# MATHS

# BOOKS - OBJECTIVE RD SHARMA

# ENGLISH

# MISCELLANEOUS EQUATIONS AND INEQUATIONS

## Section I Solved Mcqs

**1.** The number of real solutions of the equation $e^x = x$ is

A. 1

B. 2

C. 0

D. None of these

**Answer: C**

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**2.** The number of real solutions of the equation $e^x = x$ is

A. 0

B. 1

C. 2

D. None of these

**Answer: B**

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**3.** How many roots foes the following equation possess $3^{|x|}(|2-|x|\ |\ |)=2$ ?

A. 1

B. 2

C. 3

D. 4

**Answer: B**

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**4.** The number of real solutions of the equation $\log_a x = |x|, 0 < a < 1$, is

A. 0

B. 1

C. 2

D. None of these

**Answer: B**

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**5.** The number of solution of the equation $|x| = \cos x,$ is

A. 1

B. 2

C. 3

D. 0

**Answer: B**

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**6.** The number of real solutions of the equation x-sinx=0, is

A. 0

B. 1

C. 2

D. infinitely many

**Answer: B**

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**7.** The number of real solutions of the equation $\sin(e^x) = 2^x + 2^{-x}$ is

A. 0

B. 1

C. 2

D. infinitely many

**Answer: A**

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**8.** The equation $2\sin^2\left(\frac{x}{2}\right)\cos^2 x = x + \frac{1}{x}, 0 < x \leq \frac{\pi}{2}$ has

A. one real solution

B. no real solution

C. infinitely many real solutions

D. None of these

**Answer: B**

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**9.** Number of solutions of $\log_4(x-1) = \log_2(x-3)$ is :

A. 3

B. 1

C. 2

D. 0

**Answer: B**

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**10.** The equation $||x-2|+a|=4$ can have four distinct real solutions for $x$ if $a$ belongs to the interval $(-\infty,-4)$ (b) $(-\infty,0)\ (4,\infty)$ (d) none of these

A. $(-\infty,4)$

B. $(-\infty,-4)$

C. $(4,\infty)$

D. $[-4,4]$

**Answer: B**

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**11.** The equation $\sqrt{(x+1)} - \sqrt{(x-1)} = \sqrt{(4x-1)}$ has

A. no solution

B. one solution

C. two solutions

D. more than two solutions

**Answer: A**

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**12.** The number of solutions of $|[x] - 2x| = 4, \text{where}[x]]$ is the greatest integer less than or equal to x, is

A. 2

B. 4

C. 1

D. infinite

**Answer: B**

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**13.** The solution set of the equation $(x+1)^2+[x-1]^2=(x-1)^2+[x+1]^2$, where [x] and (x) are the greatest integer and y are prime numbers and $x^2-2y^2=1$, is

A. N

B. Z

C. Q

D. R

**Answer: B**

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**14.** If $[\sin x] + \left[\frac{x}{2\pi}\right] + \left[\frac{2x}{5\pi}\right] = \frac{9x}{10\pi}$, where $[\cdot]$ denotes the greatest integer function, the number of solutions in the interval (30,40) is .....

.

A. 0

B. 1

C. 2

D. infinite

**Answer: B**

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**15.** Let [x] represent the greatest integer less than or equal to $x$ If $\left[\sqrt{n^2+\lambda}\right] = \left[n^2+1\right] + 2$ , where $\lambda, n \in N,$ then $\lambda$ can assume

$(2n+4)d \Leftrightarrow erentvalus$

$(2n+5)d \Leftrightarrow erentvalus$

$(2n+3)d \Leftrightarrow erentvalus$

$(2n+6)d \Leftrightarrow erentvalus$

A. (2n+4) different values

B. (2n+3) different values

C. (2n+5) different values

D. (3n+6) different values

**Answer: C**

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**16.** Number of solutions $2^{\sin(|x|)} = 4^{|\cos x|} \in [-\pi, \pi]$ is equal to

A. 2

B. 4

C. 6

D. None of these

**Answer: B**

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**17.** Number of roots of $|\sin|x|| = x + |x|$ in $[-2\pi, 2\pi]$ is

A. 2

B. 3

C. 4

D. 6

**Answer: B**

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**18.** Number of solutions of equation

$\log_2 (9-2)^x = 10^{\log 10 (3-x)}$, is

A. 1

B. 2

C. 0

D. None of these

**Answer: A**

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**19.** The equation $x^2 - 2[\sin x]$, where $[.]$ denotes the greatest integer function, has

A. 3

B. 4

C. 2

D. 1

**Answer: C**

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**20.** If [x] denotes the greatest integer less than or equal to x, then the solutions of the equation 2x-2[x]=1 are

