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PCMB — PHYSICS CHEMISTRY MATHEMATICS BIOLOGY

NEET/JEE

Topic: Basic Mathematics

Sub: Mathematics **Assignment: 01 Repeater** Prof. Chetan Sir

Que.1 Solve the following questions

1. If $m^2 - n^2 = 7$, where $m, n \in \mathbb{Z}$, then number of ordered pairs (m, n) is

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

2. Difference of squares of two odd integers is always divisible by

(A) 3 (B) 5 (C) 16 (D) 8

3. If $m, n \in \mathbb{N}$ and $m^2 - n^2 = 13$, then $(m+1)(n+1)$ is equal to

(A) 42 (B) 56 (C) 50 (D) None of these

4. The factor of the polynomial $x^3 + 3x^2 + 4x + 12$ is

(A) $x + 3$ (B) $x - 3$ (C) $x + 2$ (D) $x - 2$

5. The remainder when the polynomial $P(x) = x^4 - 3x^2 + 2x + 1$ is divided by $x - 1$ is

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

6. The polynomials $P(x) = kx^3 + 3x^2 - 3$ and $Q(x) = 2x^3 - 5x + k$, when divided by $(x - 4)$ leave the same remainder. Then the value of k is

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

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

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

8. If $(x - a)$ is a factor of $x^3 - a^2x + x + 2$, then 'a' is equal to

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

9. If x, y are rational numbers such that $(x + y) + (x - 2y)\sqrt{2} = 2x - y + (x - y - 1)\sqrt{5}$ then

(A) $x = 1, y = 1$ (B) $x = 2, y = 1$ (C) $x = 5, y = 1$ (D) x & y can take infinitely many values

10. If $x + \frac{1}{x} = 2$, then $x^2 + \frac{1}{x^2}$ is equal to

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

11. If $\left(a + \frac{1}{a}\right)^2 = 3$, then $a^3 + \frac{1}{a^3}$ equals :

(A) 0 (B) $3\sqrt{3}$ (C) $7\sqrt{7}$ (D) $6\sqrt{3}$

12. If a, b, c are real and distinct numbers, then the value of $\frac{(a-b)^3+(b-c)^3+(c-a)^3}{(a-b)(b-c)(c-a)}$ is :

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

13. If $\frac{3+2\sqrt{2}}{3-\sqrt{2}} = a + b\sqrt{2}$, then a & b (a, b $\in$ Q) are respectively equal to

(A) $\frac{13}{7}, \frac{9}{7}$ (B) $\frac{9}{7}, \frac{13}{7}$ (C) $\frac{13}{7}, \frac{7}{9}$ (D) $\frac{7}{9}, \frac{7}{13}$

14. The numerical value of $(x^{1/a-b})^{1/a-c} \times (x^{1/b-c})^{1/b-a} \times (x^{1/c-a})^{1/c-b}$ is (a, b, c are distinct real numbers)

(A) 1 (B) 8 (C) 0 (D) None

15. If $a+b+c=0$ then $x^{\frac{a^2}{bc}} \cdot x^{\frac{b^2}{ac}} \cdot x^{\frac{c^2}{ab}}$ is equal to

(A) x (B) x^2 (C) 1 (D) x^3

16. The complete solution set of the inequality $\frac{x^4-3x^3+2x^2}{x^2-x-30} \geq 0$ is:

(A) $(-\infty,-5) \cup (1,2) \cup (6,\infty) \cup \{0\}$ (B) $(-\infty,-5) \cup [1,2] \cup (6,\infty) \cup \{0\}$ (C) $(-\infty,-5] \cup [1,2] \cup [6,\infty) \cup \{0\}$ (D) $(-\infty,-5] \cup [1,2] \cup (6,\infty)$

17. Number of non-negative integral values of x satisfying the inequality $\frac{2}{x^2-x+1} - \frac{1}{x+1} - \frac{2x-1}{x^3+1} \geq 0$

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

18. If $x,y,z \in \mathbb{R}$ and $x^2+4y^2+9z^2-2x-4y-6z+3=0$ then value of $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}$ is equal to

