MATHS

BOOKS - MODERN PUBLICATION MATHS (KANNADA ENGLISH)

QUADRATIC EQUATIONS

Multiple Choice Questions Level I

1. The number of solutions of the equation :

sin $\left(e^{x}\right)=5^{x}+5^{-x}$ is :

A. 0

B. 2

C. 1

D. infinitely many

Answer: A

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

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3. The real roots of the equation :

$7\log_7\left(x^2 - 4x + 5\right)$ = x - 1 are :

A. 1 and 2

B. 2 and 3

C. 3 and 4

D. 4 and 5

Answer: B

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4. The real roots of $|x|^3 - 3x^2 + 3|x| - 2 = 0$ are :

A. 0,2

B. $\pm$ 1

C. $\pm$ 2

D. 1,2

Answer: C

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5. The equaton (cos p - 1) $x^2 + x$ (cos p) + sin p = 0 in the veriable x, has real roots then p can take any value in the interval :

A. $(0, 2\pi)$

B. $(0, \pi)$

C. $(-\pi, 0)$

D. $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

Answer: B

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6. The real values of x for which :

$3^{72}\left(\frac{1}{3}\right)^{x}\left(\frac{1}{3}\right)^{\sqrt{x}} > 1$ are :

A. $x \in [0,64]$

B. $x \in (0,64)$

C. $x \in [0,64)$

D. None of these

Answer: C

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7. Both the roots of the equation :

(x - b) (x -c) + (x - c) (x - a) + (x - a) (x - b) = 0 are always :

A. positive

B. negative

C. real

D. None of these

Answer: C

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8. If the roots of the equation $x^2 - 2ax + a^2 + a - 3 = 0$ are real and less then 3, then :

A. $a < 2$

B. $2 \leq \text{ and } \leq 3$

C. $3 < a \leq 4$

D. $a > 4$

Answer: A

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9. The equaton (cos p - 1) $x^2 + x$ (cos p) + sin p = 0 in the veriable x, has real roots then p can take any value in the interval :

A. $(0, 2\pi)$

B. $(-\pi, 0)$

C. $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

D. $(0, \pi)$

Answer: D

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10. The sum of the roots of the equation $x^2 + px + q = 0$ is equal to the sum of their squares, then :

A. $p^2 - q^2 = 0$

B. $p^2 + q^2$ = 2q

C. $p^2 + p = 2q$

D. None of these

Answer: C

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11. The number of real roots of $2^{2x^2 - 7x + 5} = 1$ is :

A. 0

B. 1

C. 2

D. 4

Answer: C

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12. If $f(x) = 2x^3 + mx^2 - 13x + n$ and 2 and 3 are 2 roots of the equations f(x)=0, then values of m and n are

A. $-5, \ -30$

B. $-5, 30$

C. $5, 30$

D. None of these

Answer: B

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13. The value of p for which the difference between the roots of the equation $x^2 + px + 8 = 0$ is 2, are

A. $\pm$ 2

B. ± 4

C. ± 6

D. ± 8

Answer: C

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14. If α, β are real and $\alpha^2, -\beta^2$ are the roots of the equation $a^2x^2 + x + \left(1 - a^2\right) = 0 (a > 1)$, then β^2

A. a^2

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

C. $1 - a^2$

D. $1 + a^2$

Answer: B

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15. 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. $x^2 - 5x - 3 = 0$

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

C. $3x^2 + 12x + 3 = 0$

D. None of these

Answer: B

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16. If x is real , then least value of the expression

$(ax^2 + bx + c), a < 0$ is :

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

B. $b^2 - 4ac$

C. $\frac{4ac - b^2}{4a}$

D. $\frac{4ac - b^2}{4a^2}$

Answer: C

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17. Let α, β the roots of the equation (x - a) (x - b) = c , c $\neq$ 0. Then the roots of the equation $(x - \alpha)x - \beta) + c = 0$ are :

A. a , c

B. b, c

C. a, b

D. a + c , b + c

Answer: C

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18. The value of m for which the equation $x^3 + x + 1 = 0$. Has two roots equal in magnitude but opposite in sign, is :

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

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

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

D. $\frac{4}{5}$

Answer: B

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19. The value of $x^2 + 2bx + c$ is + ve if :

A. $b^2 - 4ax > -0$

B. $b^2 - 4ax < -0$

C. $c^2 < b$

D. $b^2 < c.$

Answer: D

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20. Let a, be the roots of the equation $x^2 + x + 1 = 0$. The equation whose roots are α^{19} and β^7 are:

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

B. $x^2 - x + 1 = 0$

C. $x^2 + x - 1 = 0$

D. $x^2 + x + 1 = 0$

Answer: D

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

A. are real and positive

B. are real and negative

C. have negative real poarts

D. have positive real parts.

Answer: C

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22. If one root of the equation $ax^2 + bx + c = 0$ is reciprocal of the one root of the equation

$a_1x^2 + b_1x + c_1 = 0$, then :

A. $(aa_1 - cc_1)^2 = (bc_1 - b_1a)(b_1c - a_1b)$

B. $(ab_1 - a_1b)^2 = (bc_1 - b_1c)(ca_1 - c_1a)$

C. $(bc_1 - b_1c)^2 = (ca_1 - c_1a)(ab_1 - a_1b)$

D. None of these

Answer: A

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23. If $1, a_1, a_2. \ldots, a_{n-1}$ are n roots of unity, then the value of $(1 - a_1)(1 - a_2).... (1 - a_{n-1})$ is :

A. 0

B. 1

C. n

D. n^2

Answer: C

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24. If $x^2 + ax + b = 0$ and $x^2 + bx + a = 0$ have a common root, then the numberical value of a + b is :

A. 1

B. 0

C. -1

D. None of these

Answer: C

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25. If the ratio of the roots of $x^2 + bx + x = 0$ and $x^2 + qx + r = 0$ be the same , then :

A. $r^2x = b^2q$

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

C. $rb^2 = cq^2$

D. $rc^2 = bq^2$

Answer: C

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26. If α and β are the roots of $x^2 + qx + 1 = 0$ and γ, δ the roots of $x^2 + qx + 1 = 0$, then the value of $(\alpha - \gamma)(\beta - \gamma)(a + \delta)\beta + \delta)$ is :

A. $p^2 - q^2$

B. $q^2 - p^2$

C. p^2

D. q^2 .

Answer: B

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27. If $\frac{|x-2|}{x-2} \geq 0,$ then

A. $x, \in [2, \infty)$

B. $x, \in (2, \infty)$

C. $x, \in (-\infty, 2)$

D. $x, \in (\infty, 2]$

Answer: B

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28. The length of a rectangle is three times the breadth. If the minimum perimeter of the rectangle is 160 cm, then :

A. beadth $>$ 20 cm

B. length $<$ 20 cm

C. breadth $\geq$ 20 cm

D. length $\leq$ 20 cm

Answer: C

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29. If $|x+3| \geq 10$,then :

A. $x \in (-13, 7)$

B. $x \in (-13, 7]$

C. $x \in (-\infty, -13] \cup [7, \infty)$

D. $x \in (-\infty, -13] \cup [3, \infty)$

Answer: C

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30. If - 3x + 17 $<$ - 13 , then :

A. $x \in (10, \infty)$

B. $x \in [10, \infty)$

C. $x \in (-\infty, 10]$

D. $x \in [-10, 10)$.

Answer: A

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31. If | x + 2 | $\leq$ 9 , then :

A. $x \in (-7, 11)$

B. $x \in (-11, 7]$

C. $x \in (-\infty, -7) \cup (11, \infty)$

D. $x \in [-\infty, -7) \cup (11, \infty)$

Answer: B

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32. If $|x - 1| > 5$, then :

A. $x \in (-4, 6)$

B. $x \in [-4, 6]$

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

D. $x \in (-\infty, -4) \cup (6, \infty)$

Answer: C

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33. If $x^2 + 2x - 3 \geq 0$ and $x^2 - 2x - 3 \geq 0$, then :