A. $x = n + \frac{1}{2}, n \in N$

B. $x = n - \frac{1}{2}, n \in N$

C. $x = n + \frac{1}{2}, n \in Z$

D. $n < x < n + 1, n \in Z$

**Answer: C**

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**21.** If $0 < x < 1000$ and $\left[\frac{x}{2}\right] + \left[\frac{x}{3}\right] + \left[\frac{x}{5}\right] = \frac{31}{30}x$, where $[x]$ is the greatest integer less than or equal to $x$ the number of possible values of x is

A. 34

B. 32

C. 33

D. None of these

**Answer: C**

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**22.** If $f(\sin x) - f(-\sin x) = x^2 - 1$ is defined for all $x \in R$, then the value of $x^2 - 2$ can be

A. 0

B. 1

C. -1

D. 2

**Answer: C**

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**23.** If $[x]^2 = [x+2]$, where [x]=the greatest integer integer less than or equal to x, then x must be such that

A. x=2,-1

B. $x \in [2, 3)$

C. $x \in [1, 0)$

D. None of these

**Answer: D**

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**24.** The value of $[\sin x] + [1 + \sin x] + [2 + \sin x]$ in $x \in (\pi, 3\pi/2]$ can be ([.] is the greatest integer function) can be.

A. 0

B. 1

C. 2

D. 3

**Answer: A**

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**25.** Find the solution set of $(x)^2 + (x+1)^2 = 25$ where $(x)$ is the least integer greater than or equal to $x$.

A. (2,4)

B. $(-5, -4] \cup (2, 3]$

C. $[-4, -3) \cup [3, 4)$

D. None of these

**Answer: B**

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**26.** The solution of the equation

$5^{\log_a x} + 5x^{\log_a 5} = 3, a > 0$, is

A. $5^{\log_a 5}$

B. $2^{-\log 5a}$

C. $2^{-\log_a 5}$

D. $2^{\log 5a}$

**Answer: B**

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**27.** The number of solutions of the equation $\cos[x] = e^{2x-1}$, $x \in [0, 2\pi]$, where [.] denotes the greates integar function is

A. 0

B. 1

C. 2

D. infinite

**Answer: B**

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**28.** If $3^{x+1} = 6^{\log_2 3}$, then x is equal to

A. 3

B. 2

C. $\log_3 2$

D. $\log_2 3$

**Answer: D**

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**29.** The equation

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

for $x \in (-2, 3)$ will have number of solutions. $1$

b. $2$ c. $3$ d. $0$

A. 2

B. 4

C. 3

D. None of these

**Answer: D**

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**30.** If $\left(\sqrt{2}\right)^{x}+\left(\sqrt{3}\right)^{x}=\left(\sqrt{13}\right)^{x/2}$, then the number of real values of x is

A. 2

B. 4

C. 1

D. None of these

**Answer: C**

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**31.**

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

A. no solution

B. one solution

C. two solutions

D. more than two solutions

**Answer: D**

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**32.** The solution set of the equation

$$(x)^2 + [x]^2 = (x-1)^2 + [x+1]^2,$$

where (x) denotes the least integer greater than or equal to x and [x] denotes the greatest integer less than or equal to x, is

A. R

B. R-Z

C. R-N

D. None of these

**Answer: B**

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**33.** The equation $5^{1+\log_5 \cos x} = \frac{5}{2}$ has

A. no solution

B. one solution

C. two solutions

D. more than two solutions

**Answer: D**

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**34.** The solution set of the equation

$$\left|\frac{x+1}{x}\right| + |x+1| = \frac{(x+1)^2}{|x|}, \text{ is}$$

A. $\{x : x \geq 0\}$

B. $\{x : x > 0\} \cup \{-1\}$

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

D. $\{x : x \geq 1 \quad \text{or} \quad , x \leq -1\}$

**Answer: B**

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**35.** The equation $(0.4)^{x-1} = (6.25)^{6x-5}$ has

A. no solution

B. one solution

C. two solutions

D. more than two solutions

**Answer: B**

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**36.** The equation $\left|\frac{x}{x-1}\right| + |x| = \frac{x^2}{|x-1|}$ has

A. exactly one solutions

B. exactly two solutions

C. at most two solutions

D. infinite number of solutions

**Answer: D**

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**37.** The equation $\left(\frac{x}{x+1}\right)^2 + \left(\frac{x}{x-1}\right)^2 = a(a-1)$ has

a. Four real roots if $a > 2$

b.Four real roots if $a < -1$

c. Two real roots if $1 < a < 2$

d . No real roots if $a < -1$

A. four real roots, if $a > 2$

B. two real roots, if $1 < a < 2$

C. four real roots for all $a < -1$

D. all the above

**Answer: D**

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**38.** The equation $\frac{|x^2 - 4x| + 3}{x^2 + |x - 5|} = 1$ has

