

JEE MAIN INTEGRALS — PROPERTIES OF DEFINITE INTEGRALS — PYQS

Max. Marks: 104
Questions: 26

Section A (MCQ) — 20 questions

Q.1 The value of the integral $\int_{-\pi/4}^{\pi/4} \left(\frac{32\cos^4 x}{1 + e^{\sin x}} \right) dx$ is :

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

- (1) $4\pi + 2$ (2) $3\pi + 8$ (3) $3\pi + 4$ (4) $4\pi + 3$

Scan or tap for the full solution



Q.2 The value of the integral $\int_{-1}^1 \left(\frac{x^3 + |x| + 1}{x^2 + 2|x| + 1} \right) dx$ is equal to :

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

- (1) $3\log_e 2$ (2) $2\log_e 2$ (3) $5\log_e 3$ (4) $3\log_e 3$

Scan or tap for the full solution



Q.3 The value of the integral $\int_0^\infty \frac{\log_e(x)}{x^2 + 4} dx$ is:

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

- (1) $\frac{\pi \log_e(2)}{2}$ (2) $\frac{\pi \log_e(2)}{4}$
 (3) $1 + \pi \log_e(2)$ (4) $2 + \pi \log_e(2)$

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Q.4 Let $\int_{-2}^2 (|\sin x| + [x \sin x]) dx = 2(3 - \cos 2) + \beta$, where $[\cdot]$ is the greatest integer function. Then $\beta \sin\left(\frac{\beta}{2}\right)$ equals:

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

- (1) 1 (2) 2 (3) 4 (4) 8

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Q.5 If $\alpha = 1$ and $\beta = 1 + i\sqrt{2}$, where $i = \sqrt{-1}$ are two roots of the equation $x^3 + ax^2 + bx + c = 0$, $a, b, c \in \mathbb{R}$, then $\int_{-1}^1 (x^3 + ax^2 + bx + c) dx$ is equal to :

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

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

Scan or tap for the full solution



Q.6 The integral $\int_0^1 \cot^{-1}(1 + x + x^2) dx$ is equal to :

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

$$(1) 2\tan^{-1} 2 + \frac{1}{2} \log_e \left(\frac{5}{4} \right) + \frac{\pi}{2}$$

$$(2) 2\tan^{-1} 2 + \frac{1}{2} \log_e \left(\frac{5}{4} \right) - \frac{\pi}{2}$$

$$(3) 2\tan^{-1} 2 - \frac{1}{2} \log_e \left(\frac{5}{4} \right) + \frac{\pi}{2}$$

$$(4) 2\tan^{-1} 2 - \frac{1}{2} \log_e \left(\frac{5}{4} \right) - \frac{\pi}{2}$$

Scan or tap for the full solution



Q.7 Let $[\cdot]$ denote the greatest integer function. Then the value of $\int_0^3 \left(\frac{e^x + e^{-x}}{[x]!} \right) dx$ is :

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

$$(1) e^2 + e^3 - \frac{1}{e^2} - \frac{1}{e^3} \quad (2) \frac{1}{2} \left(e^2 + e^3 - \frac{1}{e^2} - \frac{1}{e^3} \right)$$

$$(3) e^2 + e^3 - \frac{1}{2e^2} - \frac{1}{2e^3} \quad (4) \frac{1}{2} (e^2 + e^3) - \frac{1}{e^2} - \frac{1}{e^3}$$

Scan or tap for the full solution



Q.8 The value of $\int_0^{20\pi} (\sin^4 x + \cos^4 x) dx$ is equal to:

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

$$(1) \frac{15\pi}{2} \quad (2) 25\pi \quad (3) 15\pi \quad (4) \frac{25\pi}{2}$$

Scan or tap for the full solution



Q.9 Let $[\cdot]$ denote the greatest integer function. Then

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left(\frac{12(3 + [x])}{3 + [\sin x] + [\cos x]} \right) dx$$

is equal to :

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

$$(1) 12\pi + 5 \quad (2) 11\pi + 2 \quad (3) 15\pi + 4 \quad (4) 13\pi + 1$$

Scan or tap for the full solution



Q.10 The value of the integral $\int_{\frac{\pi}{24}}^{\frac{5\pi}{24}} \frac{dx}{1 + \sqrt[3]{\tan 2x}}$ is :

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

$$(1) \frac{\pi}{3} \quad (2) \frac{\pi}{18} \quad (3) \frac{\pi}{6} \quad (4) \frac{\pi}{12}$$

Scan or tap for the full solution



- Q.11** The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left(\frac{1}{[x]+4} \right) dx$, where $[\cdot]$ denotes the greatest integer function, is

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

- (1) $\frac{1}{60}(21\pi - 1)$ (2) $\frac{1}{60}(\pi - 7)$
 (3) $\frac{7}{60}(\pi - 3)$ (4) $\frac{7}{60}(3\pi - 1)$

Scan or tap for the full solution



- Q.12** The value of $\int_{-\pi/6}^{\pi/6} \left(\frac{\pi + 4x^{11}}{1 - \sin(|x| + \pi/6)} \right) dx$ is equal to:

[JEE Main 2026 (Online) 21st January Morning Shift]

- (1) 8π (2) 4π (3) 2π (4) 6π

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- Q.13** The integral $\int_{-1}^3 (|\pi^2 x \sin(\pi x)|) dx$ is equal to:

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

- (1) $2 + 3\pi$ (2) $4 + \pi$ (3) $1 + 3\pi$ (4) $3 + 2\pi$

Scan or tap for the full solution



- Q.14** Let $f(x)$ be a positive function and

$$I_1 = \int_{-1}^1 2x f(2x(1-2x)) dx \text{ and}$$

$$I_2 = \int_{-1}^2 f(x(1-x)) dx. \text{ Then the value of } \frac{I_2}{I_1} \text{ is equal to } \underline{\hspace{2cm}}$$

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

- (1) 12 (2) 9 (3) 6 (4) 4

Scan or tap for the full solution



- Q.15** The integral $\int_0^{\pi} \frac{(x+3)\sin x}{1+3\cos^2 x} dx$ is equal to

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

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

Scan or tap for the full solution



- Q.16** The value of

$$\int_{-1}^1 \frac{(1 + \sqrt{|x|-x})e^x + (\sqrt{|x|-x})e^{-x}}{e^x + e^{-x}} dx \text{ is equal to}$$

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

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

Scan or tap for the full solution



- Q.17** Let the domain of the function $f(x) = \log_2 \log_4 \log_6 (3 + 4x - x^2)$ be (a, b) . If

$$\int_0^{b-a} [x^2] dx = p - \sqrt{q} - \sqrt{r}, \quad p, q, r \in \mathbb{N},$$

$\gcd(p, q, r) = 1$, where $[\cdot]$ is the greatest integer function, then $p + q + r$ is equal to

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

- (1) 10 (2) 11 (3) 9 (4) 8

Scan or tap for the full solution



- Q.18** The integral $\int_0^{\pi} \frac{8x dx}{4\cos^2 x + \sin^2 x}$ is equal to

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

- (1) $2\pi^2$ (2) $4\pi^2$ (3) π^2 (4) $\frac{3\pi^2}{2}$

Scan or tap for the full solution



- Q.19** Let (a, b) be the point of intersection of the curve $x^2 = 2y$ and the straight line $y - 2x - 6 = 0$ in the second quadrant. Then the integral $I = \int_a^b \frac{9x^2}{1+5^x} dx$ is equal to :

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

- (1) 27 (2) 18 (3) 24 (4) 21

Scan or tap for the full solution



- Q.20** If $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{96x^2 \cos^2 x}{(1+e^x)} dx = \pi(\alpha\pi^2 + \beta)$, $\alpha, \beta \in \mathbb{Z}$, then $(\alpha + \beta)^2$ equals

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

- (1) 196 (2) 100 (3) 64 (4) 144

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Section B (Numerical) — 6 questions

- Q.21** If $\alpha = \int_0^{2\sqrt{3}} \log_2 (x^2 + 4) dx + \int_2^4 \sqrt{2x-4} dx$, then α^2 is equal to _____.

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

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- Q.22** The value of $\sum_{r=1}^{20} \left(\left| \sqrt{\pi \left(\int_0^1 x |\sin \pi x| dx \right)} \right| \right)$ is _____.

[JEE Main 2026 (Online) 28th January Morning Shift]

Scan or tap for the full solution



- Q.23** $6 \int_0^{\pi} |(\sin 3x + \sin 2x + \sin x)| dx$ is equal to _____.

[JEE Main 2026 (Online) 21st January Morning Shift]

Scan or tap for the full solution



Q.24 If $f(x)$ satisfies the relation

$$f(x) = e^x + \int_0^1 (y + xe^y)f(y) dy, \text{ then } e + f(0) \text{ is equal to}$$

_____.

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

Scan or tap for the
full solution



Q.25 Let $[.]$ be the greatest integer function. If

$$\alpha = \int_0^{64} (x^{1/3} - [x^{1/3}]) dx, \text{ then } \frac{1}{\pi} \int_0^{\pi} \left(\frac{\sin^2 \theta}{\sin^6 \theta + \cos^6 \theta} \right) d\theta$$

is equal to _____.

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

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full solution



Q.26 Let $[.]$ denote the greatest integer function. If

$$\int_0^{e^3} \left[\frac{1}{e^x - 1} \right] dx = \alpha - \log_e 2, \text{ then } \alpha^3 \text{ is equal to}$$

_____.

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

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full solution



ANSWER KEY

Section A (MCQ) — 20 questions

Ques.	1	2	3	4	5	6	7	8	9	10	11
Ans.	2	2	2	2	3	4	2	3	2	4	4
Ques.	12	13	14	15	16	17	18	19	20		
Ans.	2	3	4	2	1	1	1	3	2		

Section B (Numerical) — 6 questions

Ques.	21	22	23	24	25	26	
Ans.	192	210	17	2	36	8	