MATHS

BOOKS - ML KHANNA

THEORY OF QUADRATIC EQUATIONS

Problem Set - 1

1. If α and β are the roots of $ax^2 + bx + c = 0$, then the value of $\left\{\frac{1}{a\alpha + b} + \frac{1}{a\beta + b}\right\}$ is

A. $\frac{a}{bc}$

B. $\frac{b}{ca}$

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

D. none

Answer: B

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2. If α and β are the roots of $ax^2 + bx + c = 0$, then the value of $(a\alpha + b)^{-2} + (a\beta + b)^{-2}$ is equal to

A. $\frac{b^2 - 2ac}{a^2c^2}$

B. $\frac{c^2 - 2ab}{a^2b^2}$

C. $\frac{a^2 - 2bc}{b^2c^2}$

D. none

Answer: A

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3. If α and β are the roots of $4x^2 + 3x + 7 = 0$, the value of $\frac{1}{\alpha^3} + \frac{1}{\beta^3}$ is

A. $-\frac{27}{64}$

B. $\frac{63}{16}$

C. $\frac{225}{343}$

D. `none of these

Answer: C

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4. If α and β are the roots of the equation $x^2 + px + p^2 + q = 0$, then the value of $\alpha^2 + \alpha\beta + \beta^2 + q =$

A. 0

B. 1

C. q

D. 2q

Answer: A

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5. If α and β are the roots of $ax^2 + bx + c = 0$, then the value of the expression $(a\alpha + b)^{-3} + (a\beta + b)^{-3}$ is equal to

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

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

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

D. none

Answer: B

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6. If α, β are roots of $ax^2 - 2bx + c = 0$, then $\alpha^3\beta^3 + \alpha^2\beta^3 + \alpha^3\beta^2$ is

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

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

C. $\frac{c^2}{a^3}$

D. `none

Answer: D

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

A. $1/4$

B. $1/3$

C. $7/2$

D. 4

Answer: A

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

A. n^2

B. $2n^2$

C. $n^2 + 2$

D. $-n^2$

Answer: A

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9. If α, β are the roots of $ax^2 + bx + c = 0$, then $\alpha\beta^2 + \alpha^2\beta + \alpha\beta$ is equal to

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

B. 0

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

D. none

Answer: A

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10. If α, β are the roots of $ax^2 + bx + c = 0$ and $\alpha + \beta, \alpha^2 + \beta^2, \alpha^3 + \beta^3$ are in G.P., then

A. $\Delta \neq 0$

B. $b\Delta = 0$

C. $cb \neq 0$

D. $c\Delta = 0$

Answer: D

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

A. p=1

B. p=1 or 0

C. p=-2

D. p=-2 or 0

Answer: B

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12. If p,q are the roots of the equation $x^2 + px + q = 0$ where both p and q are non-zero, then (p,q)=

A. (1,2)

B. (1,-2)

C. (-1,2)

D. (-1,-2)

Answer: B

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13. 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. $-1, 2$

Answer: C

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14. If $a(p+q)^2 + 2bpq + c = 0abda(p+r)^2 + 2bpr + c = 0(a \neq 0)$, then $qr = p^2$ b. $qr = p^2 + \frac{c}{a}$ c. $qr = p^2$ d. none of these

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

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

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

D. $p^2 + \frac{b}{a}$

Answer: B

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15. Let 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 $x^2 - qx + r = 0$, the value of r is (2007, 3M)

$\frac{2}{9}(p-q)(2q-p)$ (b) $\frac{2}{9}(q-p(2p-q)$ $\frac{2}{9}(q-2p)(2q-p)$ (d) $\frac{2}{9}(2p-q)(2q-p)$

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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16. Let a, b, c, p, q be the real numbers. Suppose α, β are the roots of the equation $x^2 + 2px + q = 0$. and $\alpha, \frac{1}{\beta}$ are the roots of the equation $ax^2 + 2bx + c = 0$, where $\beta \notin \{-1, 0, 1\}$. Statement I $(p^2 - q)(b^2 - ac) \geq 0$ Statement 11 $b \notin pa$ or $c \notin qa$.

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

A. $-\frac{9}{4}$

B. $\frac{9}{4}$

C. $-\frac{1}{4}$

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

Answer: A

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18. If α and β be the roots of $x^2 + px - q = 0$ and γ, δ the roots of $x^2 + px + r = 00$, then the value of $(\alpha - \gamma)(\alpha - \delta) = (\beta - \gamma)(\beta - \delta)$=

A. $q + r$

B. $r + q$

C. $p + q + r$

D. none

Answer: A

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19. If one root of $5x^2 + 13x + k = 0$ be the reciprocal of the other root then the value of k is

A. k=0

B. k=5

C. k=1/6

D. k=6

Answer: B

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20. The difference between the roots of the equation $x^2 + kx + 1 = 0$ is less than $\sqrt{5}$,then the set of possible values of k is

A. $(3, \infty)$

B. $(-3, \infty)$

C. $(-3, 3)$

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

Answer: A

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21. If the roots of $x^2 - bx + c = 0$ are two consecutive integers, then $b^2 - 4c$ is 0 (b) 1 (c) 2 (d) none of these

A. 1

B. 2

C. 3

D. 4

Answer: A

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22. If the equation $\frac{x^2 - bx}{ax - c} = \frac{m - 1}{m + 1}$ has roots equal in magnitude but opposite in sign, then m is equal to

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

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

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

D. none of these

Answer: B

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23. If the equation $\frac{a}{x-a}+\frac{b}{x-b}=1$ has two roots equal in magnitude and opposite in sign then the value of a + b is

A. 0

B. 1

C. -1

D. none

Answer: A

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24. 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. $(0, \infty)$

Answer: B

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25. If product of roots of the equation $mx^2 + 6x + (2m-1) = 0$ is -1 then m equals

A. 1

B. 1/3

C. -1

D. $-1/3$

Answer: B

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26. The equation formed by multiplying each root of $ax^2 + bx + c = 0$ by 2 is $x^2 = 36x + 24 = 0$

A. $2bc = ac + c^2$

B. $2ab = bc + c^2$

C. $2ac = ab + b^2$

D. none

Answer: c

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27. If $\sin\theta$ and $\cos\theta$ are the roots of the equation $lx^2 + mx + n = 0$, then

A. $l^2 - m^2 + 2ln = 0$

B. $l^2 + m^2 + 2ln = 0$

C. $l^2 - m^2 - 2ln = 0$

D. $l^2 + m^2 - 2ln = 0$

Answer: A

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28. Find the value of a for which the sum of the squares of the roots of the equation $x^2 - (a-2)x - a - 1 = 0$ assumes the least value.

A. 0

B. 1

C. 2

D. 3

Answer: B

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29. If the θ and $\sec\theta$ are rots of the equation $ax^2 + bx + x = 0,$ then

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

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

C. $a^4 + 4ab^2c - b^4 = 0$

D. none of these

Answer: C

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30. The roots of the equation $x^2 + px + q = 0$ are $\tan 22^\circ$ and $\tan 23^\circ$ then

A. $p + q = 1$

B. $p + q = -1$

C. $p - q = 1$

D. $p - q = -1$

Answer: D

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31. 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. 0

B. 1

C. 2

D. 3

Answer: D

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32. 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. a+b=c

B. b=a+c

C. a=b+c

D. c=a+c

Answer: A

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

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

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

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

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

Answer: D

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34. If α and β are the roots of $x^2 - p(x+1) - c = 0$, then the value of $\frac{\alpha^2 + 2\alpha + 1}{\alpha^2 + 2\alpha + c} + \frac{\beta^2 + 2\beta + 1}{\beta^2 + 2\beta + c}$ is

A. 2

B. 1

C. -1

D. 0

Answer: B

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35. If α, β are the roots of $6x^2 - 2x + 1 = 0$ and $s_n = \alpha^n + \beta^n$ then $\underset{n \to \infty}{L} \sum_{r=1}^{n} s_r$ is

A. $\frac{5}{17}$

B. 0

C. $\frac{3}{37}$

D. none

Answer: B

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36. If α, β be the roots of $ax^2 + 2bx + c = 0$ and $\alpha + \delta, \beta + \delta$ be those of $Ax^2 + 2Bx + C = 0$, then the value of $\left(b^2 - ac\right) / \left(B^2 - AC\right)$ is

A. $\left(\frac{a}{A}\right)^2$

B. $\left(\frac{A}{a}\right)^2$

C. 0

D. 1

Answer: A

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37. let α, β be roots of $ax^2 + bx + c = 0$ and γ, δ be the roots of $px^2 + qx + r = 0$and D_1 and D_2 be the respective equations .if $\alpha, \beta, \gamma, \delta$ in $A.P.$ then $\frac{D_1}{D_2}$ is

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

B. $\frac{a^2}{A^2}$

C. $\frac{b^2}{B^2}$

D. $\frac{c^2}{C^2}$

Answer: B

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38. If the roots of the equation $x^2 + px + q = 0$ differ from the roots of the equation $x^2 + qx + p = 0$ by the same quantity, then the value of p+q is

A. -1

B. -2

C. -4

D. none

Answer: C

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39. The ratio of the roots of the equation $ax^2 + bx + c = 0$ is same as the ratio of the roots of equation $px^2 + qx + r = 0$. If D_1 and D_2 are the discriminants of $ax^2 + bx + c = 0$ and $px^2 + qx + r = 0$ respectively then $D_1 : D_2 =$

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

B. $\frac{b^2}{B^2}$

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

D. none of these

Answer: B

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40. If a,b,c are in G.P. then the roots of the equation $ax^2 + bx + c = 0$ are in the ratio

A. $\frac{1}{2}\left(-1 + i\sqrt{3}\right)$

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

C. $\frac{1}{2}(1+i\sqrt{3})$

D. $\frac{1}{2}(1-i\sqrt{3})$

Answer: A::B

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41. If the ratio of the roots of $a_1x^2+b_1x+c_1=0$ be equal to the ratio of the roots of $a_2x^2+b_2+c_2=0$, 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

Answer: B

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42. If the roots of the equation $x^2 + px + q = 0$ are in the same ratio as those of the equation $x^2 + lx + m = 0$. Then which one of the following is correct ?