A. $x \geq 3$ or $x \leq -3$

B. $x \leq -1$

C. $x \leq 1$

D. x has no value in R.

Answer: A

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34. The set of real values of x satisfying | x -1 | $\leq$ 3 and $|x - 1| \geq 1$ is :

A. [2, 4]

B. $(-\infty, 2] \cup [4, \infty)$

C. $[-2, 0] \cup [2, 4]$

D. None of these

Answer: C

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35. If x is real , then the expression $\frac{x^2+34x-71}{x^2+2x-7}$ can have no value between :

A. 3 and 7

B. 4 and 8

C. 5 and 9

D. 6 and 10 .

Answer: C

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36. For real values of x, the expression $\frac{(x-b)(x-c)}{(x-a)}$ will assume all real values provided :

A. a $\leq c \leq b$

B. b $\geq a \geq$ c

C. $b \leq c \leq a$

D. $a \geq b \geq c$

Answer: B

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37. If α, β are the roots of the equation :

$x^2 + x\sqrt{\alpha} + \beta = 0$, then the values of α and β are :

A. $\alpha = 2$ and $\beta = -2$

B. $\alpha = 2$ and $\beta = 1$

C. $\alpha = 1$ and $\beta = -2$

D. $\alpha = 1$ and $\beta = -1$.

Answer: C

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38. The number of real solutions of :

$+le^x - 11 = e^x(e^x - 2)$ is :

A. 0

B. 1

C. 2

D. 4

Answer: B

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39. The equation $3^{x-1}+5^{x-1}=34$ has :

A. no solution

B. one solution

C. two solutions

D. more than two solutions.

Answer: B

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40. The solution set of $\log_x 2 \log_{2x} 2 = \log_{4x} 2$ is :

A. $\left\{2^{-\sqrt{2}}, 2^{\sqrt{2}}\right\}$

B. $\left\{\frac{1}{2}, 2\right\}$

C. $\left\{\frac{1}{4}, 2^2\right\}$

D. None of these

Answer: A

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41. If $\log_{10} x + \log_{10} y \geq 2$, then the smallest value of x + y is :

A. 10

B. 30

C. 20

D. None of these

Answer: C

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42. If the equations $ax + by = 1$ and $cx^2 + dy^2 = 1$ have only one solution, prove that $\frac{a^2}{c} + \frac{b^2}{d} = 1$ and $x = \frac{a}{c}, y = \frac{b}{d}$

A. $\frac{a^2}{c} + \frac{b^2}{d} = 1$

B. $x = -\frac{a}{c}$

C. $y = \frac{b}{d}$

D. None of these

Answer: A

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43. If $3^{\frac{x}{2}} + 2^x > 25$ then the solution set is

A. R

B. $(2, +\infty)$

C. $(4, +\infty)$

D. None of these

Answer: C

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44. The solution set of $x^2 + 2 \leq 3x \leq 2x^2 - 5$, is

A. ϕ

B. [1,2]

C. $(-\infty, -1] \cup \left[\frac{5}{2}, +\infty\right)$

D. None of these

Answer: A

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45. The real roots of the equation $5^{\log 5\left(x^2-4x+5\right)} = x - 1$ are :

A. 1 and 2

B. 2 and 3

C. 3 and 4

D. 4 and 5

Answer: B

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46. If $\alpha, \beta$the roots of $8x^2 - 3x + 27 = 0$, then the value of $\left[\left(\frac{\alpha^2}{\beta}\right)^{1/3} + \left(\frac{\beta^2}{\alpha}\right)^{1/3}\right]$ is ,

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

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

C. $\frac{1}{5}$

D. $\frac{1}{6}$

Answer: B

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Multiple Choice Questions Level Ii

1. If α and β are the roots of the equation $x^2 - p(x+1) - q = 0$, then the value of :

$$\frac{\alpha^2 + 2\alpha + 1}{\alpha^2 + 2\alpha + q} + \frac{\beta^2 + 2\beta + 1}{\beta^2 + 2\beta + q}$$ is :

