

## JEE MAIN INTEGRALS — INTEGRATION BY PARTS — PYQS

**Max. Marks: 20**
**Questions: 5**

### Section A (MCQ) — 3 questions

**Q.1** Let  $f(t) = \int \left( \frac{1 - \sin(\log_e t)}{1 - \cos(\log_e t)} \right) dt$ ,  $t > 1$ .

If  $f(e^{\pi/2}) = -e^{\pi/2}$  and  $f(e^{\pi/4}) = \alpha e^{\pi/4}$ , then  $\alpha$  equals

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

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

Scan or tap for the  
full solution



**Q.2** Let  $f(x) = \int \frac{(2-x^2) \cdot e^x}{(\sqrt{1+x})(1-x)^{3/2}} dx$ . If  $f(0) = 0$ , then  $f\left(\frac{1}{2}\right)$  is equal to:

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

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

Scan or tap for the  
full solution



**Q.3** Let  $f: \mathbb{R} \rightarrow \mathbb{R}$  be a twice differentiable function such that  $f(2) = 1$ . If  $F(x) = xf(x)$  for all  $x \in \mathbb{R}$ ,  $\int_0^2 xF'(x) dx = 6$  and  $\int_0^2 x^2 F''(x) dx = 40$ , then  $F'(2) + \int_0^2 F(x) dx$  is equal to:

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

- (1) 13                      (2) 11                      (3) 9                      (4) 15

Scan or tap for the  
full solution



### Section B (Numerical) — 2 questions

**Q.4** The number of elements in the set  $S = \{x : x \in [0, 100] \text{ and } \int_0^x t^2 \sin(x-t) dt = x^2\}$  is

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

Scan or tap for the  
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**Q.5** If  $\int_0^1 4\cot^{-1}(1-2x+4x^2)dx = a\pi^{-1}(2) - b\log_e(5)$ , where  $a, b \in \mathbb{N}$ , then  $(2a+b)$  is equal to \_\_\_\_\_.

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

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full solution



### ANSWER KEY

#### Section A (MCQ) — 3 questions

| Ques. | 1 | 2 | 3 |  |  |  |  |  |  |  |  |  |  |
|-------|---|---|---|--|--|--|--|--|--|--|--|--|--|
| Ans.  | 3 | 3 | 2 |  |  |  |  |  |  |  |  |  |  |

#### Section B (Numerical) — 2 questions

| Ques. | 4  | 5 |  |  |  |  |  |  |  |  |  |  |  |
|-------|----|---|--|--|--|--|--|--|--|--|--|--|--|
| Ans.  | 16 | 9 |  |  |  |  |  |  |  |  |  |  |  |