A. $p^2m = l^2q$

B. $\pm^2 = q^2l$

C. $p^2l = q^2m$

D. $p^2m = q^2l$

Answer: A

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43. If the sum of the roots of the equation $ax^2 + bx + c = 0$ is equal to the sum of the reciprocal of their squares, then bc^2, ca^2 and ab^2 are in

A. A.P.

B. G.P.

C. H.P.

D. None

Answer: A

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44. 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. (3,7)

C. (-3,77)

D. (3,-7)

Answer: C

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45. α, β be the roots of the equation $x^2 - 3x + a = 0$ and γ, δ the roots of $x^2 - 12x + b = 0$ and numbers $\alpha, \beta, \gamma, \delta$ (in this order) form an increasing G.P., then

A. p=2, q=16

B. p=4, q=16

C. p=2, q=32

D. p=4, q=32

Answer: B

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

A. $-2, -32$

B. $-2, 3$

C. $-6, 3$

D. $-6, -32$

Answer: A

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47. If α, β are roots of $x^2 \pm px + 1 = 0 and \gamma, \delta$ are the roots of $x^2 + qx + 1 = 0$, then prove that $q^2 - p^2 = (\alpha - \gamma)(\beta - \gamma)(\alpha + \delta)(\beta + \delta)$.

A. $p^2 - q^2$

B. $q^2 - p^2$

C. p^2

D. q^2

Answer: B

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48. The condition that the roots of the equation $ax^2 + bx + c = 0$ be such that one root is n times the other

A. $na^2 = bc(n+1)^2$

B. $nb^2 = ca(n+1)^2$

C. $nc^2 = ab(n+1)^2$

D. none

Answer: B

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49. If one root of

$\left(a^2 - 5a + 3\right)x^2 + (3a - 1)x + 2 = 0$

is twice the other, then what is the value of 'a' ?

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

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

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

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

Answer: A

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50. If the roots of the equation $ax^2 + bx + c = 0$ are in the ratio $m:n$ then

A. $mna^2 = (m+n)c^2$

B. $mnb^2 = (m+n)ac$

C. $mnb^2 = (m+n)^2 ac$

D. none of these

Answer: C

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51. If the roots of the equation $ax^2 + bx + c = 0$ are of the form $(k+1)/k and (k+2)/(k+1), then (a+b+c)^2$ is equal to $2b^2 - ac$ b. $a62$ c. $b^2 - 4ac$ d. $b^2 - 2ac$

A. $b^2 - 4ac$

B. $b^2 - 2ac$

C. $2b^2 - ac$

D. Σa^2

Answer: A

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52. If one root of the equation $ax^2 + bx + c = 0$ be the square of the other, then

A. $a^3 + bc(b + c) = 3abc$

B. $b^3 + ac(a + c) = 3abc$

C. $c^3 + ab(a + b) = 3abc$

D. none

Answer: B

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53. If one root of the equation $x^2 + px + q = 0$ is square or the other 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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54. If $\alpha, \beta, \gamma, \delta$ be the roots of $x^4 + x^2 + 1 = 0$, then the equation whose roots are $\alpha^2, \beta^2, \gamma^2, \delta^2$ is

A. $\left(x^2 + x + 1\right)^2 = 0$

B. $\left(x^2 - x + 1\right)^2 = 0$

C. $x^4 + x^2 + 1 = 0$

D. $x^4 - x^2 + 1 = 0$

Answer: A

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55. 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. $1/3$

B. 1

C. 3

D. $2/3$

Answer: C

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56. If one root $x^2 - x - k = 0$ is square of the other, then $k = 2 \pm \sqrt{5}$ b. $2 \pm \sqrt{3}$ c. $3 \pm \sqrt{2}$ d. $5 \pm \sqrt{2}$

A. $2 \pm \sqrt{3}$

B. $3 \pm \sqrt{2}$

C. $2 \pm \sqrt{5}$

D. $5 \pm \sqrt{2}$

Answer: C

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57. If one root of the equation $8x^2 - 6x - a - 3 = 0$ is the square of the other values of a are :

A. $4, \ -24$

B. $4, 24$

C. $-4, \ -24$

D. $-4, 24$

Answer: D

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58. If α, β are the roots fo the equation $\lambda\left(x^2 - x\right) + x + 55 = 0$. If λ_1 and λ_2 are two values of λ for which the roots α, β are related by $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} = \frac{4}{5}$ find the value of $\frac{\lambda_1}{\lambda_2} + \frac{\lambda_2}{\lambda_1}$

A. 150

B. 254

C. 180

D. 100

Answer: B

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59. If $ax^2 + bx + c = 0$ is satisfied by every value of x, then

A. b,c=0

B. c=0

C. a=0

D. a=b=c=0

Answer: D

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60. Let f (x) =(px+q) cos x + (rx+s) sin x and $f'(x) = x\cos x\,\forall x \in R$ then

A. p=-1

B. q=1

C. r=1

D. s=-1

Answer: B::C

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61. The number of values of λ for which $(\lambda^2 - 3\lambda + 2)x^2 + (\lambda^2 - 5\lambda + 6)x + \lambda^2 - 4 = 0$ is an identity in x is

A. 1

B. 2

C. -2

D. 0

Answer: A

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62. If $p(x+1)^2 + q(x^2 - 3x - 2) + x + 1 = 0$ be an identity in x, then p,q are

A. 2,-2

B. 1,-1

C. 0,0

D. none

Answer: D

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63. If α, β, γ are the roots of the equaion $x^3 + px^2 + qx + r = 0$, then $(1-\alpha^2)(1-\beta^2)(1-\gamma^2)$ is equal to

A. $(1+q)^2 - (p+r)^2$

B. $(1+q)^2 + (p+r)^2$

C. $(1-q)^2 + (p-r)^2$

D. none of these

Answer: A

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64. If α, β are the roots of the equation $2x^2 + 6x + b = 0, (b < 0)$ then $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$ is less than

A. 2

B. -2

C. 10

D. none

Answer: B

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65. If α, β are roots of the equation $ax^2 + 3x + 2 = 0(a < 0)$, then $\frac{\alpha^2}{\beta} + \frac{\beta^2}{\alpha}$ is greater than

A. 0

B. 1

C. 2

D. none of these

Answer: D

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66. The value of a for which the sum of the squares of the roots of $2x^2 - 2(p-2)x - p - 1 = 0$ is least, is

A. p=1

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

C. $p = 2$

D. $p = -1$

Answer: B

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67. The real quadratic equation whose one root is $2 - \sqrt{3}$ is

A. $x^2 - 4x + 1 = 0$

B. $x^2 + 4x - 1 = 0$

C. $x^2 - 4x - 1 = 0$

D. none of these

Answer: A

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68. If α and β are the roots of the equation $ax^2 + bx + c = 0$, then the equation whose roots are $\frac{1}{\alpha + \beta}, \frac{1}{\alpha} + \frac{1}{\beta}$ is

A. $acx^2 + (a^2 + bc)x + bc = 0$

B. $bcx^2 + (b^2 + ac)x + ab = 0$

C. $abx^2 + (c^2) + ab)x + ca = 0$

D. none of these

Answer: B

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69. If $\alpha \neq \beta$ and $\alpha^2 = 5\alpha - 3 and \beta^2 = 5\beta - 3.$ find the equation whose roots are $\alpha / \beta and \beta / \alpha.$

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

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

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

D. none

Answer: C

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

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

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

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

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

Answer: D

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71. If $x^2 - x + 1 = 0$ then the value of x^3 is

A. 1

B. -1

C. $-1, 1$

D. 0

Answer: B

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72. Let α and β be the roots of the equation $x^2 + ax + 1 = 0, a \neq 0$. Then the equation whose roots are $-\left(alphla + \frac{1}{\beta}\right)$ and $-\left(\frac{1}{\alpha} + \beta\right)$ is

A. $x^2 = 0$

B. $x^2 + 2bx + 4 = 0$

C. $x^2 - 2bx + 4 = 0$

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

Answer: C

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73. The equation whose roots are such that their A.M. = 9 and G.M. = 4 is

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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74. Ramesh and Mahesh solve an equation. In solving Ramesh commits a mistake in constant term and find the roots are 8 and 2. Mahesh commits a mistake in the coefficient of x and find the roots -9 and -1. The corret roots are

A. $-8, 2$

B. 9,1

C. 9,-1

D. $-8, \ -2$

Answer: B

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75. Two candidates attempt to solve a quadratic equation of the form $x^2 + px + q = 0$. One starts with a wrong value of p and finds the roots to be 2 and 6. The other starts with a wrong value of q and finds the roots to be 2,-9.The correct roots are

A. 3,4

B. 5,3

C. $-3.\ -4$

D. none

Answer: C

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76. If 8,2 are the roots of $x^2 + ax + \beta = 0$ and 3,3 are the roots of $x^2 + \alpha x + b = 0$, then the roots of $x^2 + ax + b = 0$ are

A. $8,\ -1$

B. $-9, 2$

C. $-8, -2$

D. 9,1

Answer: D

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77. Let α, βbe 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+b,b+c

Answer: C

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78. In a quadratic equation with leading coefficient 1, a student read the coefficient 16 of x wrong as 19 and obtain the roots as -15 and -4. The correct roots are

A. 6,10

B. $-6, \ -10$

C. $-7, \ -9$

D. none of these

Answer: B

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79. Two students while solving a quadratic equation in x, one copied the constant term incorrectly and got the roots 3 and 2. The other copied the constant term and coefficient of x^2 correctly as -6 and 1 respectively. The correct roots are

