

# INTEGRALS

$$\text{Q1 } \int \frac{x^2}{(x \sin x + \cos x)^2} dx$$

$$\text{Q2 } \int \frac{1}{2 - \tan x} dx$$

$$\text{Q-3 } \int \frac{1}{3 + 2 \sin x} dx$$

$$\text{Q-4 } \int \frac{1}{x^4 - 16} dx$$

$$\text{Q-5 } \int \frac{1}{x^4 + 16} dx$$

$$\text{Q-6 } \int \sqrt{\tan x} dx$$

$$\text{Q-7 } \int \sqrt{\cot x} dx$$

$$\text{Q-8 } \int (\sqrt{\tan x} + \sqrt{\cot x}) dx$$

$$\text{Q-9 } \int \sqrt{\frac{\sin(x-a)}{\sin(x+a)}} dx$$

$$\text{Q-10 } \int (x^3 + 2x) \sqrt{x^4 + 3x^2 + 1} dx$$

$$\text{Q-11 } \int \frac{dx}{x+1+\sqrt{x+2}}$$

$$\text{Q-12 } \int \sqrt{\frac{x-1}{x+1}} dx$$

$$\text{Q-13 } \int \frac{(e^{2x} + e^x)}{\sqrt{e^{2x} + e^x + 5}} dx$$

$$\text{Q-14 } \int \frac{\sin x \cos x}{\sin^4 x + \cos^4 x} dx \quad \text{PAWAN}$$

$$\text{Q-15 } \int \frac{\sin^6 x + \cos^6 x}{\sin^2 x \cos^2 x} dx$$

$$\text{Q16 } \int \frac{x^{1/2}}{x^{1/2} + x^{1/3}} dx$$

$$\text{Q-17 } \int \frac{\sin x + \cos x}{\sqrt{9 + 16 \sin 2x}} dx$$

$$\text{Q-18 } \int \frac{\sin 2x \cos 2x}{\sqrt{9 - \cos^4 2x}} dx$$

$$\text{Q-19 } \int \sqrt{e^x + 1} dx$$

$$\text{Q-20 } \int \frac{1}{\sin(x-a)\cos(x-b)} dx$$

$$\text{Q-21 } \int \frac{1}{\sin(x-a)\sin(x-b)} dx$$

$$\text{Q-22 } \int \frac{1}{(x-3)\sqrt{x-1}} dx$$

$$\text{Q-23 } \int \tan x \cdot \tan 2x \cdot \tan 3x dx$$

$$\text{Q-24 } \int \tan \sqrt{x} dx$$

$$\text{Q-25 } \int \frac{1}{\cos^2 x + \sin 2x} dx$$

$$\text{Q-26 } \int \frac{\sqrt{\cos 2x}}{\cos x} dx \quad \text{PAWAN}$$

$$\text{Q-27 } \int \frac{\sin x + \cos x}{\sin^4 x + \cos^4 x} dx$$

$$\text{Q-28 } \int \sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}} dx$$

$$\text{Q-29 } \int (x+2)(x-1)^5 dx$$

$$\text{Q-30 } \int \frac{dx}{x(x^{10}+1)}$$

$$\text{Q-31 } \int \frac{dx}{x^2(x^4+1)^{3/4}}$$

$$\text{Q-32 } \int [\log(\log x) - \frac{1}{(\log x)^2}] dx$$

$$\text{Q-33 } \int \sqrt{\frac{a+x}{a-x}} dx$$

$$\text{Q-34 } \int \frac{x^{1/2}}{1+x^{3/4}} dx$$

$$\text{Q-35 } \int \frac{\sqrt{1+x^2}}{x^4} dx$$

$$\text{Q-36 } \int \frac{\cos 5x + \cos 4x}{1 - 2\cos 3x} dx$$

$$\text{Q-37 } \int \frac{\cos x - \cos 2x}{1 - \cos x} dx$$

$$\text{Q-38 } \int \frac{x^2}{x^4 - x^2 - 12} dx$$

$$\text{Q-39 } \int \sin^{-1} \sqrt{\frac{x}{a+x}} dx$$

$$\text{Q-40 } \int \frac{x^9}{(4x^2+1)^6} dx$$

$$\text{Q-41 } \int \tan^{-1} \sqrt{x} dx$$

$$\text{Q-42 } \int \frac{x+\sin x}{1+\cos x} dx$$

$$\text{Q-43 } \int \frac{\log x - 1}{(\log x)^2} dx$$

$$\text{Q-44 } \int \frac{x}{(x^2-3)\sqrt{1+x^2}} dx$$

$$\text{Q-45 } \int \frac{\sin x}{\sin 3x} dx$$

$$\text{Q-46 } \int \frac{1}{\sin x + \sin 2x} dx$$

$$\text{Q-47 } \int \frac{2 \sin x + 3 \cos x}{\sin x - 2 \cos x} dx$$

$$\text{Q-48 } \int x \sin^{-1} x dx \quad \text{PAWAN}$$

$$\text{Q-49 } \int \frac{\sin^{-1} \sqrt{x} - \cos^{-1} \sqrt{x}}{\sin^{-1} \sqrt{x} + \cos^{-1} \sqrt{x}} dx$$

