PRACTICE PAPER 01 (2026-27)
CHAPTER 07 : INTEGRALS

SUBJECT: MATHEMATICS	**MAX. MARKS:** 40
CLASS: XII	**DURATION:** 1½ hrs

General Instructions:

(i) All questions are compulsory.

(ii) This question paper contains 20 questions divided into five Sections A, B, C, D and E.

(iii) Section A comprises 10 MCQs of 1 mark each (Q9 and Q10 are Assertion–Reason questions). Section B comprises 4 questions of 2 marks each. Section C comprises 3 questions of 3 marks each. Section D comprises 1 question of 5 marks with an internal choice. Section E comprises 2 case study based questions of 4 marks each, with internal choice in the last sub-part.

(iv) There is no overall choice. Internal choices have been provided where indicated.

(v) Use of calculators is not permitted.

SECTION – A

Questions 1 to 10 carry 1 mark each.

1. $\int (3x^2 + 4\cos x)\,dx$ is equal to

(a) $x^3 + 4\sin x + C$ (b) $x^3 - 4\sin x + C$

(c) $6x - 4\sin x + C$ (d) $\frac{x^3}{3} + 4\sin x + C$

2. $\int \frac{dx}{x\log x}$ is equal to

(a) $\log|x| + C$ (b) $\frac{1}{\log x} + C$

(c) $\log|\log x| + C$ (d) $\frac{(\log x)^2}{2} + C$

3. $\int e^x(\sin x + \cos x)\,dx$ is equal to

(a) $e^x\cos x + C$ (b) $e^x\sin x + C$

(c) $e^x(\sin x - \cos x) + C$ (d) $\frac{e^x\sin x}{2} + C$

4. The value of $\int_0^2 |x-1|\,dx$ is

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

5. The value of $\int_0^1 \frac{2x}{1+x^2}\,dx$ is

(a) 2 log 2 (b) 1 (c) log 2 (d) 1/2

6. $\int \frac{dx}{x^2+16}$ is equal to

(a) $\tan^{-1}\frac{x}{4} + C$ (b) $4\tan^{-1}\frac{x}{4} + C$

(c) $\frac{1}{16}\tan^{-1}\frac{x}{4} + C$ (d) $\frac{1}{4}\tan^{-1}\frac{x}{4} + C$

7. $\int \frac{dx}{\sin^2 x \cos^2 x}$ is equal to

(a) $\tan x - \cot x + C$ (b) $\tan x + \cot x + C$

(c) $-\tan x - \cot x + C$ (d) $\cot x - \tan x + C$

8. The value of $\int_0^3 \frac{\sqrt{x}}{\sqrt{x} + \sqrt{3-x}} dx$ is

(a) 3 (b) 3/2 (c) 9/2 (d) 0

For Q9 and Q10, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.

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

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

(c) A is true but R is false.

(d) A is false but R is true.

9. Assertion (A): $\int x^n dx = \frac{x^{n+1}}{n+1} + C$ for every real number n.

Reason (R): $\int \frac{dx}{x} = \log|x| + C$ for x ≠ 0.

10. Assertion (A): $\int_{-\pi/2}^{\pi/2} \sin x \, dx = 0$.

Reason (R): If f is an odd function, then $\int_{-a}^{a} f(x) \, dx = 0$.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. Evaluate $\int \left(x + \frac{1}{x}\right)^2 dx$.

12. Evaluate $\int \frac{\cos x}{1 + \sin^2 x} dx$.

13. Evaluate $\int_1^e \frac{\log x}{x} dx$.

14. Evaluate $\int \frac{dx}{x^2 - 4}$.

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. Evaluate $\int x \sec^2 x \, dx$.

16. Evaluate $\int \frac{3x + 5}{(x+1)(x+3)} dx$.

17. Evaluate $\int_0^{\pi/2} \frac{\sin x}{1 + \cos^2 x} dx$.

SECTION – D

Question 18 carries 5 marks.

18. Evaluate $\int_0^{\pi} \frac{x \sin x}{1+\cos^2 x}\, dx$.

OR

Evaluate $\int \frac{dx}{(x+1)(x^2+4)}$.

SECTION – E (Case Study Based Questions)

Questions 19 and 20 carry 4 marks each.

19. A manufacturer finds that the marginal cost (the rate of change of total cost C with respect to the number of units x produced) is given by dC/dx = 6x + 40 (in ₹). The fixed cost, i.e. the cost when x = 0, is ₹500.

Based on the above information, answer the following questions:

(i) Write $\int (6x+40)\, dx$ and evaluate it. (1)

(ii) Find the total cost function C(x). (1)

(iii) Find the extra cost when production rises from 10 to 20 units, i.e. $\int_{10}^{20} (6x+40)\, dx$. (2)

OR

(iii) Find the total cost of producing 30 units. (2)

20. A particle moves along a straight line with velocity v(t) = 3t² − 12t + 9 m/s, where t is the time in seconds. At t = 0 the particle is at the origin, so its position s(t) satisfies s′(t) = v(t) and s(0) = 0.

Based on the above information, answer the following questions:

(i) Find the position function s(t). (1)

(ii) Find the displacement of the particle in the first 3 seconds. (1)

(iii) Find the total distance travelled in the first 3 seconds. (2)

OR

(iii) Find the displacement of the particle in the first 5 seconds. (2)

— End of Question Paper —