A. 3,-2

B. $-3, 2$

C. $-6, -1$

D. $6, -1$

Answer: D

Watch Video Solution

80. A quadratic equation whose roots are $\frac{a}{\sqrt{a} \pm \sqrt{(a-b)}}$ is

A. $ax^2 - b\sqrt{bx} + b^2 = 0$

B. $bx^2 - 2a\sqrt{ax} + a^2 = 0$

C. $ax^2 - abx + b = 0$

D. $a^2x^2 + abx + b^2 = 0$

Answer: B

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81. If $\frac{1}{a+\sqrt{b}}$ (b not a perfect square) be a root of a quadratic equation, then its form is

A. $\left(a^2-b\right)x^2-2bx+1=0$

B. $\left(a^2-b\right)x^2-2ax+1=0$

C. $x^2-2ax+\left(a^2-b^2\right)=0$

D. none

Answer: B

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82. The quadratic equation whose roots are A.M. and H.M. between the roots of the equation $ax^2+bx+c=0$, is

A. $\left(abx^2+cb^2+ac\right)x+bc=0$

B. $2abx^2+\left(b^2+4ac\right)x+2bc=0$

C. $2abx^2 + (b^2 + ac)x + bc = 0$

D. none

Answer: B

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83. If $\alpha + \beta = 3, \alpha^3 + \beta^3 = 7$, then α and β are the roots of

A. $3x^2 + 9x + 7 = 0$

B. $9x^2 - 27x + 20 = 0$

C. $2x^2 - 6x + 15 = 0$

D. none

Answer: B

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84. If $x^2 - 3x + 2$ is a factor of $x^4 - px^2 + q = 0$, then p,q are

A. 2,3

B. 4,5

C. 5,4

D. 0,0

Answer: C

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85. If the roots of the equation $x^2 - 5x + 16 = 0$ are α, β and the roots of the equation $x^2 + ax + b = 0$ are $\alpha^2 + \beta^2$ and $\frac{\alpha\beta}{2}$, then (a,b) is

A. (1,56)

B. (1,-56)

C. (-1,56)

D. (-1,-56)

Answer: D

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86. The roots of the equation $(b-c)x^2+(c-a)x+(a-b)=0$ are

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

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

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

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

Answer: B

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87. If one root of the equation $ix^2 - 2(i+1)x + (2-i) = 0$ is 2-i, then the other root is

A. $-i$

B. $2+i$

C. i

D. $2-i$

Answer: A

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88. The number of real roots of the equation $2^{2x^2-7x+5} = 1$ is

A. 0

B. 1

C. 2

D. 4

Answer: C

Watch Video Solution

89. The equation $(x-a)^3+(x-b)^3+(x-c)^3=0$ has

A. all roots real

B. one real, two complex

C. three real roots a,b,c

D. none

Answer: B

Watch Video Solution

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

A. 2

B. 1

C. 0

D. 3

Answer: C

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91. If α, β be the roots of $ax^2 + bx + c = 0$, then those of $ax^2 + 2bx + 4c = 0$ are

A. $\alpha/2, \beta/2$

B. $2\alpha, 2\beta$

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

D. $-\alpha, -\beta$

Answer: B

View Text Solution

92. If p ad q are non-zero constants, the equation $x^2 + px + q = 0$ has roots α and β, then the equation $qx^2 + px + 1 = 0$ has roots

A. α and $1/\beta$

B. $1/\alpha$ and β

C. $1/\alpha$ and $1/\beta$

D. none of these

Answer: C

Watch Video Solution

93. The quadratic equation whose roots are reciprocal of the roots of the equation $ax^2 + bx + c = 0$ is :

A. $cx^2 + bx + a = 0$

B. $bx^2 + cx + a = 0$

C. $cx^2 + ax + b = 0$

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

Answer: A

Watch Video Solution

94. If $x = 2 + 2^{2/3} + 2^{2/3}$, then the value of $x^3 - 6^2 + 6x$ is 3 b. 2 c. 1 d. -2

A. 3

B. 2

C. 1

D. none of these

Answer: B

Watch Video Solution

95. The number of roots of the equation, $x - \frac{2}{x-1} = 1 - \frac{2}{x-1}$ is 0

(b) 1 (c) 2 (d) 3

A. 1

B. 2

C. 0

D. infinitely many

Answer: C

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96. If a,b,c are real $x^3 - 3b^2x + 2c^3$ is divisible by x-a and x-b, then

A. $a = -b = -c$

B. $a = 2b = 2c$

C. $a = b = c$ or $a = -2b = -2c$

D. none of these

Answer: C

Watch Video Solution

97. If $x^2 - 2x\cos\theta + 1 = 0$, then the value of $x^{2n} - 2x^n \cos n\theta + 1$ is equal to

A. $\cos 2n\theta$

B. $\sin 2n\theta$

C. 0

D. some real number other than 0

Answer: C

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98. If a and β^2 are the roots $8x^2$-10x+3=0' then the equation whose roots are $(a+i\beta)^{100}$ and $(a-i\beta)^{100}$ can be`

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

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

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

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

Answer: B

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99. If α, β are the roots of $ax^2+bx+c=0$, the equation whose roots are $2+\alpha, 2+\beta$ is

A. $ax^2+x(4a-b)+4a-2b+c=0$

B. $ax^2+x(4a-b)+4a+2b+c=0$

C. $ax^2+x(b-4a)+4a+2b+c=0$

D. $ax^2 + x(b - 4a) + 4a - 2b + c = 0$

Answer: D

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100. The value of x for which $\log_3\left(2^{1-x} + 3\right), \log_9 4$ and $\log_{27}\left(2^x - 1\right)^3$ form an A.P. is

A. $11/6$

B. $6/11$

C. $\log_2(11/6)$

D. 1

Answer: D

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101. The inequality $|2x - 3| < 1$ is valid when x lies in the interval :

A. (3,4)

B. (1,2)

C. (-1,2)

D. (-4,3)

Answer: B

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102. If the product of the roots of the equation $x^2 - 3kx + 2e^{2\ln k} - 1 = 0$ 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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103. Find the number of quadratic equations, which are unchanged by squaring their roots.

A. 2

B. 4

C. 6

D. none of these

Answer: B

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104. If roots of an equation $x^n - 1 = 0 are 1, a_{1,2}, a_{n-1},$ then the value of $(1 - a_1)(1 - a_2)(1 - a_3)(1 - a_{n-1})$ will be n b. n^2 c. n^n d. 0

A. 0

B. 1

C. n

D. n^2

Answer: C

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105. If $7^{\log 7 (x^2 - 4x + 5)} = x - 1$, x may have values

A. 2,3

B. 7

C. $-2, -3$

D. $2, -3$

Answer: A

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106. If a+b+c=0 then $x^{a^2/bc} . x^{b^2/ca} . x^{c^2/ab}$ is equal to

A. 1

B. x

C. x^2

D. x^3

Answer: D

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107. If $x = (\beta - \gamma)(\alpha - \delta) \quad y = (\gamma - \alpha)(\beta - \delta), z = (\alpha - \beta)(\gamma - \delta),$ then the value of $x^3 + y^3 + z^3 - 3xyz$ is

A. 0

B. $\alpha^6 + \beta^6 + \gamma^6 + \delta^6$

C. $\alpha^6\beta^6\gamma^6\delta^6$

D. none of these

Answer: A

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108. If α, β, γ are the roots of the equation $x^3 + ax + b = 0$, then $\frac{\alpha^3 + \beta^3 + \gamma^3}{\alpha^2 + \beta^2 + \gamma^2} =$

A. $\frac{3b}{2a}$

B. $\frac{-3b}{2a}$

C. 3b

D. 2a

Answer: A

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109. If α, β, γ are the roots if the equation $x^3 - 3x + 11 = 0$ then the equation whose roots are $(\alpha + \beta), (\beta + \gamma), (\gamma + \alpha$ is

A. $x^3 + 3x + 11 = 0$

B. $x^3 - 3x - 11 = 0$

C. $x^3 + 3x - 11 = 0$

D. none

Answer: B

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110. If $\alpha + i\beta$ is one of the roots of the equation $x^3 + qx + r = 0$, then 2α is one of the roots of the equation :

A. $x^2 - qx + r = 0$

B. $x^3 - qx - r = 0$

C. $x^3 + qx - r = 0$

D. none

Answer: C

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111. If the equation $x^3 + ax^2 + b = 0 (b \neq 0)$ has a double root then

A. $4a + 27b^3 = 0$

B. $4a^3 + 27b = 0$

C. $27a + 4b^3 = 0$

D. none

Answer: B

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112. If α, β arethe roots of the equation $x^2 - ax + b = 0$ and $A_n = \alpha^n + \beta^n$ then which of the following is true? (A) $A_{n+1} = aA_n + bA - (n-1)$ (B) $A_{n+1} = bA_n + aA - (n-1)$ (C) $A_{n+1} = aA_n - bA - (n-1)$ (D) $A_{n+1} = bA_n \pm aA - (n-1)$

A. $A_{n+1} = aA_n + bA_{n-1}$

B. $A_{n+1} = bA_n + aA_{n-1}$

C. $A_{n+1} = aA_n - bA_{n-1}$

D. $A_{n+1} = bA_n - aA_{n-1}$

Answer: C

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113. If α, β are the roots of the equation $ax^2 + bx + c = 0$ and $S_n = \alpha^n + \beta^n$, then $aS_{n+1} + bS_n + cS_{n-1} = (n \geq 2)$

A. 0

B. a+b+c

C. abc

D. none

Answer: A

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114. Let $aandb$ be the roots of the equation $x^2 - 10cx - 11d = 0$ and those of $x^2 - 10ax - 11b = 0arec, \ldots$ then find the value of $a + b + c + \ddot{w}henа \neq b \neq c \neq \ldots$

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Problem Set - 1 (True And False)

1. If c, d are the roots of the equation $(x-a)(x-b)-k=0$, prove that a, b are roots of the equation $(x-c)(x-d)+k=0$.

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2. If α is a root of the equation $x^2+2x-1=0,$ then prove that $4\alpha^2-3\alpha$ is the other root.