A. no real solution

B. exactly one real solutions

C. two real solutions

D. three real solutions

**Answer: D**

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**39.** The number of real solutions of the equation

$$\frac{x^2}{1-|x-5|}=1 \text{ is}$$

A. 4

B. 2

C. 1

D. None of these

**Answer: D**

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**40.** The number of real roots of the equation

$$\sqrt{1+\sqrt{5}x+5x^2}+\sqrt{1-\sqrt{5}x+5x^2}=4 \text{ is}$$

A. 0

B. 1

C. 2

D. 4

**Answer: B**

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**41.** The equation $3^{x-1} + 5^{n-1} = 34$ has

A. no solution

B. one solution

C. two solutions

D. more than two solutions

**Answer: B**

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**42.** The number of roots of the equation $1 + 3^{x/2} = 2^x$ is

A. 0

B. 1

C. 2

D. None then 2

**Answer: B**

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**43.** The number of real roots of the equation

$x^2 + x + 3 + 2\sin x = 0, x \in [-\pi, \pi]$, is

A. 2

B. 3

C. 4

D. None of these

**Answer: D**

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**44.** The number of solutions of the equation

$\log_3\left(3+\sqrt{x}\right)+\log_3\left(1+x^2\right)=0$, is

A. 0

B. 1

C. 2

D. more than two

**Answer: A**

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**45.** The number of real roots of the equation

$\log_{1/3}\left(1+\sqrt{x}\right)+\log_{1/3}(1+x)=2$, is

A. 0

B. 1

C. 2

D. more than 2

**Answer: A**

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**46.** The number of roots of the equation $x^3 + x^2 + 2x + \sin x = 0$ in $(-2\pi, 2\pi)$

A. 1

B. 2

C. 3

D. None of these

**Answer: A**

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**47.** Solve the equation

$$\log_{x^2-6x+8}\left[\log_{2x^2-2x+8}\left(x^2+5x\right)\right]=0$$

A. no solution

B. exactly one negative solution

C. at most one negative solution

D. exactly two negative solutions

**Answer: B**

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**48.** The number of real solutions of equation $2^{\frac{x}{2}} + \left(\sqrt{2}+1\right)^{x} = \left(5+2\sqrt{2}\right)^{\frac{x}{2}}$ is

A. 1

B. 2

C. 4

D. infinite

**Answer: A**

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**49.** If $0 < a < 5, 0 < b < 5$ and $\frac{x^2+5}{2} = x - 2\cos(a+bx)$ is satisfied for at least one real x then least value of $\frac{a+b}{\pi}$ is ?

A. $\pi/2$

B. $\pi$

C. $3\pi$

D. $4\pi$

**Answer: C**

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**50.** If $5^x + \left(2\sqrt{3}\right)^{2x} \geq 13^x$ then the solution set for

A. $[2, \infty)$

B. {2}

C. $(-\infty, 2]$

D. [0,2]

**Answer: C**

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**51.** The roots of the equation $2^{x+2}.3^{\frac{3x}{x-1}} = 9$ are given by

A. $\log_2\left(\frac{2}{3}\right), -2$

B. 3,-3

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

D. $1 - \log\left(\frac{2}{3}\right), 2$

**Answer: C**

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**52.** Let

$2\sin^2 x + 3\sin x - 2 > 0 and x^2 - x - 2 < 0 (x$

is measured in radians). Then $x$ lies in the interval

$\left(\frac{\pi}{6}, \frac{5\pi}{6}\right)$ (b) $\left(-1, \frac{5\pi}{6}\right)$ $(-1, 2)$ (d) $\left(\frac{\pi}{6}, 2\right)$

A. $(\pi/6, 5\pi/6)$

B. $(-1, 5\pi/6)$

C. $(-1, 2)$

D. $(\pi/6, 2)$

**Answer: D**

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**53.** The equation $2^{|x^2-12|} = \sqrt{e^{|x|\log 4}}$ has

A. no real solution

B. only two real solutions whose sum is zero

C. only two real solutions whose sum is not zero

D. four real solutions whose sum is zero.

**Answer: D**

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**54.** The equation $(\sqrt{5}+2)^{|x|}+(\sqrt{5}-2)^{|x|}=18.$ has

A. only one solution

B. two solutions

C. no solution

D. any number of solutions

**Answer: B**

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**55.** The set of all values of x, measured in radians, satisfying the two inequalities

$2\cos^2 x < 2 - 3\cos x$ and $x^2 < 4x + 12$, is

A. $(-2, -\pi/3) \cup (\pi/3, 5\pi/3)$

B. $(\pi/3, \pi/2) \cup (3\pi/2, 2/\pi)$

C. (-2,6)

D. $(-2, 1/2)$

**Answer: A**

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**56.** The set of values of a for which the inequation $x^2 + ax + a^2 + 6a < 0$ is satisfied for all $x\varepsilon(1, 2)$ lies in the interval

