

PYQSide

JEE MAIN CONTINUITY AND DIFFERENTIABILITY — PYQS

Max. Marks: 72

Questions: 18

Section A (MCQ)

- Q.1** Let $f(x) = \begin{cases} \frac{1}{2} & x \leq 0 \\ \frac{1}{2} \sin x & 0 < x < \pi \\ \frac{1}{2} & x \geq \pi \end{cases}$, & $x \leq \pi$. If f is continuous at $x = \frac{\pi}{2}$, then the value of $\int_0^{\pi} |x^2 + 2x - 3| dx$ is :

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

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

Scan or tap for the full solution



- Q.2** If $y = \tan^{-1} \left(\frac{3\cos x - 4\sin x}{4\cos x + 3\sin x} \right) + 2\tan^{-1} \left(\frac{x}{1 + \sqrt{1-x^2}} \right)$, then $\frac{dy}{dx}$ at $x = \frac{\sqrt{3}}{2}$ is equal to :

[JEE Main 2026 (Online) 4th April Morning Shift]

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

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- Q.3** Let f be a real polynomial of degree n such that $f(x) = f'(x)f''(x)$, for all $x \in \mathbb{R}$. If $f(0) = 0$, then $36(f'(2) + f''(2) + \int_0^2 f(x) dx)$ is equal to:

[JEE Main 2026 (Online) 4th April Morning Shift]

- (1) 42 (2) 46 (3) 56 (4) 66

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- Q.4** Let $f(x) = \lim_{\theta \rightarrow 0} \left(\frac{\cos \pi x - x^{\left(\frac{2}{\theta}\right)} \sin(x-1)}{1 + x^{\left(\frac{2}{\theta}\right)} (x-1)} \right)$, $x \in \mathbb{R}$.

Consider the following two statements :

(I) $f(x)$ is discontinuous at $x = 1$.(II) $f(x)$ is continuous at $x = -1$.

Then, [JEE Main 2026 (Online) 28th January Evening Shift]

- (1) Neither (I) nor (II) is True
 (2) Only (II) is True
 (3) Only (I) is True
 (4) Both (I) and (II) are True

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- Q.5** Let $\alpha, \beta \in \mathbb{R}$ be such that the function $f(x) = \begin{cases} 2\alpha \ln(x-2) + 2\beta x, & x < 1 \\ (\alpha + 3)x + (\alpha - \beta), & x \geq 1 \end{cases}$ be differentiable at all $x \in \mathbb{R}$. Then $34(\alpha + \beta)$ is equal to

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

- (1) 48 (2) 84 (3) 36 (4) 24

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- Q.6** Let $[t]$ denote the greatest integer less than or equal to t . If the function $f(x) = \begin{cases} \sin \left(\frac{1}{2} \left(\cos x + \sin x \right) \right), & x < 0 \\ \frac{1}{2} \sin x - \frac{1}{2} \sin 2x, & 0 \leq x < \pi \\ 0, & x = \pi \end{cases}$ is continuous at $x = 0$, then $a^2 + b^2$ is equal to :

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

- (1)
- $\frac{1}{2}$
- (2)
- $\frac{5}{8}$
- (3)
- $\frac{3}{4}$
- (4)
- $\frac{9}{16}$

Scan or tap for the full solution



- Q.7** Let $f(x) = \begin{cases} \frac{ax^2 + 2ax + 3}{4x^2 + 4x - 3}, & x \neq -\frac{3}{2}, \frac{1}{2} \\ b, & x = -\frac{3}{2}, \frac{1}{2} \end{cases}$ be continuous at $x = -\frac{3}{2}$. If $f \circ f(x) = \frac{7}{5}$, then x is equal to: [JEE Main 2026 (Online) 23rd January Morning Shift]

- (1) 1.4 (2) 2 (3) 1 (4) 0

Scan or tap for the full solution



- Q.8** If $f(x) = \begin{cases} \frac{a|x| + x^2 - 2(\sin|x|)(\cos|x|)}{x}, & x \neq 0 \\ b, & x = 0 \end{cases}$

is continuous at $x = 0$, then $a + b$ is equal to :