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3. If the ratio of roots of equation $lx^2+nx+n=0$ is $p:q$ then find the value $\sqrt{\frac{p}{q}}+\sqrt{\frac{q}{p}}+\sqrt{\frac{n}{l}}$= ?

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Problem Set - 1 (Fill In The Blanks)

1. If α, β be the roots $x^2 - px + q = 0$ and α', β' be those of $x^2 - p'x + q' = 0$, then the value of

$(\alpha - \alpha')^2 + (\beta - \alpha')^2 + (\alpha - \beta')^2 + (\beta - \beta')^2 = ...$

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2. The roots of the equation $4x^4 - 24x^3 + 57x^2 + 18x - 45 = 0$ if one of them is $3 + i\sqrt{6}$, are ....

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3. If α, β are the roots of the quadratic equation $6x^2 - 6x + 1 = 0$, then

$\frac{1}{2}(a + b\alpha + c\alpha^2 + d\alpha^3) + \frac{1}{2}(a + b\beta + c\beta^2 + d\beta^3) = ...$

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4. If $5\{x\} = x + [X]$ and $[X] - \{x\} = \frac{1}{2}$, where {x} and [X] are fractional and integral part of x then x= ....

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Problem Set - 2

1. The equation $(b-c)x^2 + (c-a)x + (a-b) = 0$ has

A. equal roots

B. irrational roots

C. rational roots

D. none of these

Answer: C

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2. If the roots of the equation

$(b-c)x^2+(c-a)x+(a-b)=0$ be equal, then a,b,c are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: A

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3. If the roots of the equation $a(b-c)x^2+b(c-a)x+c(a-b)=0$ are equal, show that $2/b=1/a+1/\cdot$

A. $\frac{1}{a}+\frac{1}{c}$

B. $a+c$

C. $1/a+c$

D. $a + 1/c$

Answer: A

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4. If a, b, c are in H.P., then the equation $a(b-c)x^2 + b(c-a)x + c(a-b) = 0$

A. real and distinct roots

B. equal roots

C. complex roots

D. none of these

Answer: B

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5. Suppose A, B, C are defined as $A = a^2b + ab^2 - a^2c - ac^2$, $B = b^2c + bc^2 - a^2b - ab^2$, and $C = a^2c + ac^2 - b^2c - bc^2$, where $a > b > c > 0$ and the equation $Ax^2 + Bx + C = 0$ has equal roots, then a, b, c are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: C

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6. If a, b, c, d are four consecutive terms of an increasing A.P., then the roots of the equation $(x - a)(x - c) + 2(x - b)(x - d) = 0$ are a. non-real complex b. real and equal c. integers d. real and distinct

A. real and distinct

B. complex

C. equal roots

D. none

Answer: A

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

A. rational

B. irrational

C. non-real

D. equal

Answer: A

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8. If $(a+b+c=0$, find the nature of the roots of ttie equation $(c^2-ab)x^2-2(a^2-bc)x+(b^2-ac)=0.$

A. imaginary

B. real and equal

C. real and unequal

D. none of these

Answer: B

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9. 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. imaginary

B. real and equal

C. real and unequal

D. none of these

Answer: B::C

Watch Video Solution

10. If the roots of the equation $(x-b)(x-c)+(x-c)(x-a)+(x-a)(x-b)=0$ are equal, then

A. a+b+c =0

B. $a+b\omega+c\omega^2=0$

C. $a-b+c=0$

D. $a+b\omega^2+c\omega=0$

Answer: B::D

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11. If the expression $x^2 - 2(\Sigma a)x + 3\Sigma ab = 0$ be a perfect square, then

A. $\Sigma a = 0$

B. $\Sigma ab = 0$

C. $a = b = c$

D. none

Answer: C

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12. If a,b and c are real numbers then the roots of the equation $(x-a)(x-b) + (x-b)(x-c) + (x-c)(x-a) = 0$ are always

A. positive

B. negative

C. real

D. none of these

Answer: C

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13. If three distinct positive numbers a, b, c are in H.P.,then the equation $ax^2 + 2bx + c = 0$ has:-

A. real

B. imaginary

C. rational

D. equal

Answer: B

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14. Find the condition if the roots of $ax^2 + 2bx + c = 0 and bx^2 - 2\sqrt{acx} + b = 0$ are simultaneously real.

A. a=b,c=0

B. $ac = b^2$

C. $4b^2 = ac$

D. none of these

Answer: B

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15. if a $< c < b,$ then check the nature of roots of the equation

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

A. complex

B. real

C. equal

D. unequal

Answer: A

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16. The value of m for which the equation $x^3 - mx^2 + 3x - 2 = 0$ has two roots equal in magnitude but opposite in sign, is

A. $1/2$

B. $2/3$

C. $3/4$

D. $4/5$

Answer: B

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17. If $a \in Z$ and the equation $(x-a)(x-10)+1=0$ is integral roots, then the values of a are

A. 8,10

B. 10,12

C. 12,8

D. none

Answer: C

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18. The equation $(6-x)^4+(8-x)^4=16$ has

A. sum of roots 28

B. product of roots 2688

C. two real roots

D. two imaginary roots

Answer: A::B::C::D

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19. If $x^2 + x + 1$ is a factor of $ax^3 + bx^2 + cx + d$, then the real root of $ax^3 + bx^2 + cx + d = 0$ is

A. $-d/a$

B. d/a

C. a/d

D. none of these

Answer: A

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20. Let $f(x) = ax^3 + 5x^2 - bx + 1$. If $f(x)$ when divide by $2x + 1$ leaves 5 as remainder, and $f'(x)$ is divisible by $3x - 1$, then

A. 24,12

B. 26,12

C. 26,10

D. none

Answer: B

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21. If $x^3 + 3x^2 - 9x = c$ is of the form $(x - \alpha)^2(x - \beta)$, then c is equal to 27 b. -27 c. 5 d. -5

A. -27

B. 27

C. 5

D. 5

Answer: A::D

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22. If the two roots of the euqation $(\lambda-1)\left(x^2+x+1\right)^2-(\lambda+1)\left(x^4+x^2+1\right)=0$ are real and distinct, then λ lies in the interval

A. $(-\infty, 2)$

B. $(2, \infty)$

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

D. $(-\infty, -2) \cap (2, \infty)$

Answer: B::C

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23. The value of a for which the quadratic equation

$3x^2+2a^2+1x+a^2-3a+2=0$

Possesses roots of opposite signs lies in

A. $(-\infty, 1)$

B. $(-\infty, 0)$

C. $(1, 2)$

D. $\left(\frac{3}{2}, 2\right)$

Answer: C

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24. If 1 lies between the roots of the equation $3x^2 - 3\sin\alpha x - 2\cos^2\alpha = 0$, the α lies in the interval

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

B. $\left(\frac{\pi}{12}, \frac{\pi}{2}\right)$

C. $\left(\frac{\pi}{6}, \frac{5\pi}{6}\right)$

D. $\left(\frac{\pi}{6}, \frac{\pi}{2}\right) \cup \left(\frac{\pi}{2}, \frac{5\pi}{6}\right)$

Answer: D

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25. If $a.4^{\tan x} + a.4^{-\tan x} - 2 = 0$ has real solutions, where $0 \leq x \leq \pi, x \neq \pi/2$, then a lies in the interval

A. $[-1, 1]$

B. $[-1, 0]$

C. $(0, 1]$

D. $[0, \infty]$

Answer: C

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26. If the equation $(\cos\theta - 1)x^2 + (\cos\theta)x + \sin\theta = 0$ has real roots, then θ lies in

A. $[0, \pi]$

B. $[-\pi, 0]$

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

D. $[0, 2\pi]$

Answer: A

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27. If the roots of the equation $(x-p)(x-q) = p^2 - 2q^2$ be real and distinct for all $p > 0$ then q lies in the interval

A. $\left[-p, \frac{7}{5}p\right]$

B. $\left[-p, \frac{5}{7}p\right]$

C. $\left[-p, \frac{1}{7}p\right]$

D. $\left[-2p, -\frac{7}{5}p\right]$

Answer: B

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28. The value of a for which the equation $2x^2 - 2(2a+1)x + a(a-1) = 0$ has roots, α and β such that $\alpha < a < \beta$ is

A. $a \geq 0$

B. $a < 0$

C. $-3 < a < 0$

D. none of these

Answer: D

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29. 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. $m > 3$

B. $-1 < m < 3$

C. $1 < m < 4$

D. $-2 < m < 4$

Answer: D

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30. The value of λ for. Which $2x^2 - 2(2\lambda + 1)x + \lambda(\lambda + 1) = 0$ may have one root less than λ and other root greater than λ are given by

A. $1 > \lambda > 0$

B. $-1 < \lambda < 0$

C. $\lambda \geq 0$

D. $\lambda > 0 \text{ or } \lambda < -1$

Answer: D

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

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

B. $4a + 2|b| + c < 0$

C. $a + |b| + c < 0$

D. $c < 0$

Answer: A::B::C::D

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32. Find the values of a if $x^2 - 2(a-1)x + (2a+1) = 0$ has positive roots.

