

Autumn Break Holiday Homework

Class – XII

TOPIC- INTEGRALS

1 Mark Questions

01. Evaluate $\int \frac{dx}{\sin^2 x \cos^2 x}$

02. Integrate $\frac{1 - \sin x}{\cos^2 x}$ with respect to x

03. Integrate $\sin^2 x$ with respect to x

04. Evaluate $\int \frac{x + \cos 6x}{3x^2 + \sin 6x} dx$

05. Integrate $x \sec^2 x$ with respect to x

06. Evaluate: $\int_{-1}^1 (x+1) dx$

07. Evaluate $\int_0^1 \cot^{-1}(1-x+x^2)$

08. Write the $\int_0^{\frac{\pi}{2}} \log \left| \frac{3+5 \sin x}{3+5 \cos x} \right| dx$

09. Evaluate: $\int \frac{dx}{x^2 + 2x + 2}$

10. Integrate $e^{x+3} + 6 \cos x - 4x^3 + 5$

11. Find the value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^7 x dx$

12. Evaluate: $\int_{-\pi/4}^{\pi/4} x^3 \sin^4 x dx$

17. Evaluate: $\int \frac{x}{x-4} dx$

18. Eval: $\int \frac{10x^9 + 10^x \log_e 10}{x^{10} + 10^x} dx$

19. Evaluate: $\int \frac{e^x(1+x)}{\cos^2(e^x x)} dx$

20. Evaluate: $\int \frac{dx}{x^2 - 2x + 1}$

21. Evaluate: $\int y^3 e^{y^4} dy$

22. Evaluate: $\int \sqrt{4-p^2} dp$

23. Evaluate $\int \frac{dx}{x + x \log x}$

24. Evaluate $\int \cot^2 x dx$

25. Evaluate: $\int \sqrt{z^2 - 4z + 3} dz$

26. Evaluate: $\int x^{17} \cos^6 x dx$

27. Evaluate: $\int \frac{x}{x-4} dx$

28. Evaluate: $\int \frac{x}{x^2 - 16} dx$

13. Integrate $3 \operatorname{Cosec}^2 x - 5x + \sin x$ w.r.to x
14. Evaluate: $\int \tan^2 x \, dx$
15. Evaluate: $\int e^x \left(\frac{1}{x} - \frac{1}{x^2} \right) dx$
16. Integrate $x e^x$ with respect to x
29. What is $f'(x)$ if $f(x) = \int_0^x t \sin t \, dt$
30. Integrate $x(2x-5)$ w.r.to x
31. Eval: $\int e^x (\sin 2x + 2 \cos 2x) \, dx$
32. Find the anti deri.of $\sin^2 x \cos x$

4 Mark Questions

01. Evaluate $\int \frac{(x^2 + 1)e^x}{(x + 1)^2} dx$
02. Evaluate $\int \frac{5}{(x + 1)(x^2 + 4)} dx$
03. Evaluate $\int \frac{e^{2x} - 1}{e^{2x} + 1} dx$
04. Evaluate $\int \sqrt{1 + \sin 2x} \, dx$
05. Evaluate $\int \frac{x^2 - 1}{x^4 + x^2 + 1} dx$
06. Evaluate $\int \frac{dx}{\cos(x - a) \cos(x - b)}$
08. Evaluate: $\int \frac{\sin(x + a)}{\sin(x - a)} dx$
09. Integrate $\frac{\tan^4 \sqrt{x}}{\sqrt{x}} \sec^2 \sqrt{x}$ w.r.to x
10. Evaluate $\int \frac{(3x - 1) dx}{(x - 1)(x - 2)(x - 3)}$
11. Integrate $\frac{(x^2 + 1)(x^2 + 2)}{(x^2 + 3)(x^2 + 4)}$ with respect to x
13. Integrate $1/[x(x^4 - 1)]$ with respect to x .
14. Integrate $x^2 + 1$ as a limit of sum as x ranges from 0 to 5
15. Evaluate the integral as a limit of sum $\int_0^2 (3x^2 + 4) dx$

