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IIT JEE

Physics DPP

DPP-7 Basic Maths: Indefinite Integration
By Physicsaholics Team

Q) Find $\int x \, dx = ?$

(a) $\frac{x^2}{2} + C$

(b) $x^2 + C$

(c) $x^2 + x + C$

(d) C

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Ans. a

$$I = \int x \, dx$$

$$I = \frac{x^{1+1}}{1+1} + C$$

$$I = \frac{x^2}{2} + C$$

Q) Find $\int \frac{1}{x} dx = ?$

(a) $\frac{x^2}{2} + C$

(b) $\frac{1}{x^2} + C$

(c) $\ln x + C$

(d) None of these

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Ans. c

$$I = \int \frac{1}{x} dx$$

$$\therefore \frac{d}{dx} (\ln x) = \frac{1}{x}$$

$$\therefore \boxed{\int \frac{1}{x} dx = \ln(x) + C}$$

Q) Find $\int (4x^2 + 1)dx = ?$

(a) $x^4 + x + C$

(b) $\frac{4x^3}{3} + x + C$

(c) $8x + C$

(d) None of these

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Ans. b

$$I = \int (4x^2 + 1) dx$$

$$I = \int 4x^2 dx + \int dx$$

$$I = 4 \int x^2 dx + \int dx$$

$$I = \frac{4}{3} x^3 + x + C$$

Q) Find $\int 3e^{3x} dx = ?$

(a) $3e^{3x} + C$

(b) $e^{3x} + C$

(c) $\frac{3e^{4x}}{4} + C$

(d) None of these

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Ans. b

$$I = \int 3 e^{3x} dx$$

$$\therefore \int e^{ax} = \frac{1}{a} e^{ax} + C$$

$$\therefore I = 3 \int e^{3x} dx$$

$$I = 3 \frac{e^{3x}}{3} + C$$

$$I = e^{3x} + C$$

Q) Find $\int \left(e^x + \frac{2}{x} \right) dx = ?$

(a) $e^{2x} + \ln 2x + C$

(b) $\frac{e^{2x}}{2} + 2 \ln 2x + C$

(c) $e^x + 2 \ln x + C$

(d) None of these

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Ans. c

$$I = \int \left(e^x + \frac{2}{x} \right) dx$$

$$I = \int e^x dx + 2 \int \frac{1}{x} dx$$

$$I = e^x + 2 \ln(x) + c$$

Q) If $y = (3x + 1)^3$, then find $I = \int y \, dx$?

(a) $I = \frac{(3x+1)^4}{4} + C$

(b) $\frac{(3x+1)^4}{12} + C$

(c) $I = \frac{(3x+1)^4}{3} + C$

(d) None of these

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Ans. b

$$I = \int (3x+1)^3$$

$$\therefore I = \int (ax+b)^n = \frac{(ax+b)^{n+1}}{a(n+1)} + c$$

$$\therefore I = \frac{(3x+1)^{3+1}}{3(3+1)} + c$$

$$I = \frac{(3x+1)^4}{12} + c$$

Q) If $y = \sin x + \cos x$, then find $I = \int y \, dx$?

- (a) $I = -\cos x - \sin x + c$ (b) $I = \cos x - \sin x + c$
(c) $I = -\cos x + \sin x + c$ (d) None of these

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Ans. c

$$y = \sin x + \cos x$$

$$I = \int y \, dx$$

$$I = \int (\sin x + \cos x) \, dx$$

$$I = \int \sin x \, dx + \int \cos x \, dx$$

$$I = -\cos x + \sin x + C$$

Q) Find $I = \int \frac{1}{x^3} dx$?

(a) $I = -\frac{1}{2x^2} + c$

(b) $I = \frac{1}{2x^2} + c$

(c) $I = \frac{1}{x^2} + c$

(d) None of these

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Ans. a

$$I = \int \frac{1}{u^3} du$$

$$I = \int u^{-3} du$$

$$I = \frac{u^{-3+1}}{-3+1} + C$$

$$I = \frac{u^{-2}}{-2} + C$$

$$I = -\frac{u^{-2}}{2} + C$$

$$I = -\frac{1}{2u^2} + C$$

Q) Find $I = \int (e^x + \cos x) dx$?

(a) $I = e^x - \sin x + c$

(b) $I = e^x + \sin x + c$

(c) $I = e^x - \cos x + c$

(d) None of these

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Ans. b

$$\cdot I = \int (e^x + \cos x) dx$$

$$I = \int e^x dx + \int \cos x dx$$

$$\boxed{I = e^x + \sin x + C}$$

Q) Find $I = \int (4x^3 + 3x^2 + 2x + 1) dx$?

(a) $I = 12x^4 + 6x^3 + 2x^2 + x + c$

(b) $I = \frac{4}{3}x^4 + \frac{3}{2}x^3 + 2x^2 + x + c$

(c) $I = x^4 + x^3 + x^2 + x + c$

(d) None of these

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Ans. c

$$I = \int (4x^3 + 3x^2 + 2x + 1) dx$$

$$I = 4 \frac{x^4}{4} + 3 \frac{x^3}{3} + 2 \frac{x^2}{2} + x + C$$

$$I = x^4 + x^3 + x^2 + x + C$$

Q) Find $I = \int (6\sqrt[5]{x} + 5\sqrt[3]{x^2}) dx$?

(a) $I = 5x^{\frac{6}{5}} + 3x^{\frac{5}{3}} + c$

(b) $I = x^{\frac{6}{5}} + x^{\frac{5}{2}} + c$

(c) $I = 6x^{\frac{6}{5}} + 5x^{\frac{5}{2}} + c$

(d) None of these

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Ans. a

$$I = \int (6\sqrt[5]{x} + 5\sqrt[3]{x^2}) dx$$

$$I = \int (6(x)^{\frac{1}{5}} + 5(x^2)^{\frac{1}{3}}) dx$$

$$I = \int (6(x)^{\frac{1}{5}} + 5(x)^{\frac{2}{3}}) dx$$

$$I = \int 6(x)^{\frac{1}{5}} dx + \int 5(x)^{\frac{2}{3}} dx$$

$$I = 6 \frac{x^{\frac{1}{5}+1}}{\frac{1}{5}+1} + 5 \frac{x^{\frac{2}{3}+1}}{\frac{2}{3}+1} + C$$

$$I = 6 \left(\frac{5}{6}\right) (x^{\frac{6}{5}}) + 5 \left(\frac{3}{5}\right) (x^{\frac{5}{3}}) + C$$

$$I = 5(x)^{\frac{6}{5}} + 3(x)^{\frac{5}{3}} + C$$

$$\boxed{I = 5(x)^{\frac{6}{5}} + 3(x)^{\frac{5}{3}} + C}$$

Q) Find $I = \int (3x^2 + e^x + \sin x + 2) dx$?

(a) $I = 3x^3 + e^x + \cos x + 2x + c$

(b) $I = x^3 + e^x - \cos x + 2x + c$

(c) $I = x^3 + e^x + \cos x + 2x + c$

(d) None of these

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Ans. b

$$I = \int (3x^2 + e^x + \sin x + 2) dx$$

$$I = 3 \int x^2 dx + \int e^x dx + \int \sin x dx + \int 2 dx$$

$$I = 3 \left[\frac{x^3}{3} \right] + e^x + (-\cos x) + 2x + C$$

$$\boxed{I = x^3 + e^x - \cos x + 2x + C}$$

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