A. $a > 0$

B. $0 < a < 4$

C. $a \geq 4$

D. none of these

Answer: C

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33. If the equation $x^2 + 2(a+1)x + 9a - 5 = 0$ has only negative root, then

A. $a \leq 6$

B. $a \geq 6$

C. $a \leq 0$

D. $a \geq 0$

Answer: B

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34. The value of k for which both the roots of the equation $4x^2 - 20kx + \left(25k^2 + 15k - 66\right) = 0$ are less than 2, lies in

A. (4/5,2)

B. (2,0)

C. (-1,-4/5)

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

Answer: D

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

A. $a < 2$

B. $2 \leq a \leq 3$

C. $3 < a \leq 4$

D. $a > 4$

Answer: A

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36. If both the roots of the equation $x^2 - 12kx + k^2 + k - 5 = 0$ are less than 5, then k lies in the inverval

A. $(-\infty, 4)$

B. $[4, 5]$

C. $[5, 6]$

D. $(6, \infty)$

Answer: A

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37. If both the roots of the equation $x^2 - 6ax + 2 - 2a + 9a^2 = 0$ exceed 3, then

A. $a > \frac{11}{9}$

B. $a < \frac{11}{9}$

C. $a > \frac{9}{11}$

D. $a < \frac{9}{11}$

Answer: A

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38. 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

A. less than -4ab

B. greater than 4ab

C. less than 4ab

D. greater than -4ab

Answer: D

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39. If $\cos^4 x + \sin^2 x - \lambda = 0, \lambda \in R$ has real solutions, then

A. $\lambda \leq 1$

B. $\frac{3}{4} \leq \lambda \leq 1$

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

D. none

Answer: B

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40. If the roots of $x^2 + x + a = 0$ exceed 'a' ,then

A. $2 < a < 3$

B. $a > 3$

C. $-3 < a < 3$

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

Answer: D

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41. The range of values of m for which the equation $(m-5)x^2 + 2(m-10)x + m + 10 = 0$ has real roots of the same sign, is given by

A. $m > 10$

B. $-5 < m < 5$

C. $m < -10, 5 < m \leq 6$

D. none of these

Answer: C

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42. The equation $ax^2 + bx + c = 0$ where a,b,c are real numbers connected by the relation $4a + 2b + c = 0$ and $ab > 0$ has

A. real roots

B. complex roots

C. exactly one root

D. none of these

Answer: A

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43. If $a, b, c \in R$ and $a + b + c = 0$, then the quadratic equation $4ax^2 + 3bx + 2c = 0$ has

A. one positive and one negative root

B. imaginary roots

C. real roots

D. none of these

Answer: C

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44. If a,b,c are positive and are in A.P., the roots of the quadratic equation $ax^2 + bx + c = 0$ are real for

A. $\left|\frac{c}{a} - 7\right| \geq 4\sqrt{3}$

B. $\left|\frac{a}{c} - 7\right| < 4\sqrt{3}$

C. all a and c

D. no a and c

Answer: A

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45. If $f(x) = ax^2 + bx + c, g(x) = -ax^2 + bx + c, whereac \neq 0,$ then prove that $f(x)g(x) = 0$ has at least two real roots.

A. at least three real roots

B. no real root

C. at least two real roots

D. two real and two imaginary roots

Answer: C

Watch Video Solution

46. If a, b, c are positive and a = 2b + 3c, then roots of the equation $ax^2 + bx + c = 0$ are real for

A. $\left|\frac{a}{c} - 11\right| \geq 4\sqrt{7}$

B. $\left|\frac{c}{a}-11\right| \geq 4\sqrt{7}$

C. $\left|\frac{b}{c}-4\right| \geq 2\sqrt{7}$

D. $\left|\frac{c}{b}-4\right| \geq 2\sqrt{7}$

Answer: A

Watch Video Solution

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

A. 2

B. 4

C. 0

D. none of these

Answer: C

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48. Real roots of the equation $x^2 + 5|x| + 4 = 0$ are

A. $-1, \ -4$

B. 1,4

C. $-4, 4$

D. none of these

Answer: D

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49. The number of real roots of the equation $(\sin 2^x)\cos(2^x) = \frac{1}{4}\left(2^x + 2^{-x}\right)$ is equal to

A. 1

B. 2

C. 3

D. 0

Answer: D

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50. The number of solutions of the equation $5^x + 5^{-x} = \log_{10} 25, x \in R$ is

A. 0

B. 1

C. 2

D. inifinitely many

Answer: A

Watch Video Solution

51. The number of solutions of the equation $\sin e^x = 5^x + 5^{-x}$ is

A. 0

B. 1

C. 2

D. infinite

Answer: A

Watch Video Solution

52. The number of real roots of the equation $(x+3)^4 + (x+5)^4 = 16$ is

A. 0

B. 2

C. 4

D. none

Answer: B

Watch Video Solution

53. The number of real solutions of the equation $\left(\frac{5}{7}\right)^2 = -x^2 + 2x - 3$ is equal to

A. 0

B. 1

C. 2

D. none of these

Answer: A

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

A. $2/3$

B. $9/4$

C. $-9/4$

D. 1

Answer: C

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55. 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 the other in (-2,-1)

C. imaginary roots

D. none of these

Answer: A

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56. 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 [-1,1]

C. at least one root in [0,2]

D. none of these

Answer: A

Watch Video Solution

57. If $\left(ax^2 + c\right)y + \left(dx^2 + c'\right)$=0 and x is a rational function of y and ac is $-ve$ and ac is perfact square then

A. $a^2 + c^2 = d^2 + c^2$

B. $ad + c' = 1$

C. $\frac{a}{c} = \frac{d}{c'}$

D. $ac + dc = 0$

Answer: C

Watch Video Solution

58. If the equation $x^2 - 4x + \log_{\frac{1}{2}} a = 0$ does not have two distinct real roots, then maximum value of a is

A. $\frac{1}{16}$

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

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

D. none of these

Answer: A

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59. Consider the equation of the form $x^2 + ax + b = 0$. Then number of such equations that have real roots and have coefficients a and b in the set {1,2,3,4,5,6} {a may be equal to b} is

A. 20

B. 19

C. 18

D. 17

Answer: B

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60. If $\alpha, \beta$are the roots of $x^2 + px + q = 0$ and α^n, β^n are the roots of $x^{2n} + p^n x^n + q^n = 0$, and if $\left(\frac{\alpha}{\beta}\right), \left(\frac{\beta}{\alpha}\right)$ are the roots of $x^n + 1 + (x+1)^n = 0$. Then n is

A. an odd integer

B. an even integer

C. any integer

D. none of these

Answer: B

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61. 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 real roots

B. two negative roots

C. two positive roots

D. one positive and one negative roots

Answer: A

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62. If $\alpha, \beta, \gamma, \delta$ are the roots of the equation $x^4 + 4x^3 - 6x^2 + 7x - 9 = 0$,then the value of $(1+\alpha^2)(1+\beta^2)(1+\gamma^2)(1+\delta^2)$ is

A. 13

B. 11

C. 9

D. 5

Answer: A

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63. The number of roots of the quadratic equation $8\sec^2\theta - 6\sec\theta + 1 = 0$ is

A. infinitely many roots

B. exactly two roots

C. exactly four roots

D. no root

Answer: D

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64. 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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65. The real root of the equation $\frac{x^2}{(x+1)^2} + x^2 = 3$ are

A. $\frac{1 \pm \sqrt{5}}{2}$

B. $\frac{1 \pm \sqrt{3}}{2}$

C. $\frac{-1 \pm \sqrt{5}}{2}$

D. $\frac{-1 \pm \sqrt{3}}{2}$

Answer: A

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66. 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 distinct, then

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

B. $\frac{11}{3} < \lambda < \frac{17}{3}$

C. $\frac{11}{6} < \lambda < \frac{15}{4}$

D. $\lambda \geq 1$

Answer: A

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Problem Set - 2 (True And False)

1. If roots of equation $x^3 - 2cx + ab = 0$ are real and unequal, then prove that the roots of $x^2 - 2(a+b)x + a^2 + b^2 + 2c^2 = 0$ will be imaginary.

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2. Show that if p, q, r and s are real numbers and $pr = 2(q+s)$, then atleast one of the equations $x^2 + px + q = 0$ and $x^2 = rx + s = 0$ has

real roots.

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3. If $a < b < c < d$ then show that $(x-a)(x-c)+3)x-b)(x-d)=0$ has real and distinct roots.

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4. If the roots of the equation $\left(a^2+b^2\right)x^2-2(bc+ad)x+\left(c^2+d^2\right)=0$ be real, then they will be equal as well and then $\frac{a}{b}=\frac{d}{c}$

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Problem Set - 2 (Fill In The Blanks)

1. The values of m for which the equation $5x^2 - 4x + 2 + m\left(4x^2 - 2x - 1\right) = 0$ will have (i) Equal roots (ii) Product of roots as 2 (iii) Sum of the roots as 6 are ..... And .....

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2. If the roots of the equation $x^2 - 8x + a^2 - 6a = 0$ are real distinct, then find all possible value of a.

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3. Let A,B,C be three angles such that $A = \frac{\pi}{4}$ and $\tan B \cdot \tan C = p$ Find all possible values of p such that A, B, C are three angles of a triangle.

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Problem Set - 3

1. If the expression $x^2 - 11x + a$ and $x^2 - 14x + 2a$ have a common factor, then the values of 'a' are

A. (0,1)

B. 3,2

C. 0,24

D. none

Answer: C

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2. If the equations $x^2 + 2x + 3\lambda = 0 and 2x^2 + 3x + 5\lambda = 0$ have a non-zero common roots, then $\lambda =$ 1 (b) -1 (c) 3 (d) none of these

A. 1

B. -1

C. 3

D. none

Answer: B

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3. If $A = \{x : f(x) = 0\}$ and $B = \{x : g(x) = 0\}$, then $A \cap B$ will be the set of roots of the equation

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

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

C. $[f(x)]^2 + [g(x)]^2 = 0$

D. none

Answer: C

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4. The quadratic equation $x^2 + (a^2 - 2)x - 2a^2$ and $x^2 - 3x + 2 = 0$ have

A. both roots common for some $a \in R$

B. only one common root $\forall a \in R$

C. no common root $\forall a \in R$

D. none

Answer: B

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5. If the equation $ax^2 + bx + c = 0$ and $cx^2 + bx + a = 0 a \neq c$, have negative common root then the value of a-b+c is

A. 0

B. 1

C. 2

D. none

Answer: A

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6. The value of a so that the equations $(2a-5)x^2-4x-15=0$ and $(3a-8)x^2-5x-21=0$ have a common root, is

A. 4,8

B. 3,6

C. 1,2

D. none

Answer: A

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7. If the equations $ax^2 + bx + c = 0$ and $x^2 + x + 1 = 0$ have a common root, then

A. a+b+c=0

B. a=b=c

C. a=b or b=c or c=a

D. none of these

Answer: B

Watch Video Solution

8. If the equations $ax^2 + bx + c = 0$,where $a, b, c \in R,\ a \neq 0$ and $x^2 + 2x + 3 = 0$ have a common root then $a : b : c$ equals

A. $1 : 2 : 3$

B. $1 : 3 : 4$

C. $2 : 4 : 5$

D. none

Answer: B

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9. 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=0

C. a+b=1

D. a-b=1

Answer: D

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10. If the quadratic equation $x^2 + ax + b = 0$ and $x^2 + bx + a = 0 (a \neq b)$ have a common root, the find the numeical value of a +b.

