,$ then the real root of this equation

A. does not exist

B. exists and is equal to $\frac{1}{2}$

C. exists and is equal to $-\frac{1}{2}$

D. exists and is equal to 1

Answer: D

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38. If the two roots $(a-1)\left(x^4+x^2+1\right)+(a+1)\left(x^2+x+1\right)^2$=0 are real and distinct, then the set of all values of 'a' is.....

A. $\left(-\frac{1}{2}, 0\right)$

B. $(-\infty, -2) \cup (2, \infty)$

C. $\left(-\frac{1}{2}, 0\right) \cup \left(0, \frac{1}{2}\right)$

D. $\left(0, \frac{1}{2}\right)$

Answer: C

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39. The sum of all real values of X satisfying the equation $\left(x^2 - 5x + 5\right)^{x^2+4x-60} = 1$ is:

A. 3

B. -4

C. $\sqrt{3}$

D. 5

Answer: A

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40. If the equations $x^2 + bx - 1 = 0$ and $x^2 + x + b = 0$ have a common root different from -1 then $|b|$ is equal to

A. 2

B. 3

C. $\sqrt{3}$

D. $\sqrt{2}$

Answer: C

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41. If x is a solution of the equation $\sqrt{2x+1} - \sqrt{2x-1} = 1\left(x \geq \frac{1}{2}\right)$ then $\sqrt{4x^2 - 1} =$ (i) $\frac{3}{4}$ (ii) $\frac{1}{2}$ (iii) 2 (iv) $2\sqrt{2}$

A. $\frac{3}{4}$

B. $\frac{1}{2}$

C. $2\sqrt{2}$

D. 2

Answer: A

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42. Let x, y, z be positive real numbers such that $x + y + z = 12$ and $x^3y^4z^5 = (0.1)(600)^3$. Then $x^3 + y^3 + z^3$ is

A. 342

B. 216

C. 258

D. 270

Answer: B

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43. If, for a positive integer n, the quadratic equation, $x(x+1)+(x-1)(x+2)+\ +(x+n-1)(x+n)=10n$ has two consecutive integral solutions, then n is equal to : 10 (2) 11 (3) 12 (4) 9

A. 12

B. 9

C. 10

D. 11

Answer: D

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44. Let $p(x)$ be a quadratic polynomial suchthat $p(0)=1$. If $p(x)$ leaves remainder 4 when divided by $x-1$ and it leaves remainder 6 when divided by $x+1$; then

A. p(2) = 11

B. p(2) = 19

C. p(-2) = 19

D. p(-2) = 1

Answer: C

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45. The sum of all the real values of x satisfying the equation $2^{(x-1)(x^2+5x-50)} = 1$ is

A. 16

B. 14

C. -4

D. -5

Answer: C

Watch Video Solution

46. If $\alpha, \beta \in C$ are the distinct roots of the equation $x^2 - x + 1 = 0$, then $\alpha^{101} + \beta^{107}$ is equal to

A. 0

B. 1

C. 2

D. -1

Answer: B

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47. v22

A. $4\sqrt{2}$

B. 20

C. $2\sqrt{5}$

D. $2\sqrt{7}$

Answer: C

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48. Let p,q and r be real number $(p \neq q, r \neq 0)$ such that the roots of the equation

$\frac{1}{x+p} + \frac{1}{x+q} = \frac{1}{r}$ are equal in magnitude but opposite in sign, then the sum of squares of these roots is equal to :

A. $\frac{1}{2}(p^2 + q^2)$

B. $p^2 + q^2$

C. $2(p^2 + q^2)$

D. $p^2 + q^2 + r^2$

Answer: D

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49. If $f(x)$ is a quadratic expression such that $f(1) + f(2) = 0,$ and -1 is a root of $f(x) = 0,$ then the other root of $f(x) = 0$ is :

A. $-\frac{5}{8}$

B. $\frac{8}{5}$

C. $-\frac{8}{5}$

D. $\frac{5}{8}$

Answer: B

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50. Let α and β be two roots of the equation $x^2 + 2x + 2 = 0.$ Then $\alpha^{15} + \beta^{15}$ is equal to

A. -256

B. 512

C. -512

D. 256

Answer: A

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51. If both the roots of the quadratic equation $x^2 - mx + 4 = 0$ are real and distinct and they lie in the interval [1, 5], then m lies in the interval

A. (-5, -4)

B. (4,5)

C. (5,6)

D. (3,4)

Answer:

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52. The number of all possible positive integral values of α for which the roots of the quadratic equation $6x^2 - 11x + \alpha = 0$ are rational numbers is : (a) 3 (b) 2 (c) 4 (d) 5

