

Integral Calculus

TEST - 01

Evaluate the following integrals:

Q01. $\int \frac{\operatorname{cosec} x}{\operatorname{cosec} x - \cot x} dx$

Q02. $\int \frac{x}{\sqrt{8+x-x^2}} dx$

Q03. $\int 5^x 5^{5x} 5^{5^{5x}} dx$

Q04. $\int \frac{8}{(x+2)(x^2+4)} dx$

Q05. $\int \left\{ \frac{x^2+1}{(x+1)^2} \right\} e^x dx$

Q06. $\int \frac{\sin 3x}{\sin x} dx$

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

Q07. $\int \frac{x^4}{x^4-16} dx$

Q08. $\int (\sqrt{\tan x} + \sqrt{\cot x}) dx$

OR $\int \frac{\sin 2\theta}{\sqrt{\cos^4 \theta + 4 \sin^2 \theta - 2}} d\theta$

Q09. $\int (x+1)\sqrt{x+x^2} dx$

Q10. $\int \frac{2 \tan x + 3}{3 \tan x + 4} dx$

OR $\int \frac{\sqrt{\cot x}}{\cos x \sin x} dx$

TEST - 02

Evaluate the following integrals (Q01 - Q07):

Q01. $\int \frac{ax^3 + bx}{x^4 + c^2} dx$

Q02. $\int e^{2x} \left(\frac{2x-1}{4x^2} \right) dx$

Q03. $\int_0^{\pi/2} \frac{\sin^2 x}{1 + \sin x \cos x} dx$

Q04. $\int_0^{\pi} \frac{x \sin x}{1 + \cos^2 x} dx$

Q05. (a) $\int_{-3}^3 \log \sqrt{\frac{3-x}{3+x}} dx$

(b) $\int_0^{\pi} |\cos x| dx$

Q06. $\int_0^{\pi/2} \log \sin x dx$

Q07. $\int_0^1 \frac{\log(1+x)}{1+x^2} dx$

Q08. For a continuous function f defined on $[a, b]$, prove that $\int_a^b f(x) dx = \int_a^b f(a+b-x) dx$.

Hence evaluate: $\int_0^{\pi/2} (2 \log \sin x - \log \sin 2x) dx$.

Q09. Evaluate $\int_1^3 (e^x + x^2) dx$ as a limit of sums.

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

Q10. Evaluate: $\int \sqrt{1+x^2} \frac{\{\log(1+x^2) - 2 \log x\}}{x^4} dx$.

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

Answers of Integral Calculus

TEST 01

Q01. $-\cot \frac{x}{2} + k$

Q02. $\frac{1}{2} \sin^{-1} \left(\frac{2x-1}{\sqrt{33}} \right) - \sqrt{8+x-x^2} + k$

Q03. $\left(\frac{1}{(\log 5)^3} \right)^{5^{5^x}} + k$

Q04. $\log|x+2| - \frac{1}{2} \log|x^2+4| + \tan^{-1} \left(\frac{x}{2} \right) + k$

Q05. $\left(\frac{x-1}{x+1} \right) e^x + k$

Q06. $x + \sin 2x + k$ or $\frac{1}{\cos(a-b)} \log \left| \frac{\sin(x-a)}{\cos(x-b)} \right| + k$

Q07. $x + \frac{1}{2} \log \left| \frac{x-2}{x+2} \right| - \tan^{-1} \left(\frac{x}{2} \right) + k$

Q08. $\sqrt{2} \tan^{-1} \left(\frac{\tan x - 1}{\sqrt{2} \tan x} \right) + k$ or $\log \left| \sin^2 \theta + 1 + \sqrt{\cos^4 \theta + 4 \sin^2 \theta - 2} \right| + k$

Q09. $\frac{1}{3} (x+x^2)^{3/2} + \frac{1+2x}{4} \sqrt{x+x^2} - \frac{1}{8} \log \left| x + \frac{1}{2} + \sqrt{x+x^2} \right| + k$

Q10. $\frac{18}{25} x + \frac{1}{25} \log |3 \sin x + 4 \cos x| + k$ or $-2\sqrt{\cot x} + k$.

TEST 02

Q01. $\frac{a}{4} \log|x^4+c^2| + \frac{b}{2c} \tan^{-1} \left(\frac{x^2}{c} \right) + k$

Q02. $\frac{1}{4x} e^{2x} + k$

Q03. $\frac{\pi}{3\sqrt{3}}$

Q04. $\left(\frac{\pi}{2} \right)^2$

Q05. (a) 0 (b) 2

Q06. $-\frac{\pi}{2} \log 2$

Q07. $\frac{\pi}{8} \log 2$

Q08. $-\frac{\pi}{2} \log 2$

Q09. $e(e^2-1) + \frac{26}{3}$ or $\frac{\pi}{2} - \log 2$

Q10. $-\frac{1}{3} \left(1 + \frac{1}{x^2} \right)^{3/2} \left[\log \left(1 + \frac{1}{x^2} \right) - \frac{2}{3} \right] + k$ or $\frac{4}{\pi} \left[x \sin^{-1} \sqrt{x} - \frac{1}{2} \sin^{-1} \sqrt{x} + \frac{1}{2} \sqrt{x} \sqrt{1-x} \right] + k$.

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