

## PART 1 - MATHEMATICS

Topic : Integrals

## SECTION-A : (Maximum Marks : 4)

- This section contains **ONE** question.
- Each question has **FOUR** options (A), (B), (C) and (D). **ONLY ONE** of these four options is the correct answer.
- For each question, choose the option corresponding to the correct answer.
- Answer to each question will be evaluated according to the following marking scheme :  
 Full Marks : +4 If **ONLY** the correct option is chosen;  
 Zero Marks : 0 If none of the options is chosen (i.e. the question is unanswered);  
 Negative Marks : -1 In all other cases.

1. The value of the definite integral

$$\int_0^2 \frac{1}{3^x + 3} dx$$

is

(A)  $\frac{1}{2}$

(B)  $\frac{1}{3}$

(C)  $\frac{\log_e 3}{3}$

(D)  $\frac{\log_e 3}{2}$

[JEE Advanced 2026 Paper 2]

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Space for Rough Work

**SECTION-B : (Maximum Marks : 12)**

- This section contains **ONE** paragraph.
- Based on each paragraph, there are **THREE** questions.
- The answer to each question is a **NUMERICAL VALUE**.
- For each question, enter the correct numerical value of the answer (in decimal notation, truncated / rounded-off to the **SECOND DECIMAL PLACE**; e.g. 6.25, 7.00, -0.33, -.30, 30.27, -127.30) in the place designated to enter the answer.
- Answer to each question will be evaluated according to the following marking scheme :  
Full Marks : +4 If **ONLY** the correct answer is entered;  
Zero Marks : 0 In all other cases.

2. If

$$\alpha = \int_{\frac{1}{2}}^2 \frac{\tan^{-1} x}{2x^2 - 3x + 2} dx,$$

then the value of  $\sqrt{7} \tan \left( \frac{2\alpha\sqrt{7}}{\pi} \right)$  is \_\_\_\_\_.

(Here, the inverse trigonometric function  $\tan^{-1} x$  assumes values in  $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ .) [JEE Advanced 2025 Paper 2]

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**Paragraph for Questions 3 and 4**

Let  $f: \left[0, \frac{\pi}{2}\right] \rightarrow [0, 1]$  be the function defined by  $f(x) = \sin^2 x$  and let  $g: \left[0, \frac{\pi}{2}\right] \rightarrow [0, \infty)$  be the function defined by  $g(x) = \sqrt{\frac{\pi x}{2} - x^2}$ .

3. The value of  $2 \int_0^{\frac{\pi}{2}} f(x)g(x) dx - \int_0^{\frac{\pi}{2}} g(x) dx$  is \_\_\_\_\_.

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4. The value of  $\frac{16}{\pi^3} \int_0^{\frac{\pi}{2}} f(x)g(x) dx$  is \_\_\_\_\_.

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JEE ADVANCED INTEGRALS — PROPERTIES OF DEFINITE  
INTEGRALS — PYQS

Test Pattern : JEE (Advanced)

ANSWER KEY

| SECTION-A |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Ques.     | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ans.      | B |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

| SECTION-B |    |   |      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------|----|---|------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Ques.     | 2  | 3 | 4    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ans.      | 21 | 0 | 0.25 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |