

PYQSide

JEE MAIN RELATIONS AND FUNCTIONS — PYQs

Max. Marks: 76

Questions: 19

Section A (MCQ)

Q.1 Let $[\cdot]$ denote the greatest integer function. If the domain of the function $f(x) = \sin^{-1}\left(\frac{x + [x]}{3}\right)$ is $[\alpha, \beta]$, then $\alpha^2 + \beta^2$ is equal to :

[JEE Main 2026 (Online) 6th April Morning Shift]

- (1) 2 (2) 5 (3) 10 (4) 13

Scan or tap for the full solution



Q.2 If the domain of the function $f(x) = \log_{(10x^2 - 17x + 7)}(18x^2 - 11x + 1)$ is $(-\infty, a) \cup (b, c) \cup (d, \infty) - \{e\}$, then $90(a + b + c + d + e)$ equals:

[JEE Main 2026 (Online) 24th January Morning Shift]

- (1) 170 (2) 316 (3) 177 (4) 307

Scan or tap for the full solution



Q.3 The sum of all the real solutions of the equation $\log_{(x+3)}(6x^2 + 28x + 30) = 5 - 2\log_{(6x+10)}(x^2 + 6x + 9)$ is equal to :

[JEE Main 2026 (Online) 23rd January Evening Shift]

- (1) 1 (2) 4 (3) 0 (4) 2

Scan or tap for the full solution



Q.4 If the domain of the function $f(x) = \sin^{-1}\left(\frac{5-x}{3+2x}\right) + \frac{1}{\log_e(10-x)}$ is $(-\infty, \alpha] \cup [\beta, \gamma) - \{\delta\}$, then $6(\alpha + \beta + \gamma + \delta)$ is equal to

[JEE Main 2026 (Online) 22nd January Morning Shift]

- (1) 66 (2) 68 (3) 70 (4) 67

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Q.5 Let $f(x) = [x]^2 - [x+3] - 3$, $x \in \mathbb{R}$, where $[\cdot]$ is the greatest integer function. Then

[JEE Main 2026 (Online) 22nd January Evening Shift]

- (1) $f(x) = 0$ for finitely many values of x
 (2) $f(x) < 0$ only for $x \in [-1, 3)$
 (3) $\int_0^2 f(x) dx = -6$
 (4) $f(x) > 0$ only for $x \in [4, \infty)$

Scan or tap for the full solution



Q.6 Let the domain of the function

$$f(x) = \log_3 \log_5 (7 - \log_2 (x^2 - 10x + 85)) + \sin^{-1}\left(\left|\frac{3x-7}{17-x}\right|\right)$$

be $(\alpha, \beta]$. Then $\alpha + \beta$ is equal to :

[JEE Main 2026 (Online) 22nd January Evening Shift]

- (1) 12 (2) 8 (3) 10 (4) 9

Scan or tap for the full solution



Q.7 The number of elements in the relation $\mathbf{R} = \{(x, y) : 4x^2 + y^2 < 52, x, y \in \mathbb{Z}\}$ is

[JEE Main 2026 (Online) 22nd January Evening Shift]

- (1) 86 (2) 67 (3) 89 (4) 77

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Q.8 If the range of the function $f(x) = \frac{5-x}{x^2-3x+2}$, $x \neq 1, 2$, is $(-\infty, \alpha] \cup [\beta, \infty)$, then $\alpha^2 + \beta^2$ is equal to :

[JEE Main 2025 (Online) 7th April Evening Shift]

- (1) 188 (2) 192 (3) 190 (4) 194

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Q.9 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 (Online) 4th April Evening Shift]

- (1) 15 (2) 13 (3) 16 (4) 14

Scan or tap for the full solution



Q.10 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 (Online) 3rd April Morning Shift]

- (1) 4 (2) 3 (3) 7 (4) 5

Scan or tap for the full solution



Q.11 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 (Online) 3rd April Evening Shift]

- (1) 17 (2) 15 (3) 16 (4) 18

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Q.12 Let $A = \{1, 2, 3, \dots, 100\}$ and R be a relation on A such that $R = \{(a, b) : a = 2b + 1\}$. Let $(a_1, a_2), (a_2, a_3), (a_3, a_4), \dots, (a_k, a_{k+1})$ be a sequence of k elements of R such that the second entry of an ordered pair is equal to the first entry of the next ordered pair. Then the largest integer k , for which such a sequence exists, is equal to :

[JEE Main 2025 (Online) 2nd April Evening Shift]

- (1) 6 (2) 8 (3) 7 (4) 5

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Q.13 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 (Online) 2nd April Evening Shift]

- (1) 29 (2) 30 (3) 25 (4) 26

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Q.14 Let $f: \mathbb{R} \rightarrow \mathbb{R}$ be a function defined by

$$f(x) = (2+3a)x^2 + \left(\frac{a+2}{a-1}\right)x + b, a \neq 1. \text{ If}$$

$$f(x+y) = f(x) + f(y) + 1 - \frac{2}{7}xy, \text{ then the value of}$$

$$28 \sum_{i=1}^5 |f(i)| \text{ is}$$

[JEE Main 2025 (Online) 28th January Morning Shift]

- (1) 735 (2) 675 (3) 715 (4) 545

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Section B (Numerical)

Q.15 The sum of squares of all the real solutions of the equation $\log_{(x+1)}(2x^2 + 5x + 3) = 4 - \log_{(2x+3)}(x^2 + 2x + 1)$ is equal to _____.

[JEE Main 2026 (Online) 8th April Evening Shift]

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Q.16 Let $A = \{1, 4, 7\}$ and $B = \{2, 3, 8\}$. Then the number of elements, in the relation $R = \{((a_1, b_1), (a_2, b_2)) \in ((A \times B) \times (A \times B)) : a_1 + b_2 \text{ divides } a_2 + b_1\}$ is _____.

[JEE Main 2026 (Online) 5th April Evening Shift]

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Q.17 If the domain of the function

$$f(x) = \sqrt{\log_{(0.6)}\left(\left|\frac{2x-5}{x^2-4}\right|\right)}$$

is $(-\infty, a] \cup \{b\} \cup [c, d) \cup (e, \infty)$, then the value of $a + b + c + d + e$ is _____.

[JEE Main 2026 (Online) 2nd April Morning Shift]

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Q.18 Let $A = \{2, 3, 4, 5, 6\}$. Let R be a relation on the set $A \times A$ given by $(x, y)R(z, w)$ if and only if x divides z and $y \leq w$. Then the number of elements in R is _____.

[JEE Main 2026 (Online) 2nd April Evening Shift]

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Q.19 Let the domain of the function $f(x) = \cos^{-1}\left(\frac{4x+5}{3x-7}\right)$ be $[\alpha, \beta]$ and the domain of $g(x) = \log_2(2 - 6\log_{27}(2x+5))$ be (γ, δ) . Then $|7(\alpha + \beta) + 4(\gamma + \delta)|$ is equal to _____.

[JEE Main 2025 (Online) 8th April Evening Shift]

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ANSWER KEY

Section A (MCQ)

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	2	2	3	3	2	4	4	4	1	1	4
Ques.	12	13	14								
Ans.	4	4	2								

Section B (Numerical)

Ques.	15	16	17	18	19		
Ans.	2	18	4	120	96		