

Topic(s) :

Previous Years Questions (PYQ) Part 1

Chapter 3: Integration by parts ( खण्डशः समाकलन )

Khushi Foundation  
Academy

For PDF Download : Join Telegram Group [KHUSHI FOUNDATION ACADEMY](#)

For any error: [Read pin comment](#)

Q. दो फलनों के गुणफल के समाकलन का सूत्र लियें ?

Write the rule for integration by parts ?

Solution:

$$\int u v dx = u \int v dx - \int \left\{ \frac{du}{dx} \cdot \int v dx \right\} dx$$



Khushi Foundation  
Academy

Inverse trigonometric function (प्रतिलोम त्रिकोणमितीय फलन)  $\sin^{-1}x, \cos^{-1}x, \tan^{-1}x, \dots$

Logarithmic function (लघुगणकीय फलन)  $\log x, \dots$

Algebraic function (बीजाय फलन)  $x^2, x, x^0=1, 3x+5, \dots$

Trigonometric function (त्रिकोणमितीय फलन)  $\sin x, \cos x, \tan x, \dots$

Exponential function (चरघातांकीय फलन)  $e^x, a^x, \dots$

I L A T E Rule



UPBTE 2017

Q.

$$\int u v dx = u \int v dx - \int \left\{ \frac{du}{dx} \cdot \int v dx \right\} dx$$
$$I = \int x \sin x dx = x \int \sin x dx - \int \left\{ \frac{dx}{dx} \cdot \int \sin x dx \right\} dx$$

$$= x(-\cos x) - \int \left\{ 1 \cdot (-\cos x) \right\} dx$$

$$= -x \cos x + \int \cos x dx$$

$$= -x \cos x + \sin x + C \quad \underline{\text{Ans}}$$



ILATE Rule

UPBTE 2017

Q.

$$\int u v dx = u \int v dx - \int \left\{ \frac{du}{dx} \cdot \int v dx \right\} dx$$

$$\int x \cos x dx = x \int \cos x dx - \int \left\{ \frac{dx}{dx} \cdot \int \cos x dx \right\} dx$$

$$= x \sin x - \int \left\{ 1 \cdot \sin x \right\} dx$$

$$= x \sin x - \int \sin x dx$$

$$= x \sin x - (-\cos x) + C$$

$$\int x \cos x dx = x \sin x + \cos x + C$$

Ans

$$\int u v dx = u \int v dx - \int \left\{ \frac{du}{dx} \cdot \int v dx \right\} dx$$

Q.  $I = \int x^2 e^x dx = x^2 \int e^x dx - \int \left\{ \frac{d}{dx} x^2 \cdot \int e^x dx \right\} dx$

$$= x^2 e^x - \int \{ 2x \cdot e^x \} dx$$

$$= x^2 e^x - 2 \int x e^x dx$$

$$= x^2 e^x - 2 \left[ x \int e^x dx - \int \left\{ \frac{d}{dx} x \cdot \int e^x dx \right\} dx \right]$$

$$= x^2 e^x - 2 \left[ x e^x - \int \{ 1 \cdot e^x \} dx \right]$$

$$= x^2 e^x - 2 \left[ x e^x - e^x \right] + C$$

Ans



Q.

$$\int u v dx = u \int v dx - \int \left\{ \frac{du}{dx} \cdot \int v dx \right\} dx$$

$$\int x^2 \cos x dx = x^2 \int \cos x dx - \int \left\{ \frac{d x^2}{dx} \cdot \int \cos x dx \right\} dx$$

$$= x^2 \sin x - \int \{ 2x \cdot \sin x \} dx$$

$$= x^2 \sin x - 2 \int x \sin x dx$$

$$= x^2 \sin x - 2 \left[ x \int \sin x dx - \int \left\{ \frac{d x}{dx} \cdot \int \sin x dx \right\} dx \right]$$

$$= x^2 \sin x - 2 \left[ x (-\cos x) - \int \{ 1 \cdot (-\cos x) \} dx \right]$$

$$= x^2 \sin x - 2 \left[ -x \cos x + \int \cos x dx \right]$$

$$= x^2 \sin x - 2 \left[ -x \cos x + \sin x \right] + C \quad \underline{\text{Ans}}$$

$$= x^2 \sin x + 2x \cos x - 2 \sin x + C \quad \underline{\text{Ans}}$$

Q.