(A) 4 (B) 6 (C) 2 (D) Cannot be fixed values

19. If $a+b+c=0, a^2+b^2+c^2=4$ then $a^4+b^4+c^4$ is equal to

(A) 4 (B) 6 (C) 8 (D) 16

20. Solution of inequality $-5 < x+3 \leq 9$

(A) $x \in [-8,6)$ (B) $x \in (-8,6]$ (C) $x \in (-2,6]$ (D) $x \in (-8,6)$

21. If $\frac{(x+3)^2(x-1)^9(x+1)^5}{(x-3)(x-5)^4(x-6)^5} \leq 0$, then number of possible integral values of x is -

(A) 6 (B) 3 (C) 4 (D) 5

22. If $A=\{(x,y)|xy=8 \text{ and } x,y \in \mathbb{Z}\}$, then n(A) =

(A) 4 (B) 8 (C) 12 (D) 16

23. If $(\sqrt[3]{4})^{2x+\frac{1}{2}} = \frac{1}{32}$, then x =

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

Answer Key (Que 1)

1	(D)	**2**	(D)	**3**	(B)	**4**	(A)	**5**	(B)	**6**	(B)	**7**	(A)	**8**	(C)	**9**	(B)	**10**	(C)
11	(A)	**12**	(C)	**13**	(A)	**14**	(A)	**15**	(D)	**16**	(B)	**17**	(D)	**18**	(B)	**19**	(C)	**20**	(B)
21	(D)	**22**	(B)	**23**	(D)														

Que.2 Solve the following inequalities over the set of real numbers

1. $x^2+2x-3 \leq 0$

2. $x^2+6x-7 \leq 0$

3. $x^4-2x^2-63 \leq 0$

4. $\frac{x+1}{(x-1)^2} < 1$

5. $\frac{x^2-7x+12}{2x^2+4x+5} > 0$

6. $\frac{(x-1)(x+2)^2}{-x-1} < 0$

7. $\frac{x^4+x^2+1}{x^2-4x-5} < 0$

8. $\frac{x+7}{x-5} + \frac{3x+1}{2} \geq 0$

9. $\frac{1}{x+2} < \frac{3}{x-3}$

10. $\frac{14x}{x+1} - \frac{9x-30}{x-4} < 0$

11. $\frac{x^2+2}{x^2-1} < -2$

12. $\frac{5-4x}{3x^2-x-4} < 4$

13. $\frac{(x+2)(x^2-2x+1)}{4+3x-x^2} \geq 0$

14. $\frac{x^4-3x^3+2x^2}{x^2-x-30} > 0$

15. $\frac{2x}{x^2-9} \leq \frac{1}{x+2}$

16. $\frac{20}{(x-3)(x-4)} + \frac{10}{x-4} + 1 > 0$

17. $\frac{x^2+6x-7}{x^2+1} \leq 2$

18. $\frac{x^4+x^2+1}{x^2-4x-5} < 0$

19. $\frac{1}{x+2} < \frac{3}{x-3}$

20. $\frac{x^2-5x+12}{x^2-4x+5} > 3$

21. $\frac{(2-x^2)(x-3)^3}{(x+1)(x^2-3x-4)} \geq 0$

22. $\frac{5-4x}{3x^2-x-4} < 4$

23. $\frac{(x+2)(x^2-2x+1)}{4+3x-x^2} \geq 0$

24. $\frac{x^4-3x^3+2x^2}{x^2-x-30} > 0$

25. $\frac{2x}{x^2-9} \leq \frac{1}{x+2}$

Answer Key (Que 2)

1. $[-3,1]$
2. $[-7,1]$
3. $[-3,3]$
4. $(-\infty,0)\cup(3,\infty)$
5. $(-\infty,3)\cup(4,\infty)$
6. $(-\infty,-2)\cup(-2,-1)\cup(1,\infty)$
7. $(-1,5)$
8. $[1,3]\cup(5,\infty)$
9. $(-\frac{9}{2},-2)\cup(3,\infty)$
10. $(-1,1)\cup(4,6)$
11. $(-1,1)-\{0\}$
12. $(-\infty,-\frac{\sqrt{7}}{2})\cup(-1,\frac{\sqrt{7}}{2})\cup(\frac{4}{3},\infty)$
13. $(-\infty,-2]\cup(-1,4)$
14. $(-\infty,-5)\cup(1,2)\cup(6,\infty)$
15. $(-\infty,-3)\cup(-2,3)$
16. $(-\infty,-2)\cup(1,3)\cup(4,\infty)$
17. $x\in R$
18. $x\in(-1,5)$
19. $x\in(-\frac{9}{2},-2)\cup(3,\infty)$
20. $x\in(1/2,3)$
21. $x\in[-\sqrt{2},-1)\cup(-1,\sqrt{2}]\cup[3,4)$
22. $x\in(-\infty,-\frac{\sqrt{7}}{2})\cup(-1,\frac{\sqrt{7}}{2})\cup(4/3,\infty)$
23. $x\in(-\infty,-2]\cup(-1,4)$
24. $x\in(-\infty,-5)\cup(1,2)\cup(6,\infty)$
25. $x\in(-\infty,-3)\cup(-2,3)$