A. $\left(4 - \sqrt{15}, 4 + \sqrt{15}\right)$

B. $\left(5 - \sqrt{21}, 5 + \sqrt{21}\right)$

C. $\left(5 - \sqrt{21}, 4 + \sqrt{15}\right)$

D. $\left(4 - \sqrt{15}, 5 + \sqrt{21}\right)$

**Answer: C**

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**57.** Set of all values of $'x'$ satisfying the inequality

`|2x^2-4x-7|

<[1+1/2((costheta)/(costheta/2sintheta/2))^2],-

pi/2lt=theta

A. (-1,3)

B. $\left(1-\sqrt{5}, 1+\sqrt{5}\right)$

C. $\left(1-\sqrt{5}, -1\right) \cup \left(3, 1+\sqrt{5}\right)$

D. None of these

**Answer: C**

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**58.** Solve $4^{-x+0.5} - 7.2^{-x} < 4$

A. R

B. $(-2, \infty)$

C. $(2, \infty)$

D. $(2, 7/2)$

**Answer: B**

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**59.** If denote the set of all real x for which

$\left(x^2 + x + 1\right)^x < 1$, then S =

A. $(1, \infty)$

B. $(-1, \infty)$

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

D. None of these

**Answer: C**

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**60.** The solution set of the inequation

$$\frac{1}{\log_2 x} < \frac{1}{\log_2 \sqrt{x+2}}, \text{ is}$$

A. (0,1)

B. $(2, \infty)$

C. $(0, 1) \cup (2, \infty)$

D. None of these

**Answer: C**

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**61.** Solve the inequality:

$\log_x 2.\log_{2x} 2.\log_2 4x > 1$

A. $\left(1, 2^{\sqrt{2}}\right)$

B. $\left(1/\sqrt{2}, 1\right)$

C. $\left(2^{\sqrt{-2}}, 1/2\right)$

D. $\left(2^{-\sqrt{2}}, 1/2\right) \cup \left(1, 2^{\sqrt{2}}\right)$

**Answer: D**

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**62.** The value of a for which the equation $4\text{cosec}^2(\pi(a+x))+a^2-4a=0$ has a real solution , is

A. 3

B. 4

C. 2

D. 0

**Answer: [0,4]**

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**63.** The product of real roots of the equation $|x|^{\frac{6}{5}} - 26|x|^{\frac{3}{5}} - 27 = 0$ is

A. $-3^{10}$

B. $-3^{12}$

C. $-3^{12/5}$

D. $-3^{21/5}$

**Answer: A**

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**64.** Let $(a_1, a_2, a_3, a_4, a_5)$ denote a re=arrangement of (3,-5,7,4-9), then $a_1x^4 + a_2x^3 + a_3x^2 + a_4 + a_5 = 0$ has

A. at least two real roots

B. all four real roots

C. only imaginary roots

D. None of these

**Answer: A**

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**65.** .Number of solutions of equation $2^x + 2^{x-1} + 2^{x-2} = 7^x + 7^{x-1} + 7^{x-2}$ is

A. 4

B. 2

C. 1

D. 0

**Answer: C**

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**66.** The least positive onteger for which x $4^x + 8^{(2/3)(x-2)} - 72 - 4^{x-3/2}$ is non-negative, is

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**67.** The number of solutions of the equation $xe^{\sin x} - \cos x = 0$ in the interval $(0, \pi/2)$, is

A. 1

B. 2

C. 3

D. 4

**Answer: A**

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**68.** The value (s) of k for which

$$|x-1|+|x-2|+|x+1|+|x+2|=4k$$

has integer solutions, is (are)

A. 1,2,3,4,5,.....

B. 2,3,4,5,6,.....

C. 1,3,5,7,.....

D. 0,1,2,3,4,5,....

**Answer: B**

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**69.** If $k < 0$, then the number of roots of the equation $ke^x - x = 0$, is

A. 0

B. 1

C. 2

D. 3

**Answer: B**

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**70.** (i) The positive value of k for which $ke^x - x = 0$ has only one root is

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

B. 1

C. e

D. log 2

**Answer: A**

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**71.** If a continuous function $f$ defined on the real line R assume positive and negative values in R, then the equation $f(x) = 0$ has a root in R. For example, if it is known that a continuous function $f$ on R is positive at some point and its minimum value is negative, then the equation $f(x) = 0$ has a root in R. Consider $f(x) = ke^x - x$, for all real x where k is a real constant.

For k > 0, the set of all values of k for which $y = ke^x - x = 0$has two distinct roots is

A. $(0, 1/e)$

B. $(1/e, 1)$

C. $(1/e, \infty)$

D. (0,1)

**Answer: A**

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**72.** The number of solutions of the equation

$e^{|\sin x|} = \sec x$ for all $x \in (-\pi/2, \pi/2)$ is/are

A. 1

B. 3

C. 5

D. 2

**Answer: B**

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**73.** Let $x \in R$, then $\left[\frac{x}{3}\right] + \left[\frac{x+1}{3}\right] + \left[\frac{x+2}{3}\right]$, where [*] denotes the greatest integer function is equal to ...