$$I = \int x \frac{\sin x}{\cos^2 x} dx$$

$$= \int x \frac{1 \cdot \sin x}{\cos x \cos x} dx$$

$$= \int x \sec x \tan x dx$$

$$= x \int \sec x \tan x dx - \int \left\{ \frac{dx}{dx} \cdot \int \sec x \tan x dx \right\} dx$$

$$= x \sec x - \int \{ 1 \cdot \sec x \} dx$$

$$= x \sec x - \int \sec x dx$$

$$= x \sec x - \log(\sec x + \tan x) + C \quad \text{Ans}$$

$$\int u v dx = u \int v dx - \int \left\{ \frac{du}{dx} \cdot \int v dx \right\} dx$$

Note: When 1 is taken as second function. (जब 1 को द्वितीय फलन लिया जाता है)

(1)  $\int \log x \, dx$

---

(2)  $\int \tan^{-1} x \, dx$

(3)  $\int \sin^{-1} x \, dx$

(4)  $\int \cos^{-1} x \, dx$



Khushi Foundation  
Academy

$$\int u v dx = u \int v dx - \int \left\{ \frac{du}{dx} \cdot \int v dx \right\} dx$$

Q.

$$I = \int \log x dx$$

$$= \int \log x \times 1 dx$$

$$= \log x \int 1 dx - \int \left\{ \frac{d}{dx} \log x \cdot \int 1 dx \right\} dx$$

$$= \log x \cdot x - \int \left\{ \frac{1}{x} \cdot x \right\} dx \quad ; \int 1 dx = x$$

$$= x \log x - x + c$$

$$= x (\log_e x - 1) + c \quad \underline{\text{Ans}}$$

$$= x (\log_e x - \log_e e) + c$$

$$= x (\log_e \frac{x}{e}) + c$$

$$= x \log_e \frac{x}{e} + c \quad \underline{\text{Ans}}$$

$$\log_e e = 1$$

$$\log \frac{m}{n} = \log m - \log n$$

$$\int u v dx = u \int v dx - \int \left\{ \frac{du}{dx} \cdot \int v dx \right\} dx$$

Q.  $I = \int \tan^{-1} x dx$

$$= \int \tan^{-1} x \times 1 dx$$

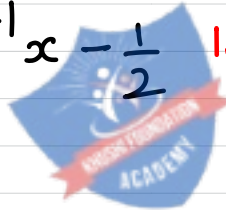
$$= \tan^{-1} x \int 1 dx - \int \left\{ \frac{d}{dx} \tan^{-1} x \cdot \int 1 dx \right\} dx$$

$$= \tan^{-1} x \cdot x - \int \left\{ \frac{1}{1+x^2} x \right\} dx$$

$$= x \tan^{-1} x - \frac{1}{2} \int \frac{2x}{1+x^2} dx$$

$$= x \tan^{-1} x - \frac{1}{2} \log |1+x^2| + C ; \text{Ans } \frac{d(1+x^2)}{dx} = 0 + 2x = 2x$$

$$\int \frac{f'(x)}{f(x)} dx = \log |f(x)| + C$$



Note:

$$(1) \int e^{ax} dx = \frac{e^{ax}}{a}$$

Same form

← 1111 2-4

$$(2) \int \sin bx dx = -\frac{\cos bx}{b}$$

$$\int -\frac{\cos bx}{b} dx = -\frac{1}{b} \int \cos bx dx$$

$$= -\frac{1}{b} \frac{\sin bx}{b}$$

$$= -\frac{1}{b^2} \sin bx$$

Then

$$\int e^{ax} \sin bx dx$$

②

Practice problem:

$$\int \log x dx = ?$$

COMMENT

Next video:

Previous Years Questions (PYQ) Part 2

LIKE

SHARE

SUBSCRIBE

YouTube Channel

Khushi Foundation Academy

Khushi Foundation  
Academy



THANK YOU