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DPP: 1
Subject: Mathematics
Topic: Quadratic Equations

1. The values of x satisfying the equation $\left(5+2\sqrt{6}\right)^{x^2-3}+\left(5-2\sqrt{6}\right)^{x^2-3}=10$, is/are

(A) $\pm\sqrt{3}$ (B) ± 2 (C) ± 3 (D) $\pm\sqrt{2}$

2. There is no real x such that $e^{\sin x}-e^{-\sin x}-4=0$. **(True /False)**

3. Solve for ' x ' : $2^{2x^2}+2^{x^2+2x+2}=2^{5+4x}$

4. The number of real solutions of the equation $27^{1/x}+12^{1/x}=2\,(8^{1/x})$ is

(A) 0 (B) 1 (C) infinite (D) none of these

5. One real solution of the equation $(x^2+2)^2+8x^2=6x\,(x^2+2)$ is

(A) $2+\sqrt{2}$ (B) $2-\sqrt{2}$ (C) $3+\sqrt{3}$ (D) $3-\sqrt{3}$

6. Number of roots of the equation $\cos^2 x+\frac{\sqrt{3}+1}{2}\sin x-\frac{\sqrt{3}}{4}-1=0$ which lie in the interval $[-\pi,\pi]$ is :

(A) 2 (B) 4 (C) 6 (D) 8

7. The number of real roots of $\sqrt{x^2+4x-21}+\sqrt{x^2-x-6}=\sqrt{6x^2-5x-39}$ is

(A) 1 (B) 2 (C) 3 (D) 4

8. If $\sqrt{x^2+4ax+5}+\sqrt{x^2+4bx+5}=2\,(a-b)$ then x = __________

9. Set of all values of x satisfying the inequality $\sqrt{x^2-7x+6}>x+2$ is

(A) $x\in\left(-\infty\frac{2}{11}\right)$ (B) $x\in\left(\frac{2}{11},\infty\right)$ (C) $x\in(-\infty,1]\cup[6,\infty)$ (D) $x\in[6,\infty)$

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

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

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

(c) $\frac{1}{(a-b+c)},(a-2b+c)$ (d) $1,\frac{(a-2b+c)}{(a+b-2c)}$

12. Find the solution set of the equation , $3^x+1-|3^x-1|=2\log_5|6-x|$

13. 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

14. The equation, $\log_2(2x^2)+\log_2 x\,.\,x^{\log_x(\log_2 x+1)}+\frac{1}{2}\log_4^2 x^4+2^{-3\log_{1/2}(\log_2 x)}=1$ has:

(a) exactly one real solution (b) two real solutions
(c) 3 real solutions (d) no solution.

15. Consider the inequality, $(x + 3)^n (x - 2) < 0, n \in N$. Then the correct statement(s) is/are

(a) the largest integral x satisfying the inequality is 1, if n is even

(b) the least integral x satisfying the inequality is -2, if n is odd

(c) number of integral x satisfying the inequality is 3, if n is odd

(d) number of positive integral x satisfying the inequality is 1, if n is even

16. The largest interval in which $x^{12} - x^9 + x^4 - x + 1 > 0$ is:

(a) $[0,\infty)$ (b) $(-\infty,0]$ (c) $(-\infty,\infty)$ (d) N.O.T

17. If a > b > 0 are two real numbers, the value of,

$$\sqrt{ab + (a-b)\sqrt{ab + (a-b)\sqrt{ab + (a-b)\sqrt{ab + ...}}}}$$ is:

(A) independent of b (B) independent of a

(C) independent of both a & b (D) dependent on both a & b.