A. [x]

B. [x]+1

C. [x]-1

D. None of these

**Answer: A**

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**74.** The roots of the equation $x^4 - 2x^3 + x - 380 = 0$ are

A. $5, \ -4, \ \frac{1 \pm 5\sqrt{3i}}{2}$

B. $-5, 4, \ \frac{-1 \pm \sqrt{3i}}{2}$

C. $5, 4\frac{-1 \pm \sqrt{3i}}{2}$

D. $-5, \ -4, \ \frac{1 \pm 5\sqrt{3}}{2}$

**Answer: A**

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**75.** How many real solutions does the equation $x^7 = 14x^5 + 16x^3 + 30x - 560 = 0$ have?

A. 7

B. 1

C. 3

D. 5

**Answer: B**

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**76.** The equation $e^x - x - 1 = 0$ has apart from x=0

A. one real root

B. two real roots

C. no real root

D. infinite number of real roots

**Answer: C**

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**77.** The number of roots of the equation $\frac{1}{x}+\frac{1}{\sqrt{(1-x^2)}}=\frac{35}{12}$ is

A. 0

B. 1

C. 2

D. 3

**Answer: D**

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**78.** The number of integral roots of the equation $x^4 + \sqrt{x^4 + 20} = 22$ is ...

A. 0

B. 2

C. 4

D. 8

**Answer: B**

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**79.** The product of the roots of the equation

$3\sqrt{8+x}+3\sqrt{8-x}=1$, is

A. -21

B. -189

C. -9

D. -5

**Answer: B**

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**80.** For a $a \leq 0$, determine all real roots of the equation $x^2 - 2a|x - a| - 3a^2 = 0$.

A. 0

B. 1

C. 2

D. infinite

**Answer: B**

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**81.** Let S denote the set of all values of the parameter a for which $x + \sqrt{x^2} = a$ has no solution, them S equals

A. (-1,1)

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

C. $[-1, \infty)$

D. $(0, \infty)$

**Answer: B**

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**82.** Let $(x_0, y_0)$ be the solution of the following equations:

$(2x)^{\ln\ 2} = (3y)^{\ln\ 3}$

$3^{\ln\ x} = 2^{\ln\ y}$

Then $x_0$ is

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

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

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

D. 6

**Answer: C**

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**83.** Let $a_n$ denote the number of all n-digit numbers formed by the digits 0,1 or both such that no consecutive digits in them are 0. Let $b_n$ be the number of such n-digit integers ending with digit 1 and let $c_n$ be the number of such n-digit integers ending with digit 0. Which of the following is correct ?

A. 7

B. 8

C. 9

D. 11

**Answer: B**

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**84.** Let $a_n$ denote the number of all n-digit numbers formed by the digits 0,1 or both such that no consecutive digits in them are 0. Let $b_n$ be the number of such n-digit integers ending with digit 1 and let $c_n$ be the number of such n-digit integers ending with digit 0. Which of the following is correct ?

A. $a_{17} = a_{16} + a_{15}$

B. $c_{17} \neq c_{16} + c_{15}$

C. $b_{17} \neq b_{16} + c_{16}$

D. $a_{17} = c_{17} + b_{16}$

**Answer: A**

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**85.** In the interval $[0, \pi/2]$, the equation $\cos^2 x - \cos x - x = 0$ has

A. no solution

B. exactly one solution

C. exactly two solutions

D. more than two solutions

**Answer: B**

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**86.** The number of points in $(-\infty, \infty)$, for which $x^2 - x\sin x - \cos x = 0$, is

A. 6

B. 4

C. 2

D. 0

**Answer: C**

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**87.** Let a $\in$ R and f : $R \to R$ be given by $f(x) = x^5 - 5x + a$, then

(a) $f(x) = 0$ has three real roots if $a > 4$

(b) $f(x) = 0$ has only one real root if $a > 4$

(c) $f(x) = 0$ has three real roots if $a < -4$

(d) $f(x) = 0$ has three real roots if $-4 < a < 4$

A. f(x) has three real roots if $a > 4$

B. f(x) has only one real root if $a > 4$

C. f(x) has three real roots if $a < -4$

D. f(x) has three real roots if $-4 < a < 4$

**Answer: B::D**

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**88.** Number of integers in the range of c so that the equation $x^3 - 3x + x = 0$ has all its roots real and distinct is:

A. 2

B. 3

C. 4

D. 5

**Answer: B**

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**89.** If $f(x)=\{x\}+\{2x\}$` and $g(x)=[x]$. The number of solutions of $f(x)=g(x)$, where $\{.\}$ and $[x]$ are

respectively the fractional part and greatest functions, is

A. 1

B. 2

C. 3

D. 4

**Answer: C**

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**90.** The number of roots of the question $1 + \log_2(1 - x) = 2^{-x}$ is:

A. 0

B. 1

C. 2

D. 3

**Answer: C**

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**91.** The number of integral values of n (where n>=2) such that the equation $2n\{x\} = 3x + 2[x]$ has exactly five solutions (where [.] denotes the greatest integer function and {x} denotes the fractional part of x) is

A. 2

B. 3

C. 4

D. 0

**Answer: B**

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

A. 2

B. $3/4$

C. $2\sqrt{2}$

D. $1/2$

**Answer: B**

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## Exercise

**1.** The number f real solution of the equation $e^x$=x, is

A. 0

B. 1

C. 2

D. 3

**Answer: B**

Watch Video Solution

**2.** The number of real solutions of the equation $e^{|x|} - |x| = 0$, is

A. o

B. 1

c. 2

D. None of these.

A. 0

B. 1

C. 2

D. 3

**Answer: A**

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

A. 0

B. 1

C. 2

D. 3

**Answer: B**

Watch Video Solution

**4.** The number of real solutions of $\log_2 x + |x| = 0$, is

A. 0

B. 1

C. 3

D. 4

**Answer: B**

Watch Video Solution

**5.** The number of real solutions of the equation $\log_{0.5} x = |x|$ is

A. 1

B. 0

C. 2

D. 3

**Answer: A**

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**6.** The number of solutions of the equation $\cos x + |x| = 0$ is

A. 0

B. 1

C. 2

D. 3

**Answer: A**

Watch Video Solution

**7.** The number of solutions of the equation $2\cos\left(\frac{x}{2}\right) = 3^x + 3^{-x}$ is

A. 0

B. 1

C. 2

D. 3

**Answer: A**

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**8.** The number of solutions of $3^{|x|} = |2 - |x|\,|$, is

A. 0

B. 2

C. 4

D. infinite

A. 0

B. 2

C. 4

D. infinite

**Answer: B**

Watch Video Solution

**9.** If $[x]^2 = [x + 6]$, where [x]= the greatest integer less than or equal to x, then x must be such that

A. x=3,-2

B. $x \in [-2, -1)$

C. $x \in [3, 4)$

D. $x \in [-2, -1) \cup [3, 4)$

**Answer: D**

Watch Video Solution

**10.** The equation $\sqrt{(x+1)} - \sqrt{(x-1)} = \sqrt{(4x-1)}$ has

A. no solution

B. one solution

C. two solutions

D. more than two solutions

**Answer: A**

Watch Video Solution

**11.** The equation $\sqrt{4x+9} - \sqrt{11x+1} = \sqrt{7x+4}$ has

A. no solution

B. one solution

C. two solutions

D. more than two solutions

**Answer: B**

Watch Video Solution

**12.** The number of real roots of $\sin(2^x)\cos(2^x) = \frac{1}{4}\left(2^x + 2^{-x}\right)$ is

A. 1

B. 2

C. 3

D. 0

**Answer: D**

Watch Video Solution

**13.** The number of irrational solutions of the equation

$$\sqrt{x^2+\sqrt{x^2+11}}+\sqrt{x^2-\sqrt{x^2+11}}=4,$$ is

A. 0

B. 2

C. 4

D. 11

**Answer: B**

Watch Video Solution

**14.** The total number of roots of the equation $\left|x - x^2 - 1\right| = \left|2x - 3 - x^2\right|$ is

A. o

B. 1

C. 2

D. infinity many

A. 1

B. 2

C. 0

D. infinitely many

**Answer: A**

Watch Video Solution

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

A. $x \in [4, \infty)$

B. $(4, \infty)$

C. $x \in (-\infty, 4]$

D. $x \in [0, 4]$

**Answer: B**

Watch Video Solution

**16.** Q. if $(\log_5 x)^2 + \log_5 x < 2$ then $x$ belong to the interval

A. $(1/25, 5)$

B. $\left(1/5, 1/\sqrt{5}\right)$

C. $(1, \infty)$

D. None of these

**Answer: A**

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**17.** The number of real solutions of the equation

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

A. 1

B. 2

C. 0

D. infinite

**Answer: C**

Watch Video Solution

**18.** The set of all real numbers satisfying the inequation

$2^x + 2^{|x|} > 2\sqrt{2}$, is

A. $(1/2, \infty)$

B. $(-\infty, \log_2(\sqrt{2}-1)$

C. $(-\infty, 1/2)$

D. $[1/2, \infty) \cup (-\infty, \log_2(\sqrt{2}-1))$

**Answer: D**

Watch Video Solution

**19.** Solution set of $x^{(\log_{10} x)^2 - 3\log_{10} x + 1} > 1000$ for $x \varepsilon R$ is

A. (0,1000)

B. $(1000, \infty)$

C. (0,100)

D. None of these

**Answer: D**

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**20.** The solution set of the inequality $\log_{\sin\left(\frac{\pi}{3}\right)}(x^2-3x+2) \geq 2$ is