A. 2

B. 3

C. 0

D. 1

Answer: D

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2. If α and β the roots of $x^2 + px + q = 0$ and α^4, β^4 are the roots of $x^2 - rx + s = 0$, then the equation $x^2 - 4qx + 2q^1 - r = 0$ has always :

A. two real roots

B. two positive roots

C. two negative roots

D. one positive and one negative root.

Answer: A

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3. If a, b and c real numbers such that $a^2 + b^2 + c^2 = 1$, then ab + bc + ca lies in the interval :

A. $\left[\frac{1}{2}, 2\right]$

B. [- 1, 2]

C. $\left[-\frac{1}{2}, 1\right]$

D. $\left[-1, \frac{1}{2}\right]$

Answer: C

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4. If the roots of the equation $\frac{x^2 - bx}{ax - c} = \frac{\lambda - 1}{\lambda + 1}$ are shuch that $\alpha + \beta = 0$, then value of λ is :

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

B. c

C. $\frac{1}{c}$

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

Answer: A

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5. Solution set of $x^{2\log x} = 10x^2$ is :

A. $\{1 - \sqrt{3}, 1 + \sqrt{3}\}$

B. $\{-1, 1\}$

C. $\left\{\frac{1}{10^{1-\sqrt{3}}}, \frac{1}{10^{1+\sqrt{3}}}\right\}$

D. $\left\{\frac{1}{10^{\frac{1-\sqrt{3}}{2}}}, \frac{1}{10^{\frac{1+\sqrt{3}}{2}}}\right\}$

Answer: D

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6. If x satisfies $|x-1|+|x-2|+|x-3| \geq 6,$ then :

A. $0 \leq x < 4$

B. $x \leq -2$ or $x \geq 4$

C. $x \leq 0$ or $x \geq 4$

D. None of these

Answer: C

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7. The equation

$\sqrt{x+3-4\sqrt{x-1}}+\sqrt{x+8-6\sqrt{x-1}}=1$ has :

A. no solution

B. only one solution

C. only two solutions

D. more than two solutions.

Answer: D

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8. The number of real roots of :

$1+a_1X+a_2x^2....+a_nx^n=0,$ where $|x|<\frac{1}{3}$ and $|a_n|<2,$ is :

A. n if n is even

B. 0 for n $\in$ N

C. 1 in n is odd

D. None of these

Answer: D

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9. The solution of x - 1 = (x - [x]) (x - {x}), (where [x] and {x} are integral and frectional part respectively of x) is :

A. $x \in R$

B. $x \in R \sim [1, 2)$.

C. $x \in [1, 2)$

D. $x \in R \sim [1, 2]$.

Answer: C

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10. Let a, b,c $\in$ R and a $\neq$ 0. If α is a root of a^2x^2 + bx + c = 0 , β is a root of a^2x^2 - bx - x = 0 and 0 $< \alpha < \beta$. Then the equation $a^2x^2 + 2bx$ + 2c = 0 has a root γ that always satisfies :

A. $\gamma = \alpha$

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

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

D. $\gamma = \beta$.

Answer: B

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11. The equation :

$x^{3/4(\log_2 x)^2_4 + \log_2 x - 5/4} = \sqrt{2}$ has :

A. only one real solution

B. exactly three real solutions

C. exactly one rational solution

D. non-real roots.

Answer: B

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12. The product of the roots of the equation $x^2 - 4mx + 3e^{2\ \log\ m} - 4 = 0$, then its roots will be real when m equals :

A. 1

B. $\sqrt{2}$

C. ± 2

D. $\pm\sqrt{2}$

Answer: C

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13. The value of 'a' for which the equation $x^3 + ax + 1 = 0$ and $x^4 + ax^2 + 1$ =0 has a common root is :

A. 2

B. -2

C. 0

D. None of these

Answer: B

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14. The number of real solutions of $\left(\frac{9}{10}\right)^x$ = - 3 + x - x^2 is :

A. none

B. one

C. two

D. more than two

Answer: A

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15. If a + b + c = 0 , then the equation equation :

$3ax^2 + 2bx + c = 0$ has :

A. at least on root in (0,1)

B. one root in (2,3) and the other in (-2,-1)

C. imaginary roots

D. None of these

Answer: A

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16. If $\alpha, \beta$are the roots of $ax^2 - 26x + c = 0$, then

$\alpha^3\beta^3 + \alpha^2\beta^3 + \alpha^3\beta^2$ equals :

A. $\frac{c^2}{a^3}(c + 26)$

B. $\frac{c^2}{a^3}(c - 26)$

C. $\frac{bc^3}{a^3}$

D. None of these

Answer: A

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17. If $\alpha, \beta$are roots of $375x^2 - 25x - 2 = 0$ and $s_n = \alpha^n + \beta^n$,

then $\lim_{n \to \infty} \sum_{r=1}^{n} s_r$ is :

A. $\frac{7}{116}$

B. $\frac{1}{12}$

C. $\frac{29}{358}$

D. None of these

Answer: B

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18. A quadratic equation whose roots are $\left(\frac{\gamma}{\alpha}\right)^2$ and $\left(\frac{\beta}{\alpha}\right)^2$, where α, β, γ are roots of $x^3 + 27 = 0$, is :

A. $x^2 - x + 1 = 0$

B. $x^2 + 3x + 9 = 0$

C. $x^2 + x + 1 = 0$

D. $x^2 - 3x + 9 = 0$

Answer: C

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19. If α, betaarethe$\sqrt[s]{o}$flambda(x^(2)+x)+x+5=0 and lambda_(1), lambda_(2)arethetwovaluesoflambda f or $whichalpha, \beta areco \cap ectedbytherelation$(alpha)/(beta)+ (beta)/(alpha)=4, $thenthevalueof$(lambda_(1))/(lambda_(2))+ (lambda_(2))/(lambda_(1))=`

A. 150

B. 1022

C. 180

D. 100

Answer: B

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20. The least integer satisfying :

$49.4 - \left(\frac{27 - x}{10}\right) < 47.4 - \left(\frac{27 - 9x}{10}\right)$ is :

A. 2

B. 3

C. 4

D. None of these

Answer: B

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21. If the equation $ax^2 + 2bx - 3c = 0$ has non-real roots and $\left(\frac{3c}{4}\right) < (a + b)$, then c is always :

A. < 0

B. > 0

C. ≥ 0

D. 0

Answer: A

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22. Let a, b, c be positive real numbers. The following system of equations in x, y and z $\frac{x^2}{a^2}+\frac{y^2}{b^2}-\frac{z^2}{c^2}=1, \frac{x^2}{a^2}-\frac{y^2}{b^2}+\frac{z^2}{c^2}=1, \frac{-x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$ has

A. no solution

B. unique solution

C. finitely many solutions

D. infinitely many solutions

Answer: D

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23. If f (x) = x - [x], x $(\neq 0) \in$ R, where [x] is the greatest integer less than or equal to x, then the number of solutions of f(x) + f$\left(\frac{1}{x}\right)$ = 1 is :

A. 0

B. 1

C. infinite

D. 2

Answer: C

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24. The real values of x for which $3^{72}\left(\frac{1}{3}\right)^{x}\left(\frac{1}{3}\right)^{\sqrt{x}}$ lt 1, are :

A. $x \in [0, 64]$

B. $x \in (0, 64)$

C. $x \in [0, 64)$

D. None of these

Answer: A

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25. If the ratio of the roots of $a_1x^2 + b_1x + c_1 = 0$ be equal to the ratio of the roots of $a_2x^2 + b_2x + c_2 = 0$,

then $\frac{a_1}{a_2}, \frac{b_1}{b_2}, \frac{c_1}{c_2}$ are in :

A. A.P.

B. G.P.

C. H.P.

D. None of these

Answer: B

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26. If the product of the roots of the equation $x^2 - 3kx + 2e^{2\log k}$ - 1 = 0 is 7, then the roots of the equation are real for k equal to :