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

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

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- Q.9** Let $[\cdot]$ denote the greatest integer function, and let $f(x) = \min \{ \sqrt{2}x, x^2 \}$. Let $S = \{x \in (-2, 2) : \text{the function } g(x) = |x| [x^2] \text{ is discontinuous at } x\}$. Then $\sum_{x \in S} f(x)$ equals

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

- (1) $2 - \sqrt{2}$ (2) $2\sqrt{6} - 3\sqrt{2}$
(3) $1 - \sqrt{2}$ (4) $\sqrt{6} - 2\sqrt{2}$

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- Q.10** Let $f(x) = \begin{cases} (1+ax)^{1/x}, & x < 0 \\ 1 + \text{mathrm{b}}, & \text{mathrm{b}} = 0 \\ \frac{\text{frac}(\text{mathrm{m}x+4}){1/2} - 2(\text{mathrm{m}x+\text{mathrm{m}c}){1/3} - 2, & \text{mathrm{m}} \\ > 0 \end{cases}$ be continuous at $x = 0$. Then e^{abc} is equal to:

[JEE Main 2025 (Online) 3rd April Morning Shift]

- (1) 64 (2) 48 (3) 36 (4) 72

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Section B (Numerical)

- Q.11** Let $f(x) = \begin{cases} x^3 + 8, & x < 0 \\ \text{mathrm{m}x}^2 - 4, & \text{mathrm{m}x} \geq 0 \end{cases}$ and $g(x) = \begin{cases} (x-8)^{1/3}, & x < 0 \\ (\text{mathrm{m}x}+4)^{1/2}, & \text{mathrm{m}x} \geq 0 \end{cases}$. Then the number of points, where the function $g \circ f$ is discontinuous, is _____.

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

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- Q.12** The number of points, at which the function $f(x) = \max \{ 6x, 2 + 3x^2 \} + |x - 1| \cos \left| x^2 - \frac{1}{4} \right|$, $x \in (-\pi, \pi)$, is not differentiable, is _____.

[JEE Main 2026 (Online) 4th April Morning Shift]

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- Q.13** Let $f(x) = \begin{cases} \text{sex} - 1, & x < 0 \\ \text{mathrm{m}x}^2 - 5\text{mathrm{m}x} + 6, & \text{mathrm{m}x} \geq 0 \end{cases}$ and $g(x) = f(|x|) + |f(x)|$. If the number of points where g is not continuous and is not differentiable are α and β respectively, then $\alpha + \beta$ is equal to _____.

[JEE Main 2026 (Online) 4th April Evening Shift]

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- Q.14** The number of points in the interval $[2, 4]$, at which the function $f(x) = \left[x^2 - x - \frac{1}{2} \right]$, where $[\cdot]$ denotes the greatest integer function, is discontinuous, is _____.

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

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- Q.15** The number of points of discontinuity of the function $f(x) = \left[\frac{x^2}{2} \right] - [\sqrt{x}]$, $x \in [0, 4]$, where $[\cdot]$ denotes the greatest integer function, is _____.

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

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- Q.16** If the function $f(x) = \frac{\tan(\tan x) - \sin(\sin x)}{\tan x - \sin x}$ is continuous at $x = 0$, then $f(0)$ is equal to _____.

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

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- Q.17** Let m and n be the number of points at which the function $f(x) = \max \{ x, x^3, x^5, \dots, x^{21} \}$, $x \in \mathbb{R}$, is not differentiable and not continuous, respectively. Then $m + n$ is equal to _____.

[JEE Main 2025 (Online) 4th April Morning Shift]

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- Q.18** Let $f(x) = \begin{cases} 3x, & x < 0 \\ \min \{ 1 + \text{mathrm{m}x} + [\text{mathrm{m}x}], \text{mathrm{m}x} + 2[\text{mathrm{m}x}] \}, & 0 \leq x \leq 2 \\ 5, & \text{mathrm{m}x} > 2 \end{cases}$ where $[\cdot]$ denotes greatest integer function. If α and β are the number of points, where f is not continuous and is not differentiable, respectively, then $\alpha + \beta$ equals _____.

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

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ANSWER KEY

Section A (MCQ)

Ques.	1	2	3	4	5	6	7	8	9	10	
Ans.	4	3	3	1	1	3	3	2	3	2	

Section B (Numerical)

Ques.	11	12	13	14	15	16	17	18			
Ans.	3	3	4	10	8	2	3	5			