A. $[1/2, 1)$

B. $(2, 5/2]$

C. $[1/2, 1) \cup (2, 5/2]$

D. $[1/2, 5/2]$

**Answer: C**

Watch Video Solution

**21.** The equation $e^x = m(m+1), m < 0$ has

A. no real roots set

B. exactly one real root

C. two real roots

D. infinitely many real roots

**Answer: B**

Watch Video Solution

**22.** Complete set of solution of $\log_{1/3}\left(2^{x+2}-4^{x}\right) \geq -2$ is :

A. $\left(-\infty, 2-\sqrt{13}\right)$

B. $\left(-\infty, 2+\sqrt{13}\right)$

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

D. None of these

**Answer: D**

Watch Video Solution

**23.** If $x, y \in R$, then $\frac{1}{2}(x + y + |x - y|) = x$ holds iff

A. $x > y$

B. $x < y$

C. x=y

D. $x \geq y$

**Answer: D**

Watch Video Solution

**24.** The equation $e^{x-8} + 2x - 17 = 0$ has :-

A. 1

B. 2

C. 4

D. 8

**Answer: A**

Watch Video Solution

**25.** The solution set of the inequation

$\log_{1/3}\left(x^2+x+1\right)+1>0$, is

A. $(-\infty,-2)\cup(1,\infty)$

B. [-1,2]

C. (-2,1)

D. R

**Answer: C**

Watch Video Solution

**26.** If $\log_3 x - \log_x 27 < 2$, then x belongs to the interval

A. $(1/3, 27)$

B. $(1/27, 3)$

C. $(1/9, 9)$

D. None of these

**Answer: A**

Watch Video Solution

**27.** $\log_{16} x^3 + \left(\log_2 \sqrt{x}\right)^2 < 1$ iff x lies in

A. (2,16)

B. $(0, 1/16)$

C. $(1/16, 2)$

D. (0,2)

**Answer: C**

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**28.** The number of solutions of the equation $\log_{x-3}\left(x^3 - 3x^2 - 4x + 8\right) = 3$ is

A. 1

B. 2

C. 3

D. 4

**Answer: A**

Watch Video Solution

**29.** If $0 < a < 1$, then the solution set of the inequation

$$\frac{1 + (\log_a x)^2}{1 + (\log_a x)} > 1, \text{ is}$$

A. $(1, 1/a)$

B. (0,a)

C. $(1, 1/a) \cup (0, a)$

D. None of these

**Answer: C**

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**30.** The numebr of solution (s) of the inequation

$$\sqrt{3x^2+6x+7}+\sqrt{5x^2+10x+14}\leq 4-2x-x^2$$

, is

A. 1

B. 2

C. 4

D. infinitely many

**Answer: A**

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## Chapter Test

**1.** If $3^x + 2^{2x} \geq 5^x$, then the solution set for x, is

A. $(-\infty, 2]$

B. $[2, \infty)$

C. $[0, 2]$

D. $\{2\}$

**Answer: A**

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**2.** The number of real solutions of the equation $1 - x = [\cos x]$ is

A. 1

B. 2

C. 3

D. 0

**Answer: B**

Watch Video Solution

**3.** The number of solutions of

$[\sin x + \cos x] = 3 + [-\sin x] + [-\cos x]$ in the internal $[0, 2\pi]$ is (where[.] denotes the the greatest integer function).

A. 0

B. 4

C. infinite

D. 1

**Answer: C**

Watch Video Solution

**4.** Let $x = \frac{a+2b}{a+b}$ and $y = \frac{a}{b}$, where a and b are positive integers. If $y^2 > 2$, then

A. $x^2 \leq 2$

B. $x^2 < 2$

C. $x^2 > 2$

D. $x^2 \geq 2$

**Answer: B**

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**5.** The solution set contained in $R$of the following inequation$3^x + 3^{1-x} - 4 < 0$ is

A. (1,3)

B. (0,1)

C. (1,2)

D. (0,2)

**Answer: B**

Watch Video Solution

**6.** If $0 < x < \pi/2$ and $\sin^n x + \cos^n x \geq 1$, then

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

B. $x \in (-\infty, 2]$

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

D. None of these

**Answer: B**

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**7.** The number of real roots of the equation

$x^2 + x + 3 + 2\sin x = 0, x \in [-\pi, \pi]$, is

A. 2

B. 4

C. 6

D. None of these

**Answer: D**

Watch Video Solution

**8.** The number of real roots of the equation

$1 + 3^{x/2} = 2^x$, is

A. 0

B. 1

C. 2

D. 3

**Answer: B**

Watch Video Solution

**9.** Total number of solutions of the equation $\sin \pi x = |\ln_e |x||$ is :

A. 2

B. 4

C. 5

D. 6

**Answer: D**

Watch Video Solution

**10.** The number of roots of the equation $\left[\sin^{-1} x\right] = x - [x]$, is

A. 0

B. 1

C. 2

D. 3

**Answer: B**

Watch Video Solution

**11.** The number of values of a for which the system of equations $2^{|x|} + |x| = y + x^2 + a$ and $x^2 + y^2 = 1$ has only one solution where a,x,y are real, is