18. The value of the expreesion $x^4 - 8x^3 + 18x^2 - 8x + 2$ when $x = 2 + \sqrt{3}$ is

(A) 0 (B) 1 (C) 2 (D) 3

19. If $x = \sqrt[3]{7 + 5\sqrt{2}} - \dfrac{1}{\sqrt[3]{7 + 5\sqrt{2}}}$, then the value of $x^3 + 3x - 14$ is equal to

(A) 1 (B) 0 (C) $\frac{1}{2}$ (D) – 1

20. If $(a^2 + b^2)^3 = (a^3 + b^3)^2$ and $ab \neq 0$ then the numerical value of $\dfrac{a}{b} + \dfrac{b}{a}$ is equal to :

(A) greater than 2 (B) smaller than - 2 (C) equal to 3/2 (D) is equal to 2/3

21. Ordered pair (x, y) $x, y \in R$ satisfying the equation $x^2 + y^2 - 2x - 4y - 4 + (a^2 + b^2 + c^2)$

$\left(\dfrac{1}{a^2} + \dfrac{1}{b^2} + \dfrac{1}{c^2}\right) = 0$ (where $a, b, c, \in R$) is.

(A) (1, 2) (B) (2, 1) (C) (2, 3) (D) None of these

22. If the number A 3 6 4 0 5 4 8 9 8 1 2 7 0 6 4 4 B is divisible by 99 then the ordered pair of digits (A, B) is ______ .

[Hint : $S_O = A + 37$; $S_E = B + 34$ $\Rightarrow$ $A - B + 3 = 0$ or 11 and $A + B + 71$ is a multiple of 9 $\Rightarrow$ $A - B = -3$ or 8 and $A + B = 1$ or 10 ;

23. The inequalities $y(-1) \geq -4$, $y(1) \leq 0$ & $y(3) \geq 5$ are known to hold for $y = ax^2 + bx + c$ then the least value of 'a' is:

(A) - 1/4 (B) - 1/3 (C) 1/4 (D) 1/8

[Hint: $a - b + c \geq -4$ ..... (i)

and $a + b + c \leq 0 \Rightarrow -a - b - c \geq 0$ .... (ii)

and $9a + 3b + c \geq 5$ .... (iii)

(i) + (ii) $\Rightarrow -2b \geq -4$..... (iv); (ii) + (iii) + (iv) $\Rightarrow 8a \geq 1 \Rightarrow a \geq 1/8$]

24. If a, b, c are distinct real numbers, then solve for x;

$$\frac{(a+x)^2}{(a-b)(a-c)} + \frac{(b+x)^2}{(b-c)(b-a)} + \frac{(c+x)^2}{(c-a)(c-b)} = 1.$$

25. 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

26. **Statement-1 :** The number of values of 'a' for which $(a^2 - 3a + 2)x^2 + (a^2 - 5a + 6)x + a^2 - 4 = 0$ is an identity in x, is 2.

Statement-2 : If a = b = c = 0, then equation $ax^2 + bx + c = 0$ is an identity in x.

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct a explanation for Statement1.

(B) Statement-1 is True, Statement-2 is True; STatement-2 is NOT a correct explanation for Statement-1

(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is True

27. Let $P(x) = ax^3 + 5x^2 - bx + 1$.
If $P(x)$ is divided by $(2x + 1)$ leaves remainder 5 & $(3x - 1)$ in a factor of $P'(x)$ find a and b.

28. A polynomial in x of degree greater than 3 leaves the remainder 2, 1 and –1 when divided by $(x - 1)$; $(x + 2)$ & $(x + 1)$ respectively. Find the remainder, if the polynomial is divided by, $(x^2 - 1)(x + 2)$.

ANSWER KEY

1.bd	**2.** True	**3.** $x = 1 \pm \sqrt{3}$	**4.c**	**5.ab**	**6.b**	**7.a**
8. $4(a - b)$	**9.a**	**10.B**	**11.d**	**12.** $\{1, 11\}$, for $x < 0$, no solution		
13.A	**14.d**	**15.abd**	**16.c**	**17.a**	**18.b**	**19.b**
20.d	**21.a**	**22.** $(9, 1)$	**23.d**	**24.** Identity	**25.D**	**26.d**

27. $a = 2b$, $b = 12$ **28.** $\frac{7}{6}x^2 + \frac{3x}{2} - \frac{2}{3}$