$$\text{Q-50 } \int \frac{\sin^7 x}{\cos x} dx$$

$$\text{Q-51 } \int \sqrt{\sin x} \cos^5 x dx$$

$$\text{Q-52 } \int \sin^4 3x dx$$

$$\text{Q-53 } \int \frac{\sin x}{\sin 4x} dx$$

$$\text{Q-54 } \int \frac{(x^2+1)}{x^4+1} (dx)$$

$$\text{Q-55 } \int \frac{(x^2+1)(x^2+2)}{(x^2+3)(x^2+4)} dx$$

$$\text{Q-56 } \int (e^{2x} + 5e^x) \sqrt{e^{2x} - 3e^x + 4} dx$$

$$\text{Q-57 } \int \frac{3 \cos x}{2 \sin x - 5 \cos x} dx$$

$$\text{Q-58 } \int \frac{1}{(x+1)\sqrt{x^2-1}} dx$$

$$\text{Q-59 } \int \frac{x^{1/2}}{x^{1/2} + x^{1/3}} dx$$

$$\text{Q-60 } \int \frac{\tan x}{\sec x + \cos x} dx$$

$$\text{Q-61} \int \frac{\sqrt{\cos 2x}}{\cos x} dx$$

$$\text{Q-62} \int \frac{(2-x)e^x}{(1-x)^2} dx$$

$$\text{Q-63} \int_0^1 \cot^{-1}(1-x+x^2) dx$$

$$\text{Q-64} \int_0^{\pi/2} \log \sin x dx$$

$$\text{Q-65} \int_0^1 \frac{\log(1+x)}{1+x^2} dx$$

$$\text{Q-66} \int_0^{\pi} \frac{x \tan x}{\sec x + \tan x} dx$$

$$\text{Q-67} \int_0^a \sin^{-1} \sqrt{\frac{x}{a+x}} dx$$

$$\text{Q-68} \int_0^{\pi/2} (\sqrt{\tan x} + \sqrt{\cot x}) dx$$

$$\text{Q-69} \int_0^{\pi} \frac{xdx}{(a^2 \cos^2 x + b^2 \sin^2 x)}$$

$$\text{Q-70} \int_0^{3.5} [x] dx \quad \text{PAWAN}$$

$$\text{Q-71} \int_0^{\pi} \frac{dx}{a+b \cos x}$$

$$\text{Q-72} \int_0^{\pi} \frac{e^{\cos x}}{e^{\cos x} + e^{-\cos x}} dx$$

$$\text{Q-73} \int_0^4 [x-1] + [x-2] + [x-4] dx$$

$$\text{Q-74} \int_{0.5}^{1.5} ([x] + 2) dx$$

$$\text{Q-75} \int_0^{\pi/2} \frac{x \sin x \cos x}{\sin^4 x + \cos^4 x} dx$$

$$\text{Q-76} \int_{-\pi/6}^{\pi/3} \frac{\sin x + \cos x}{\sqrt{\sin 2x}} dx$$

$$\text{Q-77} \int_{\pi/2}^{\pi} e^x \left( \frac{1-\sin x}{1+\cos x} \right) dx$$

$$\text{Q-78} \int_0^{\pi} \log(1-\cos x) dx$$

$$\text{Q-79} \int_0^{\pi/2} \sqrt{1-\sin 2x} dx$$

$$\text{Q-79} \int_0^{\pi} x \log \sin x dx$$

$$\text{Q-80} \int_{-\pi/4}^{\pi/4} \log(\sin x + \cos x) dx$$

Q-81  $\int_{\pi/3}^{\pi/2} \frac{\sqrt{1+\cos x}}{(1-\cos x)^{5/2}} dx$

Q-82  $\int_{-1}^2 (|x+1| + |x| + |x-1|) dx$

Q-83  $\int_0^{3\pi/2} |x \cos \pi x| dx$

Q-84  $\int_0^{\pi} \frac{1}{1+e^{\cos x}} dx$

Q-85  $\int_{-\pi}^{\pi} \frac{x(1-\sin x)}{1+\cos^2 x} dx$

Q-87  $\int_{-1}^{3/2} |x \sin \pi x| dx$

Q-88  $\int_0^{\pi} \frac{x \tan x}{\sec x \operatorname{cosec} x} dx$

Q-89 Evaluate as limit as sums  $\int_2^4 (x^2 + 3x - 1) dx$  PAWAN

Q-90 Evaluate as limit as sums  $\int_0^2 (e^{2x} + 3x - 2) dx$

Q-91 Evaluate as limit as sums  $\int_1^3 (e^{2x+1} + 3x^2 - 2) dx$

#### APPLICATION OF INTEGRALS,

Q-1 Find the area of the region enclosed between the two circles:

$$x^2 + y^2 = 1, (x-1)^2 + y^2 = 1.$$

Q-2 Using integration find the area of the region in the first quadrant enclosed by the x-axis, the

Line  $y=x$  and the circle  $x^2 + y^2 = 32$ . PAWAN

Q-3 Using integration find the area of the circle  $x^2 + y^2 = 16$  which is exterior to the parabola  $y^2 = 6x$ .

Q-4 Find the area of smaller region bounded by the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  and the straight line  $\frac{x}{a} + \frac{y}{b} = 1$ .

Q-5 Find the area of the region lying between the parabolas  $y^2 = 4ax$  and  $x^2 = 4ay$ , where  $a > 0$ .

Q-6 Using integration find the area of the region bounded by the parabola  $y^2 = 4x$  and the circle  $4x^2 + 4y^2 = 9$ .

Q-7 Using integration find the area of the region bounded by triangle ABC, where vertices A, B and C are  $(-1,1)$ ,  $(0,5)$  and  $(3,2)$  respectively.

Q-9 Prove that the curves  $y^2 = 4x$  and  $x^2 = 4y$  divide the area of the square bounded by  $x=0$ ,  $x=4$ ,  $y=4$  and  $y=0$  into three equal parts.

Q-10 Using integration find the area of the region:  $\{(x,y): 9x^2 + y^2 \leq 36 \text{ and } 3x + y \geq 6\}$ .

Q-11 Using integration find the area of the following region:  $\{(x,y): |x - 1| \leq y \leq \sqrt{5 - x^2}\}$

Q-12 Find the area of the circle  $4x^2 + 4y^2 = 9$  which is interior to the parabola  $x^2 = 4y$ .

Q-13 Using integration find the area of the following region  $\{(x,y): |x + 2| \leq y \leq \sqrt{20 - x^2}\}$ . PAWAN

Q-14 Using the method of integration find the area of the region bounded by the lines

$$3x - 2y + 1 = 0, 2x + 3y - 21 = 0 \text{ and } x - 5y + 9 = 0.$$

Q-15 Using integration find the area of the region enclosed between the two circles

$$x^2 + y^2 = 4 \text{ and } (x - 2)^2 + y^2 = 4.$$

Q-16 find the area of the region bounded by parabola  $y=x^2$  and  $y = |x|$ .

Q-17 Find the area of the following region:  $\{(x,y): x^2 + y^2 \leq 2ax, y^2 \geq ax, x \geq 0, y \geq 0\}$ .

Q-18 Draw a sketch of the following region and find its area :  $\{(x, y) \mid x^2 + y^2 \leq 1 \leq x + y\}$ .

Q-19 Make a rough sketch of the region given below and find its area using integration.

$$\{(x, y) : 0 \leq y \leq X^2 + 3; 0 \leq y \leq 2x + 3, 0 \leq x \leq 3\}.$$

Q-20 find the area enclosed by the curve  $x=3 \cos t, y=2 \sin t$ .

Q-21 sketch the graph of  $y=|x+3|$  and evaluate  $\int_{-6}^0 |x+3| dx$ . What does this integral represent?

Q-22 Using integration, find the area of the region below :

$$\{(x, y) : 0 \leq y \leq x^2 + 1, 0 \leq y \leq x + 10 \leq x \leq 2\}.$$

Q-23 Find the area of the region bounded by the curve  $x=at^2$  and  $y=2at$  between the ordinate corresponding to  $t=1$  and  $t=2$ .

Q-24 Find the area of the region bounded by the curve  $y^2=2x$  and  $x^2 + y^2=4x$

Q-25 Using integration find the area of the triangle formed by X axis and tangent and normal to the circle  $x^2 + y^2 = 4$  at  $(1, \sqrt{3})$   $2\sqrt{3}$

Q-26 Find the area of the region bounded by the curves  $y=|x-1|$  and  $y=3-|x|$

4 sq units. PAWAN

Q-27 find the area bounded by the  $y= \sin x, x=-\pi$  and  $x=\pi$  6 sq units.

Q-28 Find the area enclosed by the curve  $y= -x^2$  and the straight line  $x+y+2=0$