A. 1

B. 0

C. -1

D. none of these

Answer: C

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11. If p,q,r are three distinct real numbers, $p \neq 0$ such that $x^2 + qx + pr = 0$ and $x^2 + rx + pq = 0$ have a common root, then the value of p+q+r is

A. 0

B. 1

C. -1

D. 2

Answer: A

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12. If the quadratic equations, $ax^2 + 2cx + b = 0 and ax^2 + 2bx + c = 0 (b \neq c)$ have a common root, then $a + 4b + 4c$ is equal to: a. -2 b. -2 c. 0 d. 1

A. -2

B. -1

C. 0

D. 1

Answer: C

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13. If every pair from among the equations $x^2 + ax + bc = 0, x^2 + bx + ca = 0$ and $x^2 + cx + ab = 0$ has a common root, then the sum and product of the three common roots is

A. $2(a + b + c)$

B. a+b+c

C. $-\frac{1}{2}(a + b + c)$

D. abc

Answer: C

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14. If the equations $ax^2 + bx + c = 0 and x^3 + 3x^2 + 3x + 2 = 0$ have two common roots, then $a = b = c$ b. $a = b \neq c$ c. $a = -b = c$ d. none of these

A. $a = b = \neq c$

B. $a = -b = c$

C. $a = b = c$

D. none of these

Answer: C

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15. If the equation $x^3 + ax^2 + b = 0 (b \neq 0)$ has a double root then

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

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

C. $4a^3 + 27b + 1 = 0$

D. $4a^3 + 27b = 0$

Answer: C

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16. If both the roots of $k\left(6x^2+3\right)+rx+2x^2-1=0$ and $6k\left(2x^2+1\right)+px+4x^2-2=0$ are common, then $2r-p$ is equal to

A. 0

B. $1/2$

C. 1

D. none of these

Answer: A

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17. α_1, β_1 are the roots of $ax^2+bx+c=0$ and α_2, β_2 are the roots of $px^2+qx+r=0$ If $\alpha_1\alpha_2=\beta_1\beta_2=1$ then

A. $\frac{a}{p}=\frac{b}{q}=\frac{c}{r}$

B. $\frac{a}{r}=\frac{b}{q}=\frac{c}{p}$

C. $ap = bq = cr$

D. none

Answer: B

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18. If a,b,c are in A.P. and if $(b-c)x^2 + (c-a)x + (a-b) = 0$ and $2(c+a)x^2 + (b+c)x = 0$ have a common root, then

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

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

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

D. none of these

Answer: B

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19. If $ax^2 + bx + c = 0 and bx^2 + cx + a = 0$ have a common root and a, b, and c are nonzero real numbers, then find the value of $\left(a^3 + b^3 + c^3\right) / abc$

A. 1

B. 2

C. 3

D. none

Answer: C

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20. If the equation $x^2 - px + q = 0$ and $x^2 - ax + b = 0$ have a comon root and the other root of the second equation is the reciprocal of the other root of the first, then prove that $(q - b)^2 = bq(p - a)^2$.

A. $aq(p - b)^2$

B. $bq(p-q)^2$

C. $bq(p-a)^2$

D. $aq(p-q)^2$

Answer: C

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21. If the equation $x^3 - 3x + a = 0$ has distinct roots between 0 and 1, then the value of a is

A. $(1, 2)$

B. $(0, 2)$

C. $(2, 3)$

D. none

Answer: B

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Problem Set - 3 (True And False)

1. If the equations $x^2 + bx + ca = 0$ and $x^2 + cx + ab = 0$ have a common root, then their other roots are the roots of the equation, $x^2 + ax + bc = 0$.

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2. If the equations $x^2 + abx + c = 0$ and $x^2 + acx + b = 0$ have a common root then their other roots satisfy the equation $x^2 - a(b + c)x + a^2bc = 0$

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Problem Set - 3 (Fill In The Blanks)

1. If $x^2 - hx - 21 = 0, x^2 - 3hx + 35 = 0 (h > 0)$ has a common root, then the value of h is equal to

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2. If one root of the equation $ax^2 + bx + c = 0$ be reciprocal of the one root of the equation $d'x^2 + b'x + c' = 0$ then the required condition is .....

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Problem Set - 4

1. If $x^2 + 6x - 27 > 0$ and $x^2 - 3x - 4 < 0$, then :

A. $x > 3$

B. $x < 4$

C. $3 < x < 4$

D. $x = 3\frac{-1}{2}$

Answer: C

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2. The values of x which satisfy both the inequations $x^2 - 1 \leq 0$ and $x^2 - x - 2 \geq 0$ lie in

A. (-1, 2)

B. (-1,-1)

C. (1,2)

D. $\{-1\}$

Answer: D

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3. If x is an integer satisfying $x^2 - 6x + 5 \leq 0$ and $x^2 - 2x > 0$, then the number of possible values of x, is

A. 2

B. 3

C. 4

D. none

Answer: B

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4. The greatest negative integer satisfying $x^2 - 4x - 77 < 0$ and $x^2 > 4$ is equal to

A. -3

B. -5

C. -6

D. none of these

Answer: A

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5. If $4 \leq x \leq 9$ then the expression (x-4) (x-9) is

A. ≥ 0

B. ≤ 0

C. > 0

D. < 0

Answer: B

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6. The expression $ax^2 + bx + c$ has the same sign as of a if

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

B. $b^2 - 4ac = 0$

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

D. b and c have the same sign as of a

Answer: C

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7. The value of $x^2 + 2bx + c$ is positive if

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

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

C. $c^2 < b$

D. $b^2 < c$

Answer: D

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8. 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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9. The expression $y = ax^2 + bx + c$ has always the same sign as of a if

A. $4ac < b^2$

B. $4ac > b^2$

C. $ac < b^2$

D. $ac > b^2$

Answer: B

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10. If the graph of the function $y = 16x^2 + 8(a+5)x - 7a - 5$ is strictly above the x-axis, then 'a' must satisfy the inequality

A. $-15 < a < -2$

B. $-2 < a < -1$

C. $5 < a < 7$

D. none of these

Answer: A

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11. Let f(x) be a quadratic expression possible for all real x.

If $g(x) = f(x) - f'(x) + f''(x)$, then for any real x

A. $g(x) > 0$

B. $g(x) \geq 0$

C. $g(x) \leq 0$

D. $g(x) < 0$

Answer: A

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12. If $x^2 - 2(4\lambda - 1)x + \left(15\lambda^2 - 2\lambda - 7\right) > 0$ for all real x, then λ belongs to

A. $(0, 2)$

B. $(1, 3)$

C. $(2, 4)$

D. none of these

Answer: C

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13. If the equation $x^3 - 3x + a = 0$ has distinct roots between 0 and 1, then the value of a is

A. $+ive$

B. $-ive$

C. 2

D. Does not exist

Answer: B

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14. If $c > 0$ and $4a + c < 2b$ then $ax^2 - bc + c = 0$ has a root in the interval

A. (2,4)

B. (0,1)

C. (0,2)

D. (-2,0)

Answer: C

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15. If $y = \tan x \cot 3x$, $x \in R$, then

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

B. $y < \frac{1}{3}$ or $y > 3$

C. $\frac{1}{3} \leq y \leq 1$

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

Answer: B

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16. If $a < b < c < d$, then the quadratic equation $(x-a)(x-c)+2(x-b)(x-d)=0$ has its roots

A. real

B. imaginary

C. one root in (a,c)

D. both roots in (a,c)

Answer: A::C

Watch Video Solution

17. Let $a, b, c \in R$ and $a \neq 0$. If α is a root $a^2x^2+bx+c=0$, β is a root of $a^2x^2-bx-c=0$ and $0<\alpha<\beta$, then the equation

$a^2x^2 + 2bx + 2c = 0$ has a root γ that always satisfies

A. $\gamma = \alpha$

B. $\gamma = \beta$

C. $\gamma = (\alpha + \beta)/2$

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

Answer: D

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18. If the roots of the equation $x^2 + 2ax + b = 0$ are real and distinct and they differ by at most 2m, then b lies in the interval

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

B. $(a^2 - m^2, a^2)$

C. $(a^2, a^2 + m^2)$

D. none of these

Answer: B

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19. The middle point of the interval in which $x^2 + 2\left(\sqrt{x}\right)^2 - 3 \leq 0$ is

A. $1/2$

B. 1

C. 0

D. $-1/2$

Answer: A

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20. If $x \in R$, the least value of the expression $\frac{x^2 - 6x + 5}{x^2 + 2x + 1}$ is

A. $-1/2$

B. $-1/3$

C. -1

D. none

Answer: B

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21. The inequality $\frac{x^2 - |x| - 2}{2|x| - x^2 - 2} > 2$ holds only if.

