

# PYQSide

## JEE MAIN INTEGRALS — PROPERTIES OF DEFINITE INTEGRALS — PYQS

Max. Marks: 104

Questions: 26

### Section A (MCQ)

**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)  $2 + \pi \log_e(2)$

Scan or tap for the  
full solution



**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

Scan or tap for the  
full solution



**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  $[.]$  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  $[.]$  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)  $12\pi + 5$  (2)  $11\pi + 2$  (3)  $15\pi + 4$  (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)  $8\pi$  (2)  $4\pi$  (3)  $2\pi$  (4)  $6\pi$

Scan or tap for the full solution



**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

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

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

[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

$$f(x) = \log_2 \log_4 \log_6 (3 + 4x - x^2) \text{ be } (a, b). \text{ If}$$

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

$\gcd(p, q, r) = 1$ , 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)  $\pi^2$  (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  $I = \int_a^b \frac{9x^2}{1+5x} dx$  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

Scan or tap for the full solution



## Section B (Numerical)

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

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

Scan or tap for the full solution



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

Scan or tap for the  
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]

Scan or tap for the  
full solution



## ANSWER KEY

### Section A (MCQ)

| 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)

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