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ADVANCED MATH CLASSES

Class XII - Mathematics (041)

Topics - Definite Integrals

Alpha Test Series-7

(For Academic session 2025-26)

Max. Marks - 30

Time - 60 Minutes

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Followings are of 2 Marks each (Q01-05).

Q01. Find the value of $\int_0^{\pi} [x] dx$, where $[x]$ is greatest integer function.

Q02. Find $\int_0^{\frac{\pi}{2}} |\sin 2x| dx$.

Q03. Show that $\int_0^{\frac{\pi}{2}} \sin 2x \cos 3x dx = -\frac{2}{5}$.

Q04. Evaluate $\int_0^3 |2x - 3| dx$.

Q05. Find $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{\cos x}{1 + 3^x} dx$.

[2 × 5 = 10]

Followings are of 3 Marks each (Q06-07).

Q06. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\cos^2 x}{\cos^2 x + 4 \sin^2 x} dx$.

OR

Evaluate $\int_0^{\frac{\pi}{4}} \frac{\sin x + \cos x}{16 + 9 \sin 2x} dx$.

Q07. Prove that $\int_0^{\frac{\pi}{2}} \frac{3 \cos^2 x}{1 + \sin x \cos x} dx = \frac{\pi}{\sqrt{3}}$.

[3 × 2 = 6]

Following is of 4 Marks (Q08).

Q08. **PASSAGE BASED QUESTION :** Let $f(x)$ be a continuous function on the closed interval $[a, b]$

and $F(x)$ be an antiderivative of $f(x)$. Then $\int_a^b f(x) dx = [F(x)]_a^b = F(b) - F(a)$.

$$\text{Also } \int_{-a}^a f(x) dx = \begin{cases} 2 \int_0^a f(x) dx, & \text{if } f(-x) = f(x) \\ 0, & \text{if } f(-x) = -f(x) \end{cases}$$

Based on the passage given above, answer the following :

(i) Find $\int_{\pi/3}^{\pi/4} (\tan x + \cot x)^2 dx$.

(ii) Determine $\int_{-\pi}^{\pi} x^2 \log \left(\frac{1 - \tan x}{1 + \tan x} \right) dx$.

[2 × 2 = 4]

Followings are of 5 Marks each (Q09-10).

Q09. Find $\int_0^{\pi} \log(1 + \cos x) dx$.

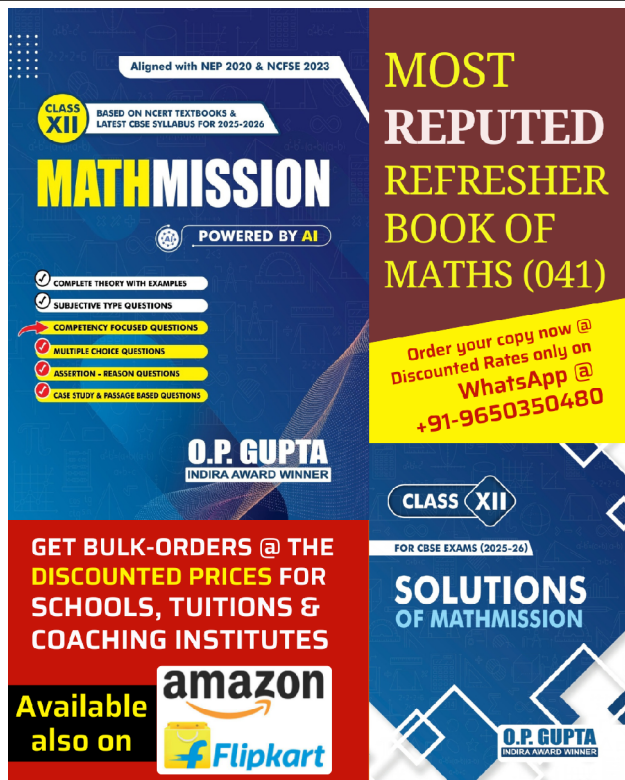
OR

Find $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \left\{ \frac{x + \frac{\pi}{4}}{2 - \cos 2x} \right\} dx$.

Q10. Evaluate $\int_0^1 \frac{8 \log(1+x)}{1+x^2} dx$.

[5 × 2 = 10]

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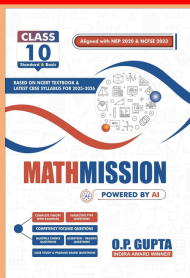
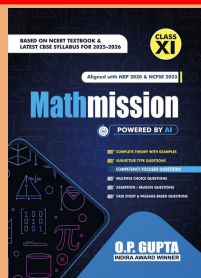
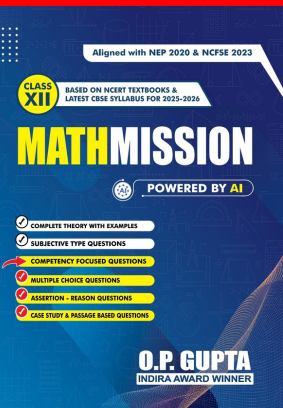
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