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

17. Evaluate $\int_0^2 e^x dx$ as a limit of sum

18. Evaluate $\int_1^2 \frac{\sqrt{x}}{\sqrt{3-x} + \sqrt{x}} dx$

19. Evaluate: $\int_0^4 |2x-1| dx$

20. Evaluate $\int_{-1}^2 |x^3 - x| dx$

21. Evaluate: $\int_0^{\frac{\pi}{2}} \frac{1}{1 + \tan x} dx$

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

23. Evaluate: $\int_0^4 |2x-1| dx$

24. Evaluate: $\int_0^{\pi/6} \frac{\cos x}{(1 - \sin x)(2 - \sin x)} dx$

25. Evaluate: $\int_{\pi/6}^{\pi/3} \frac{dx}{1 + \sqrt{\tan x}}$

26. Evaluate $\int x(\log x)^2 dx$

27. Integrate $\frac{x \cos^{-1} x}{\sqrt{1-x^2}}$ w.r.t.x

28. Evaluate $\int \frac{6x+7}{\sqrt{(x-5)(x-4)}} dx$

6 Mark Questions

01. Evaluate $\int \frac{1}{\sin x(2 + \cos x)} dx$
02. Evaluate $\int_0^{\frac{\pi}{2}} \log \sin x dx$
04. Evaluate $\int_0^{\frac{\pi}{4}} \frac{\sin x + \cos x}{9 + 16 \sin 2x} dx$
05. Evaluate $\int \frac{1}{x^3 + x^2 + x + 1} dx$
06. Evaluate $\int_1^4 f(x) dx$ where $f(x) = |x-1| + |x-2| + |x-3|$
07. Evaluate: $\int \sqrt{\tan x} dx$
08. Evaluate: $\int [\sqrt{\tan x} + \sqrt{\cot x}] dx$
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TOPIC -APPLICATIONS OF INTEGRALS

4 Mark Questions

1. Find the area lying above the x axis and included between the circle $x^2 + y^2 = 8x$ and the parabola $y^2 = 4x$
2. Find the area of the region bounded by the parabola $y = x^2$ and $y = |x|$
3. Find the area of the region bounded by the curves $y = x^2 + 2$, $y = x$, $x = 0$ and $x = 3$
4. Find the area of the region $y = |x+2|$ as x ranges from (-3) to 4 after sketching the graph

6 Mark Questions

03. Sketch the graph $y = |x-1|$. Evaluate $\int_{-2}^4 |x-1| dx$. What does this integral represents on the graph?

04. Find the area bounded by curves $(x-2)^2 + y^2 = 4$ and $x^2 + y^2 = 4$
05. Find the area under the curve $y = \sin x$ and $y = \sin 2x$ between $x = 0$ and $x = \pi/3$ and x-axis are in the ratio 2:3
06. Find the area bounded by curves $(x-1)^2 + y^2 = 1$ and $x^2 + y^2 = 1$.
07. Using the area of the triangle with vertices (1,1),(2,3),(3,1.5) using integration
08. Draw the sketch of the following region and find its area:
 $\{(x, y) : x^2 + y^2 \leq 1 \leq x + y\}$
09. Using integration find the area of the triangular region whose sides have the equations $y = 2x+1$, $y=3x+1$ and $x=4$
10. Find the area of the smaller region bounded by the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ and the line $x/3 + y/2 = 1$.
11. Find the area bounded by the curves $\{(x,y) : y \geq x^2 \text{ and } y = |x|\}$.
12. Find the area bounded by the curves $\{(x,y) : y^2 \leq 4x, 4x^2+4y^2 \leq 9\}$
13. Find the area of the smaller part of the circle $x^2+y^2=a^2$ cut off by the line $x=a/\sqrt{2}$