A. $-1 < x < -\frac{2}{3}$ only

B. only for $\frac{2}{3} < x < 1$

C. $-1 < x < 1$

D. $-1 < x < -\frac{2}{3}$ or $\frac{2}{3} < x < 1$

Answer: D

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22. If x is real, then $\frac{x^2 - 2x + 4}{x^2 + 2x + 4}$ takes values in the interval

A. $\left[\frac{1}{3}, 3\right]$

B. (1/3,3)

C. (3,3)

D. (-1/3,3)

Answer: A

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

A. 41

B. 1

C. $17/7$

D. $1/4$

Answer: A

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24. 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. $a < b < c$

C. $a > c > b$

D. $a < c < b$

Answer: C::D

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25. If x $\in$ R then $\frac{x^2+2x+a}{x^2+4x+3a}$ can take all real values if

A. $a \in (0, 2)$

B. $a \in [0, 1]$

C. $a \in [-1, 1]$

D. none

Answer: B

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26. The values of p for which the expression $\frac{px^2 + 3x - 4}{p + 3x - 4x^2}$ can assume real values for real x lie in the interval

A. $p \leq 1 \quad \text{or} \quad p \geq 7$

B. $p \geq 1 \quad \text{or} \quad p \leq 7$

C. $1 < p < 7$

D. none of these

Answer: B

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27. If P (x) is a polynomial of degree less than or equal to 2 and S is the set of all such polynomials so that $P(0) = 0, P(1) = 1,$ and $P'(x) > 0 \forall x \in [0.1],$ then

A. $S = \phi$

B. $S = ax + (1 - a)x^2 \forall a \in (0, \infty)$

C. $S = ax + (1 - a)x^2 \forall a \in R$

D. $S = ax + (1 - a)x^2 \forall a \in (0, 2)$

Answer: D

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Problem Set - 4 (True And False)

1. The roots of $(a-b)^2x^2+2(a+b-2c)x+1=0$ are real or imaginary according as c does not or does lie between a and b, $a<b$. True False.

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2. For real values of x, the value of the expression $\frac{11x^2+12x+6}{x^2+4x+2}$ lies between -5 and 3.True or False.

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3. Show thast the expression $\frac{x^2-3x+4}{x^2+3x+4}$ lies between $\frac{1}{7}$ and 7 for real values of x.

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4. If x is real, the expression $\frac{x^2 - bc}{2x - b - c}$ has no real values between b and c.True or False

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5. The value of $\frac{\tan x + 2\tan 2x}{\tan x}$ cannot lie between 1 and 5. Is it true or false ?

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Problem Set - 4 (Fill In The Blanks)

1. If x is real, prove that the value of the expression $\frac{(x-1)(x+3)}{(x-2)(x+4)}$ cannot be between $\frac{4}{9}$ and 1.

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2. $\frac{8x^2+16x-51}{(2x-3)(x+4)} > 3$, if x satisfies

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3. If $\left|\frac{12x}{4x^2+9}\right| \leq 1$, then

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4. Let $y = \sqrt{\frac{(x+1)(x+3)}{(x-2)}}$. Find all the real values of x for which y takes real values.

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Problem Set - 5

1. If $\sqrt{\left(\frac{x}{1-x}\right)} + \sqrt{\left(\frac{1-x}{x}\right)} = 2\frac{1}{6}$, then x is equal to

A. $\frac{3}{13}, \frac{5}{13}$

B. $\frac{7}{5}, \frac{3}{5}$

C. $\frac{9}{13}, \frac{4}{13}$

D. none

Answer: C

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2. Solve $\sqrt{5x^2 - 6x + 8} + \sqrt{5x^2 - 6x - 7} = 1.$

A. $3, \frac{1}{2}$

B. $4, -\frac{14}{5}$

C. $1, 2$

D. none

Answer: B

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3. $\frac{x-ab}{a+b}+\frac{x-ac}{a+c}+\frac{x-bc}{b+c}=a+b+c$, then x=

A. Σa

B. Σab

C. abc

D. none

Answer: B

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4. $\sqrt{(x/y)}+\sqrt{(y/x)}=5/2, x+y=6$, then x =

A. $(1,5)$

B. $(3,3)$

C. $\left(\frac{6}{5},\frac{24}{5}\right)$

D. none

Answer: C

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5. $\left(x^2/y\right)+\left(y^2/x\right)=9/2, x+y=3$ then (x,y) =

A. (1,2)

B. (2,1)

C. (3,0)

D. (0,3)

Answer: A::B

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6. $x^2-xy+y^2=7, x^4+x^2y^2+y^4=133$ then (x,y)=

A. $(2, 3)$

B. $(-2, -3)$

C. $(3, 2)$

D. $(-3, -2)$

Answer: A::B::C::D

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7. $(x+y)^{2/3} + 2(x-y)^{2/3} = 3\left(x^2 - y^2\right)^{1/3}, 3x - 2y = 13$

A. $\left(\frac{13}{3}, 0\right)$

B. (9,7)

C. $\left(0, -\frac{13}{2}\right)$

D. none

Answer: A::B

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8. The values of x and y in the simultaneous equations

$xy + 3y^2 - x + 4y - 7 = 0$

$2xy + y^2 - 2x - 2y + 1 = 0$ are

A. (3,4)

B. (2,-3)

C. (1,5)

D. (2,3)

Answer: B

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9. $x + y - 4xy = 0, y + z - 6yz = 0, z + x - 8zx = 0$

A. $\left(\frac{1}{2}, 2, 3\right)$

B. $\left(\frac{1}{4}, 3, 2\right)$

C. $\left(\frac{1}{3}, 1, \frac{1}{5}\right)$

D. none

Answer: C

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10. Solve for x,y,z. $xy + x + y = 23xz + z + x = 41yz + y + z = 27.$

A. $(5, 3, 6)$

B. $(-7, -5, -8)$

C. $(1, 2, 3)$

D. none

Answer: A

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11. $(x+y)^2 - z^2 = -9, (y+z)^2 - x^2 = 15, (z+x)^2 - y^2 = 3$

A. (2,3,4)

B. (1,-1,-3)

C. $-1, 1, 3$

D. none

Answer: B::C

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12. $x + y = 2, xy - z^2 = 1, x, y, z$ being all real

A. 0,2,3

B. 2,0,5

C. (4,-2,5)

D. (1,1,0)

Answer: D

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13. The value of x which satisfies $yz = a^2$, $zx = b^2$, $xy = c^2$ are

A. $\pm ca/b$

B. $\pm a/bc$

C. $\pm bc/a$

D. $\pm b/ca$

Answer: C

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14. For real roots, the solution of the equation $2^{x^2} : 2^{2x} = 8 : 1$ is

A. 1,2

B. 2,3

C. 3,-1

D. none

Answer: C

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15. For real roots, the solution of the equation $2^{2x+2} - 6^x - 2 \times 3^{2x+2} = 0$ is

A. -1

B. -2

C. 3

D. none

Answer: B

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16. For real roots, the solution of the equation $5(1/25)^{\sin^2 x} + 4 \times 5^{\cos 2x} = 25^{(\sin 2x)/2}$ is

A. $n\pi + \frac{\pi}{3}$

B. $n\pi + \frac{\pi}{4}$

C. $n\pi + \frac{\pi}{6}$

D. $n\pi + \frac{\pi}{2}$

Answer: B::D

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Problem Set - 5 (True And False)

1. Solve for x,y. $x^2 + y(x+1) = 17$ and $y^2 + x(y+1) = 13$

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2. The solution of the equations $x^2 + xy + xz = 18, y^2 + yz + yx + 12 = 0$ and $z^2 + zx + zy = 30$ are (3,-2,5) and (-3,2,-5)

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3. If $\frac{x^2 - yz}{a} = \frac{y^2 - zx}{b} = \frac{z^2 - xy}{c}$, then $(x + y + z)(a + b + c) = ax + by + cz$

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4. Show that the equation $e^{\sin x} - e^{-\sin x} - 4 = 0$ has no real solution.

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5. x=0 is only solution for the equation $2\cos^2\left\{\frac{x^2 + x}{2}\right\} = 2^x + 2^{-x}$

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Problem Set - 5 (Fill In The Blanks)

1. The equation $3^{|3x-4|} = 9^{2x-2}$ has the solution .....

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2. Fill in the blanks If

$x < 0, y < 0, x + y + (x/y) = (1/2) and (x + y)(x/y) = -(1/2), then$

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3. If $3x^2 - 4\sqrt{(3x^2 - 4x + 1)} = 4x - 4,$ then x= ....

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4. If $\frac{p+q-x}{r} + \frac{p+r-x}{q} + \frac{q+r-x}{p} + \frac{3x}{p+q+r} = 0,$ then x=....

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5. Solve $\left(x^2+2\right)^2+8x^2=6x\left(x^2+2\right)$

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6. The value of $\sqrt{6+\sqrt{6+\sqrt{6+}}}$ .....is 4 (b) 3 (c) -2 (d) 3.5

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7. The solution of the equations x+y+xy=11, $x^2y+xy^2=30$ are ....

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8. The solutions of the equations, where $a+b+c\neq 0$

$(b+c)(y+z)-ax=b-c$

$(c+a)(z+x)-by=c-a$

$(a+b)(x+y)-cz=a-b$ are ....

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9. The solutions of the equations

$z+ay+a^2x+a^3=0, z+by+b^2x+b^3=0,$

$z+cy+c^2x+c^3=0$ are ....

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10. Given

$y^2+z^2=ayz, z^2+x^2=bxz, x^2+y^2=cxy,$ express $\frac{y^2}{xz}+\frac{xz}{y^2}$ in terms of a,b,c=....

