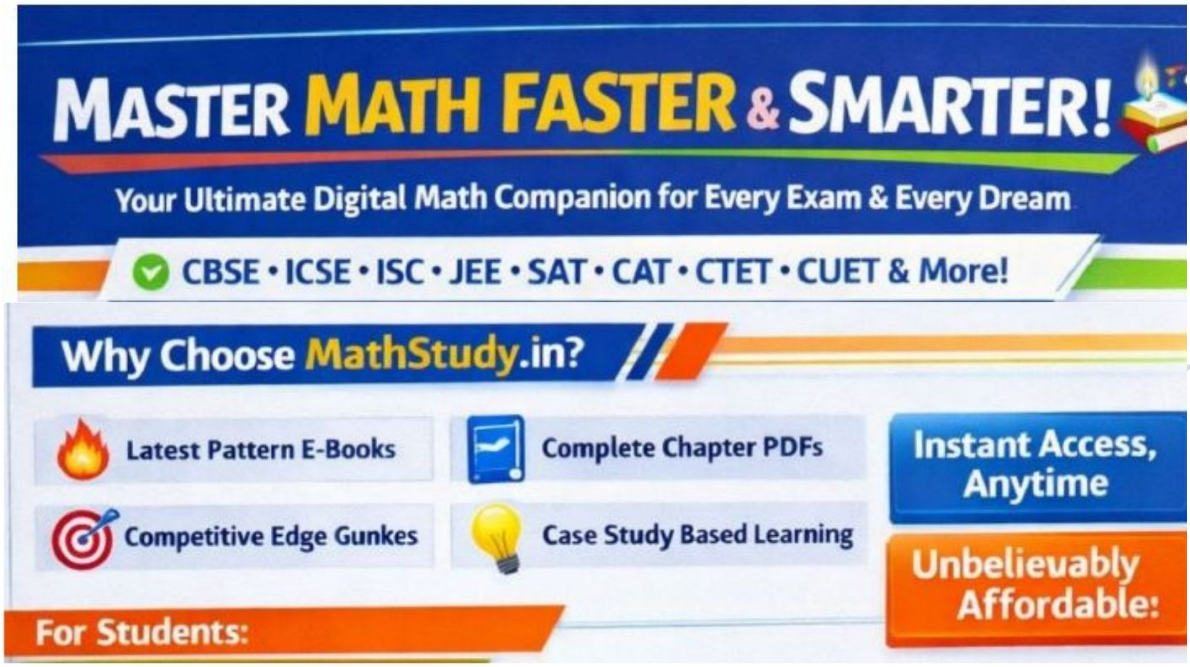
Chapter: Integration and its Applications

General Instructions

1. Total Questions: **20**
2. Duration: **60 Minutes**
3. All questions are compulsory.
4. Read each question carefully before answering.
5. Choose the most appropriate answer from the given options.
6. Use of calculator or electronic devices is strictly prohibited.

1. Evaluate the indefinite integral: $\int \frac{x^2}{(x\sin x+\cos x)^2}dx$.
2. Find the value of $\int \frac{\sqrt{\tan x}}{\sin x\cos x}dx$.
3. Evaluate: $\int \frac{dx}{x^2(x^4+1)^{3/4}}$.
4. Solve the integral: $\int e^x \frac{x^2+1}{(x+1)^2}dx$.
5. Evaluate: $\int \frac{\cos 5x+\cos 4x}{1-2\cos 3x}dx$.
6. Evaluate the definite integral: $\int_0^\pi \frac{xdx}{a^2\cos^2 x+b^2\sin^2 x}$.
7. Find the value of $\int_0^{\pi/2} \frac{\sin^2 x}{\sin x+\cos x}dx$.
8. Evaluate $\int_0^{\pi/4} \log(1+\tan x)dx$ using the properties of definite integrals.
9. Solve: $\int_0^1 \cot^{-1}(1-x+x^2)dx$.
10. Evaluate: $\int_0^\infty \frac{dx}{(1+x^2)(1+x^n)}$.
11. Find the area of the region bounded by the parabola $y^2 = 4x$ and the line $y = x$.
12. Calculate the area of the region common to the circles $x^2 + y^2 = 4$ and $(x-2)^2 + y^2 = 4$.
13. Find the area of the smaller region bounded by the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ and the line $\frac{x}{3} + \frac{y}{2} = 1$.
14. Find the area of the region bounded by $y = |x-1|$ and $y = 3 - |x|$.
15. Evaluate the integral: $\int \frac{dx}{\cos^6 x+\sin^6 x}$.
16. Find the area of the region bounded by the curve $y = \log x$, x-axis and the ordinate $x = e$.
17. Evaluate: $\int \frac{2x+1}{\sqrt{x^2+4x+3}}dx$.
18. Find the value of $\int_0^{1.5}[x^2]dx$, where [.] denotes the greatest integer function.
19. Using integration, find the area of the triangle whose vertices are $(-1, 0)$, $(1, 3)$, and $(3, 2)$.
20. Evaluate: $\int \frac{\sin x-\cos x}{\sqrt{\sin 2x}}dx$.



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