A. 1

B. 2

C. finitely many but more than 2

D. infinitely many

**Answer: A**

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**12.** The number of real solutions (x, y, z, t) of simultaneous equations $2y = \frac{11}{x} + x$ , , $2z = \frac{11}{y} + y$ , $2t = \frac{11}{z} + z$ , $2x = \frac{11}{t} + t$ is

A. 0

B. 1

C. 2

D. 4

**Answer: C**

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**13.** If the sum of the greatest integer less than or equal to x and the least integer than or equal to x is 5, then the solution set for x is

A. [2,3]

B. (0,5)

C. [5,6)

D. [2,3)

**Answer: A**

Watch Video Solution

**14.** If x,y and z are real such that $x + y + z = 4, x^2 + y^2 + z^2 = 6$, x belongs to

A. $[2/3, 2]$

B. $[0, 2/3]$

C. [0,2]

D. $[-1/3, 2/3]$

**Answer: A**

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**15.** Consider the equation :

$$x^2 + 198x + 30 = 2\sqrt{x^2 + 18x + 45}$$

A. 720

B. 20

C. 36

D. 360

**Answer: B**

Watch Video Solution

**16.** $x^8 - x^5 - \frac{1}{x} + \frac{1}{x^4} > 0$, is satisfied for

A. only positive values of x

B. only negative values of x

C. all real numbers except zero

D. only for $x > 1$

**Answer: C**

Watch Video Solution

**17.** The number of solutions of the equation

$$\frac{\left(1+e^{x^2}\right)\sqrt{1+x^2}}{\sqrt{1+x^4-x^2}} = 1+\cos x, \text{ is}$$

A. 1

B. 2

C. 3

D. 4

**Answer: A**

Watch Video Solution

**18.** The number of real roots of the equation

$1 + a_1 x + a_2 x^2 + \ldots\ldots\ldots\ldots a_n x^n = 0,$ where $|x| < \frac{1}{3}$ and $|a_n| < 2$, is

A. n if n is even

B. 1 if n is odd

C. 0 for any $n \in N$

D. None of these

**Answer: C**

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**19.** Let a,b be integers and f(x) be a polynomial with integer coefficients such that f(b)-f(a)=1. Then, the value of b-a, is

A. 1

B. -1

C. 1,-1

D. 0,1

**Answer: C**

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**20.** Let

$P_n(ix) = 1 + 2x + 3x^2 + \ldots\ldots\ldots + (n+1)x^n$

be a polynomial such that n is even.The number of real roots of $P_n(x) = 0$ is

A. 0

B. n

C. 1

D. n+1

**Answer: A**

Watch Video Solution

**21.** Let

$P_n(x) = 1 + 2x + 3x^2 + \ldots\ldots\ldots + (n+1)x^n$

be a polynomial such that n is even.The number of real roots of $P_n(x) = 0$ is

A. 0

B. n

C. 1

D. n+1

**Answer: C**

Watch Video Solution

**22.** Let

$$P_n(ix) = 1 + 2x + 3x^2 + \ldots\ldots\ldots + (n+1)x^n$$

be a polynomial such that n is even.The number of real roots of $P_n(x) = 0$ is

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**23.** The number of negative real of $x^4 - 4x - 1 = 0$, is

A. 3

B. 2

C. 1

D. 0

**Answer: C**

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**24.** Find the number of positive real roots of $x^4 - 4x - 1 = 0$

A. 3

B. 2

C. 1

D. 0

**Answer: C**

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**25.** The number of negative real of $x^4 - 4x - 1 = 0$, is

A. 3

B. 2

C. 1

D. 0

**Answer: B**

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

A. 0

B. infinite

C. 1

D. 2

**Answer: B**

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**27.** The complete set of values of $x$ satisfying the equation

$x^2 \cdot 2^{x+1} + 2^{|x-3|+2} = x^2.2^{|x-3|+4} + 2^{x-1}$ is

A. none

B. only one

C. two

D. four

**Answer: A**

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**28.** The numebr of solution (s) of the inequation

$$\sqrt{3x^2+6x+7}+\sqrt{5x^2+10x+14}\leq 4-2x-x^2$$

, is

A. 1

B. 2

C. 3

D. 4

**Answer: A**

Watch Video Solution

**29.** The number of real solutions of $1 + |e^x - 1| = e^x(e^x - 2)$

A. 1

B. 2

C. 3

D. 4

**Answer: A**