

QUESTIONS

Evaluate

Q.1 $\int \cos^2 x \, dx$

Q.2 $\int \cot^2(2x-3) \, dx$

Q.3 $\int \cos^3 x \, dx$

Q.4 $\int \sin^3(2x) \, dx$

Q.5 $\int \sin^2(4x+3) \, dx$

Q.6 $\int \cos^4(4x) \, dx$

Q.7 $\int \sin^4(3x-2) \, dx$

Q.8 $\int \operatorname{cosec}^4(x) \, dx$

Q.9 $\int \tan^4(5x) \, dx$

Q.10 $\int \cot^3(3x) \, dx$

Q.11 $\int \cos^5 x \, dx$

Q.12 $\int \sin^9 x \, dx$

Q.13 $\int \cot^5 x \, dx$

Q.14 $\int \cos^6(2x) \, dx$

Q.15 $\int \sin(2x) \cdot \sin(5x) \, dx$

Q.16 $\int \cos(2x) \cdot \cos(4x) \cdot \cos(6x) \, dx$

Q.17 $\int \sin^5 x \cdot \cos^5 x \, dx$

ANSWERS

(1) $\frac{1}{2} \left(x + \frac{\sin(2x)}{2} \right) + C$

(2) $-\frac{\cot(2x-3)}{2} - x + C$

(3) $\frac{1}{4} \left[-\frac{3\cos(2x)}{2} + \frac{\cos(6x)}{6} \right] + C$

(4) $\frac{1}{4} \left[3\sin x + \frac{\sin(3x)}{3} \right] + C$

(5) $\frac{1}{2} \left[x - \frac{\sin(8x+6)}{8} \right] + C$

(6) $\frac{1}{8} \left[3x + \frac{\sin(16x)}{16} + \frac{\sin(8x)}{2} \right] + C$

(7) $\frac{1}{8} \left[3x + \frac{\sin(12x-8)}{12} - \frac{4\sin(6x-4)}{6} \right] + C$

(8) $-\cot x - \frac{\cot^3 x}{3} + C$

(9) $\frac{\tan^3(5x)}{15} - \frac{\tan(5x)}{5} + x + C$

(10) $-\frac{\cot^2(3x)}{6} - \frac{1}{3} \log |\sin(3x)| + C$

(11) $\sin x + \frac{\sin^5 x}{5} - \frac{2\sin^3 x}{3} + C$

(12) $-\left[\cos x + \frac{\cos^9 x}{9} + \frac{6\cos^5 x}{5} - \frac{4\cos^7 x}{7} - \frac{4\cos^3 x}{3} \right] + C$

(13) $-\frac{\cot^4 x}{4} + \frac{\cot^2 x}{2} + \log |\sin x| + C$

(14) $\frac{1}{32} \left[10x + \frac{9\sin(4x)}{4} + \frac{\sin(12x)}{12} + \frac{3\sin(8x)}{4} + \frac{3\sin(4x)}{2} \right] + C$

(15) $\frac{1}{2} \left[\frac{\sin(3x)}{3} - \frac{\sin(7x)}{7} \right] + C$

(16) $\frac{1}{4} \left[x + \frac{\sin(12x)}{12} + \frac{\sin(8x)}{8} + \frac{\sin(4x)}{4} \right] + C$

(17) $-\frac{1}{64} \left[\cos(2x) + \frac{\cos^5(2x)}{5} - \frac{2\cos^3(2x)}{3} \right] + C$

INTEGRATION

TRIGONOMETRIC FORMULAE (USED)

(1) $\sin^2 \theta = \frac{1 - \cos(2\theta)}{2}$; also $\sin^2 \theta = 1 - \cos^2 \theta$

(2) $\cos^2 \theta = \frac{1 + \cos(2\theta)}{2}$; also $\cos^2 \theta = 1 - \sin^2 \theta$

(3) $\sin^3 \theta = \frac{3\sin \theta - \sin(3\theta)}{4}$; also (4) $\sin(3\theta) = 3\sin \theta - 4\sin^3 \theta$

(5) $\cos^3 \theta = \frac{3\cos \theta + \cos(3\theta)}{4}$; also (6) $\cos(3\theta) = 4\cos^3 \theta - 3\cos \theta$

(7) $\tan(3\theta) = \frac{3\tan \theta - \tan^3 \theta}{1 - 3\tan^2 \theta}$

(8) $1 - \cos(2\theta) = 2\sin^2 \theta$; (9) $1 + \cos(2\theta) = 2\cos^2 \theta$

(10) $\sin(2\theta) = 2\sin \theta \cos \theta$; (11) $\cos(2\theta) = \cos^2 \theta - \sin^2 \theta$

(12) $\sin(2\theta) = \frac{2\tan \theta}{1 + \tan^2 \theta}$ $= 2\cos^2 \theta - 1$
 $= 1 - 2\sin^2 \theta$

(13) $\cos(2\theta) = \frac{1 - \tan^2 \theta}{1 + \tan^2 \theta}$

(14) $\tan(2\theta) = \frac{2\tan \theta}{1 - \tan^2 \theta}$

(15) $2\sin A \cos B = \sin(A+B) + \sin(A-B)$

(16) $2\cos A \sin B = \sin(A+B) - \sin(A-B)$

(17) $2\cos A \cos B = \cos(A+B) + \cos(A-B)$

(18) $2\sin A \sin B = \cos(A-B) - \cos(A+B)$

(19) $\sin x \cdot \cos x = \frac{\sin(2x)}{2}$

(20) $\tan^2 x = \sec^2 x - 1$; $\cot^2 x = \operatorname{cosec}^2 x - 1$

and so on - - -