

By **O.P. GUPTA**

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$V = \frac{4}{3} \pi r^3$$

MULTIPLE CHOICE TYPE QUESTIONS

For CBSE 2026 Exams - Mathematics (041) - Class 12

Topics : Definite Integrals

Max. Marks : 25

Select the correct option in the followings. Each question carries 1 mark.

Q01. Given that $\int_0^{\frac{\pi}{4}} \sin 3x \cos x \, dx = \frac{1}{2}$. Then the value of $\int_0^{\frac{\pi}{4}} \sin 3\theta \cos \theta \, d\theta$ is

- (a) $-\frac{1}{2}$ (b) 1 (c) 2 (d) $\frac{1}{2}$

Q02. If $\int_0^{2a} f(x) \, dx = 0$, then we must have

- (a) $f(2a - x) = f(x)$ (b) $f(2a - x) = -f(x)$ (c) $f(a - 2x) = f(x)$ (d) $f(a - 2x) = -f(x)$

Q03. $\int_{-\frac{\pi}{4}}^{\frac{\pi}{4}} \sec^2 x \, dx$ is equal to

- (a) -1 (b) 0 (c) 1 (d) 2

Q04. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{1}{x^2} \sin\left(\frac{1}{x}\right) \, dx$, where $x \neq 0$, is equal to

- (a) -2 (b) 0 (c) 1 (d) π

Q05. $\int_1^e \frac{\log x}{x} \, dx$ is equal to

- (a) $\frac{e^2}{2}$ (b) 1 (c) $\frac{1}{2}$ (d) $-\infty$

Q06. $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} x \cos^2 x \, dx$ equals

- (a) 2 (b) 0 (c) 1 (d) π

Q07. If $\int_0^{\pi/2} \log\left(\frac{4+3\sin x}{4+3\cos x}\right) \, dx = \lambda$, then the value of $(2024)^{2023\lambda}$ is

- (a) 0 (b) 1 (c) 2 (d) None of these

- Q08. If $\int_0^a \frac{dx}{1+4x^2} = \frac{\pi}{8}$, then the value of a is
 (a) 2 (b) $\frac{1}{2}$ (c) 0 (d) 1
- Q09. $\int_{-2}^2 (x^3 + 1)dx =$
 (a) 2 (b) 4 (c) 0 (d) None of these
- Q10. $\int_{-1}^1 \frac{|x|}{x} dx =$
 (a) -1 (b) 0 (c) 1 (d) 2
- Q11. If $\int_0^{\pi/2} \log \sin x dx = -\frac{\pi}{2} \log 2$, then the value of $\int_0^{\pi/2} \log \cos x dx$ is given by
 (a) $\frac{\pi}{2} \log 2$ (b) $\pi \log \frac{1}{2}$ (c) $\frac{\pi}{2} \log \left(\frac{1}{2}\right)$ (d) $\pi \log 2$
- Q12. If $\int_0^{\pi/2} \log \sin x dx = -\frac{\pi}{2} \log 2$, then the value of $\int_0^1 \frac{\log x}{\sqrt{1-x^2}} dx$ is given by
 (a) $\frac{\pi}{2} \log 2$ (b) $\pi \log \frac{1}{2}$ (c) $\frac{\pi}{2} \log \left(\frac{1}{2}\right)$ (d) $\pi \log 2$
- Q13. If $\int_a^b f(x) dx = k \int_b^a f(x) dx$, then k =
 (a) -1 (b) 0 (c) 1 (d) Data insufficient
- Q14. $\int_0^{\frac{\pi}{2}} (\sin^{100} x - \cos^{100} x) dx$ equals
 (a) $\frac{\pi}{100}$ (b) 0 (c) $\frac{1}{100}$ (d) $\frac{100}{(100)^{100}}$
- Q15. $\int_3^6 \frac{x}{x^2+1} dx =$
 (a) $\frac{1}{2} \log \left(\frac{10}{37}\right)$ (b) $\log \left(\frac{37}{10}\right)$ (c) $2 \log \left(\frac{37}{10}\right)$ (d) $\frac{1}{2} \log \left(\frac{37}{10}\right)$
- Q16. Let $[.]$ be the greatest integer function. Then $\int_0^{\frac{5}{2}} [x] dx =$
 (a) 2 (b) 1 (c) 0 (d) None of these
- Q17. $\int_0^{\pi/2} f(\sin 2x) \sin x dx =$

