

# CLASS XII SAMPLE PAPER MATHS

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## SECTION-A

1.  $\int \sin^3 x dx$

2.  $\int \frac{1 + \sin 3x}{3x - \cos 3x} dx$

3.  $\int \frac{dx}{x \cos^2(1 + \log x)}$

4.  $\int \frac{e^x}{e^x + 1} dx$

5. Sketch the area of the region bounded by line  $y = 3x + 2$ , the x-axis and the ordinates  $x = -1$  and  $x = 1$

6. Find the integrating factor:  $(1 - y^2) \frac{dy}{dx} + yx = a y$ ,  $(-1 < y < 1)$ .

7.  $\int_0^{2.5} [x] dx$

8. Prove  $\int_0^a f(x) dx = \int_0^a f(a-x) dx$

9.  $\int \frac{1}{\sqrt{x-2} - \sqrt{x+1}} dx$

10.  $\int_{-\pi/2}^{\pi/2} x^7 \sin^4 x dx$

11.  $\int \frac{3x}{1+2x^4} dx$

12.  $\int \frac{\sin(\tan^{-1} x)}{1+x^2} dx$

14.  $\int x^2 e^{x^3} dx$

15.  $\int_{-5}^3 |x+3| dx$

16.  $\int_0^{\pi/2} \cos x e^{\sin x} dx$

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

18. Sketch the region enclosed between circles  $x^2 + y^2 = 1$  and  $x^2 + (y - 1)^2 = 1$ .

19. Solve:  $\frac{dy}{dx} = y \cot 2x$ , given  $y(\pi/4) = 2$

20.  $\int \frac{x^4 + x^2 + 1}{x^2 - x + 1} dx$

21.  $\int_0^{1.5} [x] dx$       22.  $\int \sqrt{1 + 2 \tan x (\tan x + \sec x)} dx$       23.  $\int \frac{x^2}{1+x^3} dx$
24.  $\int_0^{\frac{\pi}{2}} \log \left( \frac{4+3\sin x}{4+3\cos x} \right) dx$       25.  $\int \frac{2x+1}{\sqrt{x^2+x}} dx$       26.  $\int_0^1 x(1-x)^5 dx$
27.  $\int \sqrt{x^2+4x+2} dx$       28.  $\int \frac{2^x}{1-4^x} dx$       29.  $\int_1^3 \frac{\sqrt{4-x}}{\sqrt{x}+\sqrt{4-x}} dx$
30. Write order and degree  $\frac{d^4 y}{dx^4} + \sin \left( \frac{dy}{dx} \right) = 0$
31.  $\int_0^1 x(1-x)^5 dx$       32. Write order and degree:  $\frac{d^4 y}{dx^4} + \sin \left( \frac{dy}{dx} \right) = 0$       33.  $\int_{-1}^{1.5} [x] dx$
34.  $\int_0^1 \tan^{-1} \left( \frac{2x-1}{1+x-x^2} \right) dx$       35. Find the integrating factor:  $(1-y^2) \frac{dy}{dx} + yx = a y$ ,  $(-1 < y < 1)$ .

### SECTION-B

1.  $\int e^x \left( \frac{2+\sin 2x}{1+\cos 2x} \right) dx$       2.  $\int \frac{(x^2+1)e^x}{(x+1)^2} dx$       3.  $\int (\sin^{-1} x)^2 dx$
4.  $\int \left[ \log(\log x) + \frac{1}{(\log x)^2} \right] dx$       5.  $\int \frac{dx}{3-5\sin x}$       6.  $\int \frac{2x}{(x^2+2)(x^2-3)} dx$
7.  $\int \frac{3x+5}{x^3-x^2-x+1} dx$       8.  $\int \frac{e^x}{\sqrt{5-4e^x-e^{2x}}} dx$       9.  $\int_0^{\pi/2} \frac{x \cos x}{1+\sin^2 x} dx$
10. Solve:  $x^2 y dx - (x^3 + y^3) dy = 0$ .      11.  $\int_0^1 \frac{\log(1+x)}{1+x^2} dx$       12.  $\int \sec^3 x dx$
13.  $\int \frac{1}{x^{1/2} + x^{1/3}} dx$       14.  $\int \frac{\cos x + \sin x}{\sqrt{\sin 2x}} dx$       15.  $\int \frac{\sqrt{\tan x}}{\sin x \cos x} dx$
16.  $\int \frac{\sin x}{\sin 3x} dx$       17. Solve:  $x(x dy - y dx) = y dx$ ,  $y(1) = 1$ .      18.  $\int_0^{\pi/2} \log \cos x dx$

19. Solve:  $x \log x \frac{dy}{dx} + y = \frac{2}{x} \log x, x > 0.$

20 Solve :  $\cos (x + y) dy = dx, y(0)= 0$

21.  $\int_0^{\pi} \frac{xdx}{a^2 \cos^2 x + b^2 \sin^2 x}$

22.  $\int_2^4 e^{3-2x} dx$  as a limit of a sum.

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

24. Solve:  $(\tan^{-1} y - x)dy = (1 + y^2)dx$

25. Solve:  $x \cos \frac{y}{x} (ydx + xdy) = y \sin \frac{y}{x} (xdy - ydx)$

26.  $\int \frac{x^2+1}{x^4+1} dx$

27.  $\int \frac{1}{x^2(x^{\frac{3}{4}} + 2)^4} dx$

28. Show that  $\int_{-a}^a \sqrt{\frac{a-x}{a+x}} dx = a\pi$

29. Solve:  $\cos^2 x \frac{dy}{dx} + y = \tan x$

30.  $\int \frac{\sin^{-1} \sqrt{x} - \cos^{-1} \sqrt{x}}{\sin^{-1} \sqrt{x} + \cos^{-1} \sqrt{x}} dx$

31. Form the differential equation representing the family of the ellipses having foci on x-axis and centre at the origin

32. Solve :  $\sqrt{1-y^2} dx = (\sin^{-1} y - x)dy; y(0)=0$

33.  $\int \frac{dx}{\cos(x+a)\cos(x+b)}$

34.  $\int \frac{x^2}{(x^2+2)(x^2-3)} dx$

35. Evaluate:  $\int_0^{\frac{\pi}{2}} (2 \log \sin x - \log \sin 2x)$

36.  $\int_0^{\pi/2} \sin 2x \cdot \log \tan x dx$

37.  $\int_0^{\frac{\pi}{2}} \frac{x - \sin x}{1 + \cos x} dx$

38.  $\int_0^{\frac{\pi}{2}} \frac{2 + \sin x}{1 + \cos x} e^{\frac{x}{2}} dx$

39.  $\int_0^{\frac{\pi}{2}} \log \sin x dx$

40. Solve:  $x \frac{dy}{dx} = y (\log y - \log x + 1)$

41.  $(x^2 - y^2)dx + 2xydy = 0$ , if  $y(1)=1.$

42.  $\int \frac{\sin(x+a)}{\cos(x+b)} dx$

43.  $\int \frac{x^2 - 4}{x^4 + 16} dx$

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

44.  $\int_0^{\pi} \frac{xdx}{a^2 \cos^2 x + b^2 \sin^2 x}$

45.  $\int \frac{5x+3}{\sqrt{x^2+4x+10}} dx$

46.  $\int \frac{1}{x^4+1} dx$

47.  $\int_0^{\pi} \frac{x \tan x}{\sec x + \tan x} dx$

48.  $\int_0^{\pi/2} \sin 2x \cdot \log \tan x dx$

49.  $\int_0^{\pi/2} \frac{dx}{2\cos x + 4\sin x}$     50. Solve:  $\cos^2 x \frac{dy}{dx} + y = \tan x$     51. Solve  $\frac{dy}{dx} = (4x + y + 1)^2$   
 55.  $\int \frac{2x^2}{(1+x^2)(3+x^2)} dx$     56.  $\int \sin^5 x \cos^4 x dx$     57.  $\int_0^1 \frac{\log(1+x)}{1+x^2} dx$     58.  $\int \frac{\sin x}{\sin 4x} dx$ .

### SECTION-C

- Using integration find the area bounded by the line  $x+2y = 2$ ,  $y-x = 1$  and  $2x+y = 7$
- Find the ratio of the areas into which curve  $y^2 = 6x$  divides the region bounded by  $x^2 + y^2 = 16$ .

- Find the area of smaller region bounded by the ellipse  $\frac{x^2}{16} + \frac{y^2}{9} = 1$  and the straight line

$\frac{x}{4} + \frac{y}{3} = 1$  using integration

4. Evaluate:  $\int \frac{\tan \theta - \tan^3 \theta}{1 + \tan^3 \theta} d\theta$

5. Evaluate  $\int_0^{\pi} \frac{1}{5 + 4\cos x} dx$

- Find the area bounded by the line  $3x-2y+12=0$  and the parabola  $4y=3x^2$ .
- Find the area bounded by the curve  $y=\sqrt{1-x^2}$ , the line  $y=x$  and the positive x-axis.
- Solve:  $(1+e^{x/y}) dx + e^{x/y} \left(1-\frac{x}{y}\right) dy = 0$

- Using integration, find the area of the region bounded by the curve  $y = 1 + |x+1|$ ,  $x = -3$ ,  $x = 3$ ,  $y = 0$

10. Find the area of the region  $\{(x, y): \frac{x^2}{9} + \frac{y^2}{4} \leq 1 \leq \frac{x}{3} + \frac{y}{2} = 1\}$

- Find the area bounded by the curves  $y = x^2 + 2$  and the line  $x = y$ ,  $x = 0$ , and  $x = 3$ .

12. Prove:  $\int_0^{\pi} \log(1 - \cos x) dx = -\pi \log 2$

13. Evaluate  $\int_{-1}^{\frac{3}{2}} |x \cos \pi x| dx$

14.  $\int_1^4 [|x-1| + |x-2| + |x-3|] dx$

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

16. Evaluate:  $\int \frac{\sin x}{\sin 4x} dx$ .

17.  $\int_0^1 \cot^{-1}(1-x+x^2) dx$

18. Find the area of the region  $\{(x, y) : x^2 + y^2 \leq 2ax, y^2 \geq ax, x \geq 0, y \geq 0\}$ .

19. Find the area of the region  $\{(x, y) : 0 \leq y \leq x^2 + 1, 0 \leq y \leq x + 1, 0 \leq x \leq 2\}$

20. Evaluate as limit of sums:  $\int_1^3 (2x^2 + 3x + 5) dx$

21. Using integration, find the area formed by the triangle joining the points (-1,1), (0,5) and (3,2).

22. Find the area bounded by the curves  $x^2 = 4y$  and the line  $x = 4y - 2$

23. Solve:  $\frac{dy}{dx} + \left(\frac{2x}{x^2 + 1}\right)y = \frac{1}{(x^2 + 1)^2}, y(0) = 0$

24. Solve:  $dy/dx + y \cot x = 2x + x^2 \cot x$

25. Find the area enclosed between the circles  $x^2 + y^2 = 4$  and  $(x - 2)^2 + y^2 = 1$

26. Find the area of the region  $\{(x, y) : |x - 1| \leq y \leq \sqrt{5 - x^2}\}$ .

27. Find the area of the region  $\{(x, y) : x^2 + y^2 \leq 1 \leq x + y\}$

28. Find the area bounded by the curves  $x^2 = 4y$  and the line  $x = 4y - 2$

29. Evaluate  $\int_1^3 (2x^2 + 3x + 5) dx$  as a limit of sum.

30.  $\int_3^6 (|x - 3| + |x - 4| + |x - 5|) dx$

31. Evaluate as limit of sums:  $\int_0^3 (x^2 + 2x + e^{2x}) dx$