Que.3 Domain Questions

1. If the domain of the function $f(x)=\log_7(1-\log_4(x^2-9x+18))$ is $(\alpha,\beta)\cup(\gamma,\delta)$, then $\alpha+\beta+\gamma+\delta$ is equal to **[JEE Main 2025]**

(A) 17 (B) 15 (C) 16 (D) 18

2. Let the domains of the functions $f(x)=\log_4\log_3\log_7(8-\log_2(x^2+4x+5))$ and $g(x)=\sin^{-1}\left(\frac{7x+10}{x-2}\right)$ be (α,β) and $[\gamma,\delta]$, respectively. Then $\alpha^2+\beta^2+\gamma^2+\delta^2$ is equal to : **[JEE Main 2025]**

(A) 15 (B) 13 (C) 16 (D) 14

3. If the domain of the function $f(x)=\log_e\left(\frac{2x-3}{5+4x}\right)+\sin^{-1}\left(\frac{4+3x}{2-x}\right)$ is $[\alpha,\beta]$, then $\alpha^2+4\beta$ is equal to **[JEE Main 2025]**

(A) 4 (B) 3 (C) 7 (D) 5

4. If the domain of the function $f(x)=\frac{1}{\sqrt{10+3x-x^2}}+\frac{1}{\sqrt{x+|x|}}$ is (a,b), then $(1+a)^2+b^2$ is equal to : **[JEE Main 2025]**

(A) 29 (B) 30 (C) 25 (D) 26

5. If the domain of the function $f(x)=\log_e(4x^2+11x+6)+\sin^{-1}(4x+3)+\cos^{-1}\left(\frac{10x+6}{3}\right)$ is $(\alpha,\beta]$, then $36|\alpha+\beta|$ is equal to **[JEE Main 2023]**

(A) 54 (B) 72 (C) 63 (D) 45

6. If the domain of the function $f(x)=\sec^{-1}\left(\frac{2x}{5x+3}\right)$ is $[\alpha,\beta]\cup(\gamma,\delta]$, then $|3\alpha+10(\beta+\gamma)+21\delta|$ is equal to **[JEE Main 2023]**

7. If domain of the function $\log_e\left(\frac{6x^2+5x+1}{2x-1}\right)+\cos^{-1}\left(\frac{2x^2-3x+4}{3x-5}\right)$ is $(\alpha,\beta)\cup(\gamma,\delta)$, then $18(\alpha^2+\beta^2+\gamma^2+\delta^2)$ is equal to **[JEE Main 2023]**

8. The domain of $f(x)=\frac{\log_{x+1}(x-2)}{e^{2\log_e x}-(2x+3)}, x\in\mathbb{R}$ is **[JEE Main 2023]**

(A) $\mathbb{R}-\{-1,3\}$ (B) $(2,\infty)-\{3\}$
(C) $(-1,\infty)-\{3\}$ (D) $\mathbb{R}-\{3\}$

9. The domain of the function $f(x) = \sin^{-1}\left(\frac{x^2-3x+2}{x^2+2x+7}\right)$ is [**JEE Main 2022**]

(A) $[1, \infty)$ (B) $(-1, 2]$ (C) $[-1, \infty)$ (D) $(-\infty, 2]$

10. The domain of $f(x) = \frac{\cos^{-1}\left(\frac{x^2-5x+6}{x^2-9}\right)}{\log(x^2-3x+2)}$ is [**JEE Main 2022**]

(A) $x \in [-\frac{1}{2}, 1) \cup (2, \infty) - \{3\}$
(B) $x \in [-\frac{1}{2}, 1] \cup (2, \infty) - \{3\}$
(C) $x \in (-\frac{1}{2}, 1) \cup [2, \infty) - \{3\}$
(D) $x \in [-\frac{1}{2}, 1) \cup [2, \infty) - \{3\}$