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Miscellaneous Exercise (Matching Entries)

1. Match the entries of List -A and List -B

List-A		List-B	
(a)	If one root of the equation $ax^2+bx+c=0$ be square of the other, then	1.	$bx^2-2a\sqrt{a}\,x+a^2=0$
(b)	If α,β be the roots of the equation $x^2+x+1=0$, then the equation whose roots are α^{19},β^7 is	2.	$\frac{3b}{2a}$
(c)	A quadratic equation whose roots are $\frac{a}{\sqrt{a}\pm\sqrt{a-b}}$ is	3.	$b^3+ac(a+c)=3abc$
(d)	If α,β,γ are the roots of $x^3+ax+b=0$, then $\frac{\alpha^3+\beta^3+\gamma^3}{\alpha^2+\beta^2+\gamma^2}=$	4.	$x^2+x+1=0$
(e)	If x^2+x+1 is a factor of $E\equiv ax^3+bx^2+cx+d$, then the real root of the equation $E=0$ is	5.	$-\frac{d}{a}$

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2. Match the entries of List -A and List -B

List-A		List-B	
(a)	If the roots of the equation $(b-c)x^2+(c-a)x+(a-b)=0$ be equal, then a,b,c are in which series ?	1.	Imaginary
(b)	If roots of the equation $a(b-c)x^2+b(c-a)x+c(a-b)=0$ be equal, then a,b,c are in which series ?	2.	0
(c)	If the roots of $x^2-2cx+ab=0$ be real and unequal, then the roots of $x^2-2(a+b)x+(a^2+b^2+2c^2)=0$ are	3.	H.P.
(d)	The number of real roots of the equation $(\sin 2^x)(\cos 2^x)=\frac{1}{4}(2^x+2^{-x})$ is	4.	A.P.

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3. Match the entries of List -A and List -B

List-A		List-B	
(a)	The expression ax^2+bx+c has the same sign as of a if b^2-4ac is	1.	$y<\frac{1}{3}$ or $y>3$
(b)	If the graph of the function $y=16x^2+8(a+5)x-7a-5$ is strictly above the x-axis, then a lies in the interval	2.	$b^2-4ac\le 0$
(c)	If x is real then $\frac{x^2-2x+4}{x^2+2x+4}$ takes values in the interval	3.	$-15<a<-2$
(d)	If $y=\tan x\cot 3x, x\in\mathbf{R}$, then y does not lie in the interval	4.	$\left[\frac{1}{3},3\right]$

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4. Let α,β,γ be three numbers such that $\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}=\frac{1}{2},\frac{1}{\alpha^2}+\frac{1}{\beta^2}+\frac{1}{\gamma^2}=\frac{9}{4}$ and $\alpha+\beta+\gamma=2$, then

Column-I		Column-II	
(a)	$\alpha\beta\gamma$	(p)	6
(b)	$\Sigma\alpha\beta$	(q)	8
(c)	$\Sigma\alpha^2$	(r)	-2
(d	$\Sigma\alpha^3$	(s)	-1

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5. Let α,β be the roots of the equation $ax^2+bx+c=0$, then match the roots of the equation in left with roots given in right.

Column-I	Column-II
(a) $(x-b)^2+b(x-b)+ac=0$	(p) $2\alpha, 2\beta$
(b) $ax^2+2bx+4c=0$	(q) $-\frac{\alpha}{a}, \frac{\beta}{b}$
(c) $4a^2x^2-b^2+4ac=0$	(r) $a\alpha+b, a\beta+b$
(d) $a^3x^2-abx+c=0$	(s) $\alpha+\frac{b}{2a}, \beta+\frac{b}{2a}$

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Self Assessment Test

1. If the equation $x^2-(2+m)x+\left(m^2-4m+4\right)=0$ has equal roots then the values of m are

A. (0,1)

B. $\frac{2}{3}, 6$

C. $\frac{2}{3}, 1$

D. 0,2

Answer: B

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

A. 1

B. 2

C. 3

D. 4

Answer: D

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3. Find the number of solution of the equation $e^{\sin x} - e^{-\sin x} - 4 = 0$

A. 1

B. 2

C. ∞

D. none

Answer: D

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4. The roots of the equation $(p-q)x^2+(q-r)x+(r-p)=0$ are

A. $\frac{p-q}{r-p}, 1$

B. $\frac{q-r}{p-r}, 1$

C. $\frac{r-p}{p-q}, 1$

D. none of these

Answer: C

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

B. 4

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

D. none of these

Answer: C

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

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

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

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

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

Answer: D

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7. If the quadratic equation $x^2 + ax + b = 0$ and $x^2 + bx + a = 0 (a \neq b)$ have a common root, the find the numeical value of a +b.

A. 1

B. -1

C. 0

D. 2

Answer: B

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8. If the roots of the equation $x^2 - 8x + a^2 - 6a = 0$ are real distinct, then find all possible value of a.

A. $2 < a < 8$

B. $-2 < a < 8$

C. $-2 \leq a \leq 8$

D. none of these

Answer: B

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9. The value of k for which the equation $x^2 - (3k-1)x + 2k^2 + 2k = 11$ have equal roots, is

A. 5

B. 9

C. both (a) and (b)

D. 0

Answer: C

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10. 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. (-4,7)

B. (4,7)

C. (4,-7)

D. (-4,-7)

Answer: A

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11. The number of solutions of the pair of equations $2s \in^2 \theta - \cos 2\theta = 0$ $2\cos^2\theta - 3\sin\theta = 0$ in the interval $[0, 2\pi]$ is 0 (b) 1 (c) 2 (d) 4

A. 0

B. 1

C. 2

D. 4

Answer: C

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12. If α, β are roots of the equations $Ax^2 + Bx + C = 0$. Then value of $\alpha^3 + \beta^3$ is

A. $\frac{3ABC - B^3}{A^3}$

B. $\frac{3ABC + B^3}{A^3}$

C. $\frac{B^3 - 3ABC}{A^3}$

D. none of these

Answer: A

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13. If the equation $x^2 + px + q = 0$ and $x^2 + qx + p = 0$ have a common root then 1+p+q =

A. 0

B. 1

C. 2

D. 3

Answer: A

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

A. $\alpha < \beta < 0$

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

C. $0 < \alpha < \beta$

D. none of these

Answer: B

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15. 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. (0,1)

B. (1,2)

C. (3,4)

D. none of these

Answer: A

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16. If the roots of the equation $\frac{x^2 - bx}{ax - c} = \frac{m - 1}{m + 1}$ are equal to opposite sign, then the value of m will be $\frac{a - b}{a + b}$ b. $\frac{b - a}{a + b}$ c. $\frac{a + b}{a - b}$ d. $\frac{b + a}{b - a}$

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

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

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

D. none of these

Answer: A

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17. If $\sin\alpha, \cos\alpha$ are the roots of the equation $ax^2 + bx + c = 0$, then

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

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

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

D. none of these

Answer: A

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18. If α, β are the roots of $x^2 - ax + b = 0$ and If $\alpha^n + \beta^n = V_n$ then

A. $V_{n+1} = aV_n + bV_{n-1}$

B. $V_{n+1} = aV_n + aV_{n-1}$

C. $V_{n+1} = aV_n - bV_{n-1}$

D. none of these

Answer: C

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19. The value of a for which one root of the quadratic equation $\left(a^2 - 5a + 3\right)x^2 + (3a - 1)x + 2 = 0$ is twice the other is (A) $-\frac{1}{3}$ (B) $\frac{2}{3}$ (C) $\frac{2}{3}$ (D) $\frac{1}{3}$

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

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

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

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

Answer: A

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20. If a,b, c are in G.P., then the equations $ax^2 + 2bx + c = 0$ and $dx^2 + 2ex + f = 0$ have common root if $\frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in

A. A.P.

B. G.P.

C. H.P.

D. none of these

Answer: A

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21. If $3 \leq 3t - 18 \leq 18$ then which one of the following is true

A. $15 \leq 2t + 1 \leq 20$

B. $8 \leq t \leq 12$

C. $8 \leq t + 1 \leq 13$

D. $21 \leq 3t \leq 24$

Answer: C

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22. Let α (a) and β (a) be the roots of the equation

$$\left(\sqrt[3]{1+a} - 1\right)x^2 + \left(\sqrt{1+a} - 1\right)x + \left(\sqrt[6]{1+a} - 1\right) = 0, a > -1$$

Then $\lim_{a \to 0^+} \alpha\ (a)$ and $\lim_{a \to 0^+} \beta$ (a) are

A. $\frac{-5}{2}$ and 1

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

C. $-\frac{7}{2}$ and 2

D. $-\frac{9}{2}$ and 3

Answer: B

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23. Let α, β be real and z be a complex number. If $z^2 + \alpha z + \beta = 0$ has two distinct roots on the line Re $z = 1$, then it is necessary that : (1) $b \in (0, 1)$ (2) $b \in (-1, 0)$ (3) $|b| = 1$ (4) $b \in (1, \infty)$

A. $\beta \in]0, 1[$

B. $\beta \in]-1, 0[$

C. $|\beta| = 1$

D. $\beta \in]1, \infty[$

Answer: D

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24. 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 number satisfying $\alpha + \beta = -p$ and $\alpha^3 + \beta^3 = q$, then a quadratic equation having $\frac{\alpha}{\beta}, \frac{\beta}{\alpha}$ as its root 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. $(p^3 - q)x^2 - (5p^3 - 2q)x + (p^3 - q) = 0$

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

Answer: B

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25. A value of b for which the equation $x^2 + bx - 1 = 0, x^2 + x + b = 0$ have one root in common is $-\sqrt{2}$ b. $-i\sqrt{3}$ c. $\sqrt{2}$ d. $\sqrt{3}$

A. $-\sqrt{2}$

B. $-i\sqrt{3}$

C. $i\sqrt{5}$

D. $\sqrt{2}$

Answer: B

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26. The number of distinct real roots of $x^4 - 4x^3 + 12x^2 + x - 1 = 0$

A. 2

B. 3

C. 0

D. 4

Answer: A

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27. 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. $1 : 2 : 3$

B. $3 : 2 : 1$

C. $1 : 3 : 2$

D. $3 : 1 : 2$

Answer: A

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