

LAITS MATHS PART TEST-1 DATE: 13-12-20

DATE: 09-12-2020

TIME: 60mins

Marking scheme

Numeric type: +4, -1

Numeric Questions

1 If one root of the equation $x^2 + ax + b = 0$, ($a, b \in \mathbb{Q}$), is $\sqrt{3} - 2$, find values of $a + b$.

Answer: 5

Solution:

Ans. 5

2 If greatest integral value of x satisfying the equation $|x^2 + 3x + 2| = |x^2 + 2x - 2| - |x + 4|$, is λ , find value of $|\lambda|$.

Answer: 1

Solution:

Ans. 1

3 Find product of all possible values of 'x' which satisfies the equation $\log_6 54 + \log_x 16 = \log_{\sqrt{2}} x - \log_{36} \left(\frac{4}{9}\right)$

Answer: 2

Solution:

Ans. 2

4 The solution set of the inequality $\frac{1}{x-2} - \frac{1}{x} \leq \frac{2}{x+2}$ is $(-\alpha, \beta] \cup (\gamma, \alpha) \cup [\delta, \infty)$, then the value of $\alpha + \beta + \gamma + \delta$, is

Answer: 5

Solution:

Ans. 5

5 If $[3|x| - 4] = 2$, $[\cdot] = \text{G.I.F.}$, then number of integral values of x satisfying the equation, is

Answer: 2

Solution:

Ans. 2

Single Correct Questions

6 If quadratic equation $x^2 + 4x + 5 = 0$, and $ax^2 + bx + c = 0$, ($a, b, c \in \mathbb{N}$), have a common root. Then the minimum value of $(a + b + c)$ is

Correct Options:

(B) 10

Solution:

Ans. (b)

$ax^2 + bx + c = 0$ and $x^2 + 4x + 5 = 0$ will have both roots common.

$$\therefore a : b : c \equiv 1 : 4 : 5$$

7 Number of solutions of the equations, $[x] + [-x] = 4x + 1$, $[\cdot] = \text{G.I.F}$, is

Correct Options:

(B) 1

Solution:

Ans. (b)

If $x \in I$

$$[x] + [-x] = 0, \quad \therefore 4x + 1 = 0 \quad \Rightarrow x = \frac{-1}{4} \text{ (not possible)}$$

If $x \notin I$, $[x] + [-x] = -1$

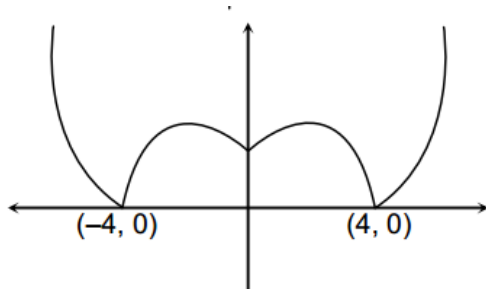
$$\therefore 4x + 1 = -1 \quad \Rightarrow x = \frac{-1}{2}$$

8 The graph of $y = |x^2 - 3|x| - 4|$, is

$$y = |x^2 - 3|x| - 4|$$

Correct Options:

(C)



Solution:

Ans. (c)

9

Set of values of 'x' satisfying the inequality $\frac{x^2 \cdot (2x + 3)(\sin x + 2)}{(e^x - 2)(x^2 - x + 2)} \geq 0$,

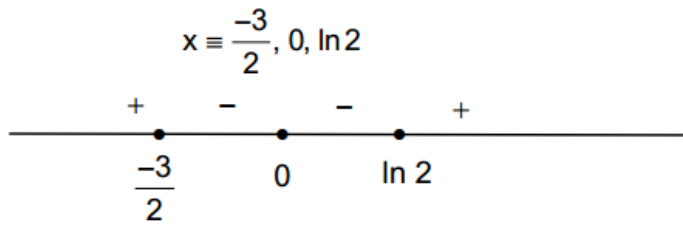
Correct Options:

(C) $\left(-\infty, \frac{-3}{2}\right] \cup (\ln 2, \infty) \cup \{0\}$

Solution:

Ans. (c)

Critical points are $x \equiv \frac{-3}{2}, 0, \ln 2$



10

If x is real then range of the expression $\frac{x^2 - 5x + 6}{x^2 - 4x + 3}$ is

Correct Options:

(D) $\mathbb{R} - \left\{ \frac{1}{2}, 1 \right\}$

Solution:

Ans. (d)

11

Number of solutions of the equation $\operatorname{sgn}(x) = \sin x$, in $x \in [-2\pi, 2\pi]$, is

Correct Options:

(B) 3

Solution:

Ans. (b)

12 Set of all values of x satisfying the inequality $\sec^2 x - 3 \sec x + 2 \leq 0$, is

Correct Options:

(C) $\left[2n\pi + \frac{5\pi}{3}, 2n\pi + \frac{7\pi}{3} \right], n \in \mathbb{I}$

Solution:

Ans. (c)

13 Let $a > 0, b > 0, c > 0$. Then both roots of equation $ax^2 + bx + c = 0$ are ($a, b, c \in \mathbb{R}$)

Correct Options:

(B) have negative real parts

Solution:

Ans. (b)

14 The set of values of 'p' for which the expression $x^2 - 2px + 3p + 4$, is negative for atleast one real x is :

Correct Options:

(C) $(-\infty, -1) \cup (4, \infty)$

Solution:

Ans. (c)

15 If $\sin^4 x + \cos^4 x = \frac{7}{2} \sin x \cdot \cos x$ then the general value of x is (where $n \in \mathbb{I}$)

Correct Options:

(C)
$$\frac{n\pi}{2} + (-1)^n \frac{\pi}{12}$$

Solution:

Ans. (c)

16 The exact value of $\frac{96 \sin 80^\circ \sin 65^\circ \sin 35^\circ}{\sin 20^\circ + \sin 50^\circ + \sin 110^\circ}$ is equal to

Correct Options:

(B) 24

Solution:

Ans. (b)

17 If α, β are roots of the equation $x^2 - 2mx + m^2 - 1 = 0$, then the number of integral values of m for which $\alpha, \beta \in (-2, 4)$ is

Correct Options:

(D) 3

Solution:

Ans. (d)

18 Identify which of the following is/are **NOT CORRECT**?

Correct Options:

(D)
$$2^{\ln(\tan x)} < 2^{\ln(\sin x)}, \forall x \in \left(0, \frac{\pi}{2}\right)$$

Solution:

Ans. (d)

19 If $\tan \alpha, \tan \beta, \tan \gamma$ are the roots of the equation, $x^3 - (a+1)x^2 + (b-a)x - b = 0$, ($b-a \neq 1$). Where $\alpha + \beta + \gamma$ lies between 0 and π then $\alpha + \beta + \gamma$ is equal to

Correct Options:

(A)
$$\frac{\pi}{4}$$

Solution:

Ans. (a)

20 The solution set of the inequality, $\log_{\cos x^2} (3-2x) < \log_{\cos x^2} (2x-1)$ is

Correct Options:

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

Solution:

Ans. (a)

21 Which of the following is **CORRECT**?

Correct Options:

(C) $\log_{1.1} 5 > \log_{0.9} 8$

Solution:

Ans. (c)

22 General value of θ satisfying the equation $\cos\theta = \frac{-1}{\sqrt{2}}$ and $\tan\theta = 1$, is

Correct Options:

(D) $2n\pi + \frac{5\pi}{4}, n \in \mathbb{I}$

Solution:

Ans. (d)

23 If roots of the equation $2x^2 - 4x - \log_{\frac{1}{2}} a = 0$, are real, then

Correct Options:

(A) $a \in (0, 4]$

Solution:

Ans. (a)

24 The number of solutions of equation $|2 - |x|| = 3^{-|x|}$ are

Correct Options:

(D) 4

Solution:

Ans. (d)

25 If the quadratic equation $ax^2 + bx + 6 = 0$, does not have two distinct real roots, then the least value of $2a + b$ is, $a > 0$

Correct Options:

(B) -3

Solution:

Ans. (b)