A. 1

B. 2

C. 3

D. 4

Answer: B

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27. If a + b + c = 0, then $x^{\frac{a^2}{bc}}, x^{\frac{b^2}{ca}}, x\left(\frac{c^2}{ab}\right)$ equals :

A. 1

B. x

C. x^2

D. x^3

Answer: D

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28. The equation $ax^2 + bx + c = 0$, where a, b,c are real number connected by the relation 4a + 2b + c = 0 and ab $<$ 0 and ab $<$ 0 has :

A. real roots

B. complex roots

C. exactly one root

D. None of these

Answer: A

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29. $If 3p^2 = 5p + 2$ and $3q^2 = 5q + 2,$ where p $\neq$ q , then the equation whose roots are 3p - 2q and 3q - 2p is :

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

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

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

D. $3x^2 + 5x - 100 = 0$

Answer: A

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

A. four real roots

B. two real roots

C. four imaginary roots

D. None of these

Answer: B

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31. If one root of the $ax^2 + bx + c = 0$ is equal to nth power of the other root, then the value of $(ac^n)^{\frac{1}{n+1}} + (a^n c)^{\frac{1}{n+1}}$ equal :

A. b

B. $-b$

C. $b^{\frac{1}{n+1}}$

D. $-b^{\frac{1}{n+1}}$

Answer: B

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32. The number of real solutions of the equation :

$|x^2 + 4x + 3| + 2x + 5 = 0$ is :

A. 1

B. 2

C. 3

D. 4

Answer: B

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33. Let p, p $\neq \{1, 2, 3, 4\}$. The number of equations of the form $px^2 + qx + 1 = 0$ having real roots is :

A. 15

B. 9

C. 7

D. 8

Answer: C

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34. A quadratic equation whose roots are $\left(\frac{\gamma}{\alpha}\right)^2$ and $\left(\frac{\beta}{\alpha}\right)^2$, where α, β, γ are roots of $x^3 + 27 = 0$, is :

A. $x^2 - x + 1 = 0$

B. $x^2 + 3x + 9 = 0$

C. $x^2 + x + 1 = 0$

D. $x^2 - 3x + 9 = 0$

Answer: C

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35. If α and β be the roots of the equation $x^2 + 7x + 12 = 0$. Then equation whose roots are $(\alpha + \beta)^2$ and $(\alpha - \beta)^2$ is :

A. $x^2 + 50x + 49 = 0$

B. $x^2 - 50x + 49 = 0$

C. $x^2 - 50x - 49 = 0$

D. $x^2 + 12x + 7 = 0$

Answer: B

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36. If the ratio of the equation $x^2 + qx + r = 0$, is the same as that of $x^2 + qx + r = 0$, then :

A. $r^2b = qc^2$

B. $r^2c = qb^2$

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

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

Answer: D

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37. If $(1+2i)$ is a root of the equation $x^2+bx+c=0$. Where b and c are real, then (b,c) is given by :

A. (2 -5)

B. (-3,1)

C. (-2, 5)

D. (3,1)

Answer: C

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38. The non-trival values of (a,b) such that roots of the equation $x^2+ax+b=0$ are equal to a and b are :

A. (2, -1)

B. (1, -2)

C. (3,2)

D. (2,1)

Answer: B

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39. The number of values of 'k' for which the equation $x^2 - 3x + k = 0$ has two distinct roots lying in the interval (0,1) is :

A. three

B. two

C. infinitely many

D. no value of k satisfies the requirement.

Answer: D

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40. If the roots of the equation $\frac{x^2 - bx}{ax - c} = \frac{\lambda - 1}{\lambda + 1}$ are such that $\alpha + \beta = 0$, then the value of λ is :

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

B. c

C. $\frac{1}{c}$

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

Answer: A

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

A. both roots in [a,b]

B. both roots in $[-\infty, b)$

C. both roots in $(b, +\infty)$

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

Answer: D

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42. Let f (x) = $(1+b)^2x^2 + 2bx + 1$ and let m(b) be the minimum value of f (x). As b varies, the range of m(b) is :