A. 3

B. 2

C. 4

D. 5

Answer: A

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53. Consider the quadratic equation $(c-5)x^2 - 2cx + (c-4) = 0, c \neq 5$. Let S be the set of all integral values of c for which one root of the equation lies in the interval (0, 2)

and its other root lies in the interval (2, 3). Then the number of elements in S is

A. 18

B. 12

C. 10

D. 11

Answer: D

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54. The values of λ such that sum of the squares of the roots of the quadratic equation $x^2 + (3 - \lambda)x + 2 = \lambda$ has the least value is

A. $\frac{15}{8}$

B. 1

C. $\frac{4}{8}$

D. 2

Answer: D

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55. If one real root of the quadratic equation $81x^2 + kx + 256 = 0$ is cube of the other root, then a value of k is

A. -81

B. 100

C. -300

D. 144

Answer: C

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56. If λ be the ratio of the roots of the quadratic equation in x, $3m^2x^2 + m(m-4)x + 2 = 0$, then the least value of m for which $\lambda + \frac{1}{\lambda} = 1$, is $k - 3\sqrt{2}$. The value of k is _____.

A. $2 - \sqrt{3}$

B. $4 - 3\sqrt{2}$

C. $-2 + \sqrt{2}$

D. $4 - 2\sqrt{3}$

Answer: B

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57. The number of integral values of m for which the quadratic expression $(1+2m)x^2 - 2(1+3m)x + 4(1+m), x \in R$, is always positive is

A. 8

B. 7

C. 6

D. 3

Answer: B

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58. Let $p, q \in R$. If $3 - \sqrt{3}$ is a root of the quadratic equation $x^2 + px + q = 0$, then

A. $p^2 - 4q + 12 = 0$

B. $q^2 - 4q - 16 = 0$

C. $q^2 + 4p + 14 = 0$

D. $p^2 - 4q - 12 = 0$

Answer: D

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59. If m is chosen in the quadratic equation $(m^2+1)x^2-3x+(m^2+1)^2=0$ such that the sum of its roots is greatest, then the absolute difference of the cubes of its roots is

A. $10\sqrt{5}$

B. $8\sqrt{3}$

C. $8\sqrt{5}$

D. $4\sqrt{3}$

Answer: C

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60. If α and β the rots of the quadratic equation, $x^2+x\sin\theta-2\sin\theta=0, \theta\in\left(0,\frac{\pi}{2}\right)$, then $\frac{\alpha^{12}+\beta^{12}}{(\alpha^{-12}+\beta^{-12})(\alpha-\beta)^{24}}$ is equal to

A. $\frac{2^{12}}{(\sin\theta-4)^{12}}$

B. $\frac{2^{12}}{(\sin\theta - 8)^6}$

C. $\frac{12^{12}}{(\sin\theta - 8)^{12}}$

D. $\frac{2^6}{(\sin\theta - 8)^6}$

Answer: C

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61. The number of real roots of the equation

$5 + |2^x - 1| = 2^x(2^x - 2)is$

A. 3

B. 2

C. 4

D. 1

Answer: D

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62. If α, β and γ are three consecutive terms of a non-constant G.P. such that the equations $ax^2 + 2\beta x + \gamma = 0$ and $x^2 + x - 1 = 0$ have a common root, then $\alpha(\beta + \gamma)$ is equal to

A. 0

B. $\alpha\beta$

C. $\alpha\gamma$

D. $\beta\gamma$

Answer: D

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63. If α and β be the roots of the equation $x^2 - 2x + 2 = 0$, then the least value of n for which $\left(\frac{\alpha}{\beta}\right)^n = 1$ is:

A. 2

B. 5

C. 4

D. 3

Answer: C

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64. The number of integral values of m for which the equation $(1+m^2)x^2 - 2(1+3m)x + (1+8m) = 0$, has no real roots is

A. 1

B. 2

C. infinitely many

D. 3

Answer: C

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Questions From Previous Years B Architecture Entrance Examination Papers

1. If the roots of the quadratic equation $x^2 + px + q = 0$ are $\tan 30^\circ$ and $\tan 15^\circ$ respectively then the value of $2 + q - p$ is

A. $1 + p$

B. $1 - p$

C. $1 - 2p$

D. $1 + 2p$

Answer: D

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2. The set of values of α for which the quadratic equation $(\alpha + 2)x^2 - 2\alpha x - \alpha = 0$ has two roots on the number line symmetrically placed about the point 1 is

A. $\{-1, 0\}$

B. $\{0, 2\}$

C. ϕ

D. $\{0, 1\}$

Answer: C

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3. The number of solutions of the equation $x^2 - 4|x| - 2 = 0$ is :

A. 1

B. 2

C. 3

D. 4

Answer: B

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4. The quadratic equation whose roots are a/b and b/a, $a \neq b \neq 0$ where $a^2 = 5a - 3$, and $b^2 = 5b - 3$, is