(a) $\int_0^{\pi} f(\sin 2x) \cos x \, dx$

(b) $\int_0^{\pi/2} f(\sin 2x) \cos x \, dx$

(c) $\int_0^{\pi/2} f(\cos 2x) \cos x \, dx$

(d) $\int_0^{\pi/2} f(\cos 2x) \sin x \, dx$

Q18. $\int_0^{\pi/2} \frac{2^{\sin x}}{2^{\sin x} + 2^{\cos x}} \, dx =$

(a) $\frac{\pi}{4}$

(b) $\frac{\pi}{2}$

(c) π

(d) $-\frac{\pi}{2}$

Q19. $\int_{-\pi/2}^{\pi/2} \frac{\cos x}{1 + e^x} \, dx =$

(a) 0

(b) 1

(c) π

(d) $\frac{\pi}{4}$

Q20. If $f(2a - x) = f(x)$ and $\int_0^{2a} f(x) \, dx = k \int_0^a f(x) \, dx$, then the value of k is

(a) 0

(b) 1

(c) 2a

(d) 2

Q21. Let $f(x) = \log(x + \sqrt{x^2 + 1})$. Then $f(x)$ is

(a) an odd function

(b) an even function

(c) neither even function nor odd function

(d) a parametric function

Q22. $\int_0^{\pi/8} \tan^2(2x) \, dx$ is equal to

(a) $\frac{4 - \pi}{8}$

(b) $\frac{4 + \pi}{8}$

(c) $\frac{4 - \pi}{4}$

(d) $\frac{4 - \pi}{2}$

Question numbers 23 to 25 are Assertion and Reason based questions. Two statements are given, one labelled **Assertion (A)** and the other labelled **Reason (R)**. Select the correct answer from the codes (a), (b), (c) and (d) as given below.

(a) Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).

(b) Both Assertion (A) and Reason (R) are true and Reason (R) is **not** the correct explanation of Assertion (A).

(c) Assertion (A) is true but Reason (R) is false.

(d) Assertion (A) is false but Reason (R) is true.

Q23. **Assertion (A)** : $\int_{\pi/5}^{3\pi/10} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} \, dx = \frac{\pi}{10}$.

Reason (R) : $\int_a^b f(x) \, dx = \int_a^b f(a + b - x) \, dx$.

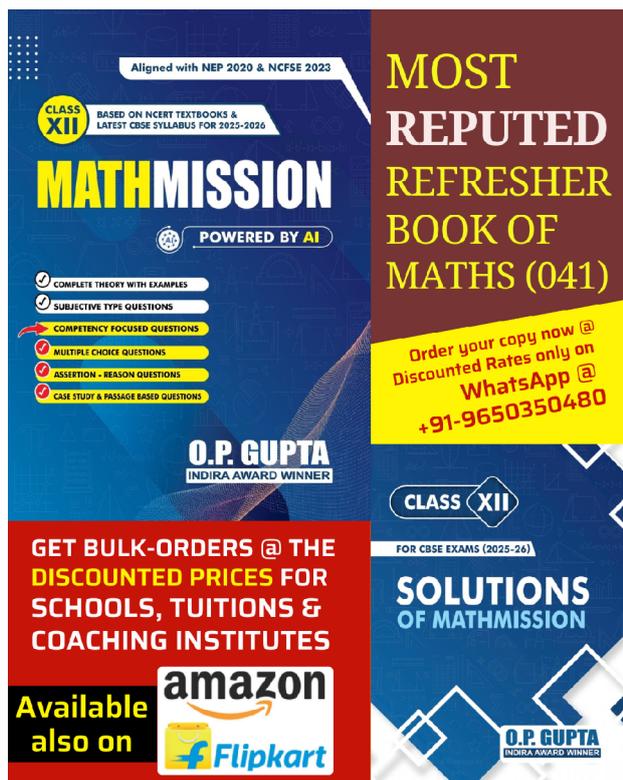
Q24. **Assertion (A)** : $\int_{-\pi/4}^{\pi/4} \sin^2 x \, dx = 2 \int_0^{\pi/4} \sin^2 x \, dx$.

Reason (R) : If $f(x)$ is an even function, then $\int_{-a}^a f(x) dx = 2 \int_0^a f(x) dx$.

Q25. **Assertion (A) :** $\int_0^5 \sqrt{25-x^2} dx = \frac{25\pi}{4}$.

Reason (R) : $\int_0^{2a} f(x) dx = 2 \int_0^a f(x) dx$, for all the real functions $f(x)$.

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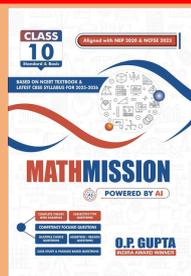
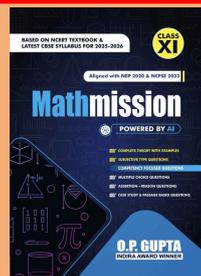
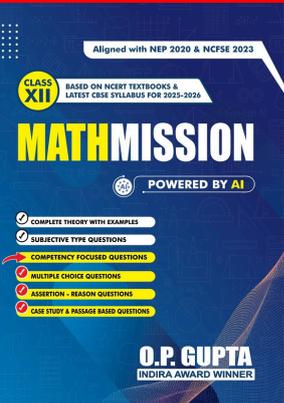
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