A. [0,1]

B. $\left(0, \frac{1}{2}\right]$

C. $\left[\frac{1}{2}, 1\right]$

D. $(0, 1]$

Answer: D

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43. The number of solutions of :

$\log_4(x-1) = \log_2(x-3)$ is :

A. 3

B. 1

C. 2

D. 0

Answer: C

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44. If $\alpha \neq \beta$ and $\alpha^2 = 5\alpha - 3, \beta^2 = 5\beta - 3$, then the equation having α/β and $\frac{\beta}{\alpha}$ as its roots, is :

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

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

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

D. $x^2 - 16x + 1 = 0$

Answer: B

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45. The number of real roots of $3^2x^2 - 7x + 7 = 9$ is (A) 0 (B) 2 (C) 1 (D) 4

A. zero

B. 2

C. 1

D. 4

Answer: B

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46. The number of values of k, for which the system of eauations:

$(k+1)x+8y=4k$

$kx+(k+3)y=3k-1$

has no solution is,

A. 0

B. 1

C. 2

D. infinite.

Answer: B

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47. The set of all real numbers x for which $x^2-|x+2|+x>0$ is

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

B. $\left(-\infty,-\sqrt{2}\right)\cup\left(\sqrt{2},\infty\right)$

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

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

Answer: B

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

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

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

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

Answer: B

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49. If minimum value of $f(x) = \left(x^2 + 2bx + 2c^2\right)$ is greater than the maximum value of $g(x) = -x^2 - 2cx + b^2$, then $(x \in R)$

A. $|c| > \frac{|b|}{\sqrt{3}}$

B. $\frac{|b|}{\sqrt{2}} > |b|$

C. $-1 < c < \sqrt{2}$ b

D. no real values of b and c exist.

Answer: B

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

A. 0,1

B. $-1, 1$

C. $0, -1$

D. $-1, 2$

Answer: C

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51. If one root of the equation $x^2 + px + q = 0$ is square of the other root, then :

A. $p^3 - q(3p - 1) + q^2 = 0$

B. $p^3 - q(3p + 1) + q^2 = 0$

C. $p^3 + q(3p - 1) - q^2 = 0$

D. $p^3 + q(3p + 1) - q^2 = 0$.

Answer: A

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52. If the roots 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. 2

B. 3

C. 0

D. 1

Answer: B

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53. 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. $-2 < m < 0$

B. $m < 3$

C. $-1 < m < 3$

D. $1 < m < 4$.

Answer: C

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54. 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. $(-3, \infty)$

B. $(3, \infty)$

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

D. $(-3, 3)$.

Answer: D

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55. The quadratic equations :

$x^2 - 6x + a = 0$ and $x^2 - cx + 6 = 0$

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 :

A. 2

B. 1

C. 4

D. 3

Answer: A

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56.

$$\left[\frac{1}{4}\right] + \left[\frac{1}{4} + \frac{1}{200}\right] + \left[\frac{1}{4} + \frac{1}{100}\right] + \left[\frac{1}{4} + \frac{1}{200}\right] + \ldots . + \left[\frac{1}{4} + \frac{199}{200}\right]$$

,

where [x] denotes the greatest integer $\leq$ x, is equal to :

A. 49

B. 50

C. 51

D. None of these.

Answer: B

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57. If α, β are roots of $375x^2 - 25x - 2 = 0$ and

$s_n = \alpha^n + \beta^n, then \sum_{n \to \infty}^{n} \sum_{r=1} S_r$ is :

A. $\frac{7}{116}$

B. $\frac{1}{12}$

C. $\frac{29}{358}$

D. Non of these.

Answer: B

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58. 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 = α, then the equation n $a_n x^{n-1} + (n-1) a_{n-1} x^{n-1} + ... , a_1 = 0$ has a positive root, which is :

A. smaller then α

B. geater then α

C. equal to α

D. greater than or equal to α.

Answer: A

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59. Let a, b,c be 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. $\lambda \in \left(\frac{1}{3}, \frac{5}{3}\right)$