A. $3x^2 - 19 + 3 = 0$

B. $3x^2 + 19x - 3 = 0$

C. $3x^2 + 19x + 3 = 0$

D. $3x^2 - 19x - 3 = 0$

Answer: A

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5. if $\alpha \& \beta$ are the roots of the quadratic equation $ax^2 + bx + c = 0$, then the quadratic equation $ax^2 - bx(x-1) + c(x-1)^2 = 0$ has roots

A. $\frac{\alpha + 1}{\alpha}, \frac{\beta + 1}{\beta}$

B. $\frac{\alpha}{\alpha - 1}, \frac{\beta}{\beta - 1}$

C. $\frac{\alpha}{\alpha+1}, \frac{\beta}{\beta+1}$

D. $1-\alpha, a-\beta$

Answer: C

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6. If x^2-3x+2 is a factor of $x^2-ax^2+b=0$ then equation whose roots are a and b is

A. $x^2+9x+20=0$

B. $x^2-9x-20=0$

C. $x^2-9x+20=0$

D. $x^2+9x-20=0$

Answer: C

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7. Let a, b, c $\in$ R, $a > 0$, and the function $f: R \to R$ be defined by $f(x) = ax^2 + bx + c$.

Statement -1 $b^2 < 4ac \Rightarrow f(s) > 0$ for evergy value of x.

Statement - 2 : f is strictly decreasing in the interval $(-\infty, -b/2a)$ and strictly increasing in the interval $(-b/2a, \infty)$.

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8. if the roots of the equation $x^2 - x\ln(a^2 - 3a + 2) + a^2 - 4 = 0$ are of opposite sign, then

A. $(-\infty, -1)$

B. $(-1, 1)$

C. $(1, 2)$

D. $(2, 3)$

Answer: C

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9. If the roots of the equation $\frac{1}{x+p}+\frac{1}{x+q}=\frac{1}{r}$ are equal in magnitude but opposite in sign and its product is α

A. p^2+q^2

B. $\frac{1}{2}(p^2+q^2)$

C. $-\frac{1}{2}(p^2+q^2)$

D. $-\frac{1}{2}(p^2-q^2)$

Answer: C

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10. The values of k for which each root of the equation, $x^2-6kx+2-2k+9k^2=0$ is greater than 3, salways satisfy the inequality :

A. $7-9y>0$

B. $11 - 9y < 0$

C. $29 - 11y > 0$

D. $29 - 11y < 0$

Answer: B

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11. The number of interal values of m for which the equation $(1 + m^2)x^2 - 2(1 + 3m)x + (1 + 8m) = 0,$ has no ral roots is

A. 2

B. 3

C. infinitely many

D. 1

Answer: C

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12. If λ_1 and λ_2 are the two valyes of λ such that the α and β of quadratic equation $\lambda(x^2 - x) + x - 5 = 0$ satisfy $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} + \frac{4}{5} = 0$ then $\frac{\lambda_1}{\lambda_2^2} + \frac{\lambda_2}{\lambda_1^2}$ is equal to

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13. If the product of the roots of the equation $x^2 - 5kx + 2e^{\ln|k|} - 1 = 0$ is 49, then the sum of the squares of the roots of the equation is :

A. 1524

B. 1152

C. 1244

D. 1654

Answer: B

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14. If 2α is a root of $ax^2 + bx + c = 0$. β is a roots of $ax^2 - 2bx - c = 0$ and the real numbers a,b,c $(a > 0)$ are such that $\beta < \alpha,$ than a root γ of $ax^2 + 4bx + 2c = 0$ always satisfies :

A. $\gamma < \beta < \alpha$

B. $\beta < \alpha < \gamma$

C. $\alpha < \gamma < 2\beta$

D. $\beta < \gamma < \alpha$

Answer: D

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15. If each pair of three equations $x^2 - p_1x + 2 = 0,\ \ x^2 - p_2x + 3 = 0,$ and $x^2 - p_3x + 6 = 0$

have a common root, then positive values of p_1, p_2, p_3 are, respectively :

A. 3,4,5

B. 2,3,6

C. 1,3,6

D. 3,5,6

Answer: A

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16. The set of all real values of α for which the equation, $|a+2||x-2| = \alpha^2 - 2\alpha$ has real solution for s, is :

A. $(\infty, 0) \cup [2, \infty)$

B. $(-\infty, 0) \cup \left[2, 1+\sqrt{5}\right]$

C. $\left[-1-\sqrt{5}, 1-\sqrt{5}\right] \cup \left[1+\sqrt{5}, \infty\right)$

D. $\left[1-\sqrt{5}, 0\right) \cup \left[2, 1+\sqrt{5}\right]$

Answer: A

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