11. The domain of the function, $f(x) = \sin^{-1}\left(\frac{3x^2+x-1}{(x-1)^2}\right) + \cos^{-1}\left(\frac{x-1}{x+1}\right)$ is: [**JEE Main 2021**]

(A) $[0, \frac{1}{2}]$
(B) $[0, \frac{1}{4}]$
(C) $[\frac{1}{4}, \frac{1}{2}] \cup \{0\}$
(D) $[-2, 0] \cup [\frac{1}{4}, \frac{1}{2}]$

12. The domain of the function $\text{cosec}^{-1}\left(\frac{1+x}{x}\right)$ is: [**JEE Main 2021**]

(A) $[-\frac{1}{2}, \infty) - \{0\}$
(B) $(-1, -\frac{1}{2}] \cup (0, \infty)$
(C) $[-\frac{1}{2}, 0) \cup [1, \infty)$
(D) $(-\frac{1}{2}, \infty) - \{0\}$

13. The domain of the function $f(x) = \sin^{-1}\left(\frac{|x|+5}{x^2+1}\right)$ is $(-\infty, -a] \cup [a, \infty)$, then a is equal to [**JEE Main 2020**]

(A) $\frac{\sqrt{17}}{2}$
(B) $\frac{\sqrt{17}-1}{2}$
(C) $\frac{1+\sqrt{17}}{2}$
(D) $\frac{\sqrt{17}}{2} + 1$

14. The domain of the definition of the function $f(x) = \frac{1}{4-x^2} + \log_{10}(x^3 - x)$ is: [**JEE Main 2019**]

(A) $(-1, 0) \cup (1, 2) \cup (2, \infty)$
(B) $(1, 2) \cup (2, \infty)$
(C) $(-2, -1) \cup (-1, 0) \cup (2, \infty)$
(D) $(-1, 0) \cup (1, 2) \cup (3, \infty)$

15. If the domain of the function $\log_5(18x - x^2 - 77)$ is (α, β) and the domain of the function $\log_{x-1}\left(\frac{2x^2+3x-2}{x^2-3x-4}\right)$ is (γ, δ), then $\alpha^2 + \beta^2 + \gamma^2$ is equal to : [**JEE Main 2025**]

(A) 195 (B) 179 (C) 186 (D) 174

16. If the domain of the function $f(x) = \sin^{-1}\left(\frac{x-1}{2x+3}\right)$ is $\mathbb{R} - (\alpha, \beta)$, then $12\alpha\beta$ is equal to : [**JEE Main 2024**]

(A) 32 (B) 40 (C) 24 (D) 36

17. If the domain of the function $\sin^{-1}\left(\frac{3x-22}{2x-19}\right) + \log_e\left(\frac{3x^2-8x+5}{x^2-3x-10}\right)$ is $(\alpha, \beta]$, then $3\alpha + 10\beta$ is equal to: [**JEE Main 2024**]

(A) 100 (B) 95 (C) 97 (D) 98

18. If the domain of the function $f(x) = \frac{\sqrt{x^2-25}}{4-x^2} + \log_{10}(x^2 + 2x - 15)$ is $(-\infty, \alpha) \cup [\beta, \infty)$, then $\alpha^2 + \beta^3$ is equal to: [**JEE Main 2024**]

(A) 140 (B) 175 (C) 150 (D) 125

19. If the domain of the function $f(x) = \log_e\left(\frac{2x+3}{4x^2+x-3}\right) + \cos^{-1}\left(\frac{2x-1}{x+2}\right)$ is $(\alpha, \beta]$, then the value of $5\beta - 4\alpha$ is equal to [**JEE Main 2024**]

(A) 10 (B) 12 (C) 11 (D) 9

20. If the domain of the function $f(x) = \cos^{-1}\left(\frac{2-|x|}{4}\right) + (\log_e(3-x))^{-1}$ is $[-\alpha, \beta) - \{\gamma\}$, then $\alpha + \beta + \gamma$ is equal to : [**JEE Main 2024**]

(A) 12 (B) 9 (C) 11 (D) 8

Answer Key (Que 3)

1	(D)	**2**	(A)	**3**	(A)	**4**	(D)	**5**	(D)	**6**	(24)	**7**	(20)	**8**	(B)	**9**	(C)	**10**	(A)
11	(C)	**12**	(A)	**13**	(C)	**14**	(A)	**15**	(C)	**16**	(A)	**17**	(C)	**18**	(C)	**19**	(B)	**20**	(C)