D. $\lambda \in \left(\frac{4}{3}, \frac{5}{3}\right)$.

Answer: A

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60. Let α, β be the roots of the equation $x^2 - px + r = 0$ and $\frac{\alpha}{2}$, 2β be the roots of the equation $x^2 - qx$ + r = 0 . Then the 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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61. 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 than 4ab

B. less then 4ab

C. greater than - 4 ab

D. less than - 4ab

Answer: C

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1. Let p and q be real numbers such that p $\neq$ 0 , $p^3 \neq$ q and $p^3 \neq -q$.

if α and β are non-zero complex numbers 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. $(p^3 + q)x^2 - (p^3 + 2q)x + (p^3 + q) = 0$

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

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

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

Answer: B

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2. Let α and β be the roots of $x^2 - 6x - 2 = 0$, with $\alpha > \beta$. If $a_n = \alpha^n - \beta^n$ for n $\geq$ 1, then value of $\frac{a_{10} - 2a_8}{2a_9}$ is :

A. 1

B. 2

C. 3

D. 4

Answer: C

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3. A value of b for which the equations :

$x^2 + bx - 1 = 0, x^2 + x + b = 0$

Have one root in common is :

A. $-\sqrt{2}$

B. $-i\sqrt{3}$

C. $-i\sqrt{5}$

D. $\sqrt{2}$.

Answer: B

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4. Sachin and Rahul attempted to solve a quadratic equation. Sachin made a mistake in writing down the constant term and ended up in roots (4,3). Rahul made a mistake in writing down coefficient of x to get roots (3,2). The correct roots of equation are :

A. $6, 1$

B. $4, 3$

C. $-6, -1$

D. $-4, -3$

Answer: A

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5. If the equations :

$x^2 + 2x + 3 = 0$ 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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6. 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. $\frac{2\sqrt{17}}{9}$

B. $\frac{\sqrt{34}}{9}$

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

D. $\frac{\sqrt{61}}{9}$

Answer: C

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

A. 6

B. -6

C. 3

D. -3

Answer: C

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8. If a, b,c , d are the roots of the equation :

$x^4 + 2x^3 + 3x^2 + 4x + 5 = 0$,

then $1 + a^2 + b^2 + c^2 + d^2$ is equal to :

A. -2

B. -1

C. 2

D. 1

Answer: B

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9. The expression :

$$\frac{1}{\sqrt{(3x+1)}}\left(\left\{\left(\frac{1+\sqrt{3x+1}}{2}\right)^7 - \left(\frac{1-\sqrt{3x+1}}{2}\right)^7\right\}\right)$$

is a polynomial in x of degree is :

A. 7

B. 5

C. 4

D. 3

Answer: D

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10. The solution of $\frac{6x}{4x-1} < \frac{1}{2}$ is :

A. $x < -\frac{1}{8}$

B. $-\frac{1}{8} < x < \frac{1}{4}$

C. $x < -\frac{1}{8} \& x > \frac{1}{4}$

D. $x > \frac{1}{8}$.

Answer: A

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11. If α and β are the roots of $x^2 - ax + b^2 = 0$, then $\alpha^2 + \beta^2$ is equal to :

A. $a^2 - 2b^2$

B. $2a^2 - b^2$

C. $a^2 - b^2$

D. $a^2 + b^2$

Answer: A

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12. The shaded region shown in fig. is given by the inequations :

A. $14x + 5y \leq 70, y \leq 14$ and $x - y \leq 5$

B. $14x + 5y \geq 70, y \leq 14$ and $x - y \geq 5$

C. $14x + 5y \leq 70, y \leq 14$ and $x - y \geq 5$

D. $14x + 5y \geq 70, y \leq 14$ and $x - y \geq 5$

Answer: C

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13. The solution set of the ineequation $\frac{x^2 + 6x - 7}{|x + 4|} < 0$ is

A. $(-7, 1)$

B. (-7, -4)

C. (-7, -4) $\cup$ (-4, 1)

D. (-7, -4) $\cup$ (4,1)

Answer: B

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