Ultimate kcet crash course 2026

Maths

Integrals

DPP: 1

Q1 $\int \frac{dx}{\sqrt{x+a}+\sqrt{x+b}} =$

(A) $\frac{2}{3(b-a)}\left[(x+a)^{3/2}-(x+b)^{3/2}\right]+c$

(B) $\frac{2}{3(a-b)}\left[(x+a)^{3/2}-(x+b)^{3/2}\right]+c$

(C) $\frac{2}{3(a-b)}\left[(x+a)^{3/2}+(x+b)^{3/2}\right]+c$

(D) None of these

Q2 $\int \frac{3x^3-2\sqrt{x}}{x}dx =$

(A) $x^3-\sqrt{x}+c$ (B) $x^3+\sqrt{x}+c$

(C) $x^3-2\sqrt{x}+c$ (D) $x^3-4\sqrt{x}+c$

Q3 $\int \frac{1}{x^2}(2x+1)^3 dx =$

(A) $4x^2+12x+6\log x-\frac{1}{x}+c$

(B) $4x^2+12x-6\log x-\frac{2}{x}+c$

(C) $2x^2+8x-3\log x-\frac{2}{x}+c$

(D) $8x^2+6x+6\log x+\frac{2}{x}+c$

Q4 The integral $\int \sqrt{16-9x^2}dx$ equals

(A) $\frac{x}{2}\sqrt{16-9x^2}+\frac{8}{3}\sin^{-1}\left(\frac{3x}{4}\right)+C$

(B) $\frac{3x}{2}\sqrt{16-9x^2}+16\sin^{-1}\left(\frac{3x}{4}\right)+C$

(C) $\frac{x}{2}\sin^{-1}\left(\frac{3x}{4}\right)+\frac{9x}{2}+C$

(D) none of these

Q5 If $\frac{d}{dx}(f(x))=\frac{1}{1+x^2}$ *then* $\frac{d}{dx}\left(f\left(x^3\right)\right)$ *is*

(A) $\frac{3x}{1+x^3}$

(B) $\frac{3x^2}{1+x^6}$

(C) $\frac{-6x^5}{\left(1+x^6\right)^2}$

(D) $\frac{-6x^5}{1+x^6}$

Q6 $\int \frac{1}{\sin x+\cos x}dx =$

(A) $\frac{1}{\sqrt{2}}\log\left|\tan\left(\frac{1}{2}x-\frac{1}{4}\pi\right)\right|+c$

(B) $\frac{1}{\sqrt{2}}\log\left|\operatorname{cosec}\left(x+\frac{\pi}{4}\right)-\cot\left(x+\frac{\pi}{4}\right)\right|+c$

(C) $\frac{1}{\sqrt{2}}\log\left|\sec\left(x+\frac{\pi}{4}\right)+\tan\left(x+\frac{\pi}{4}\right)\right|+c$

(D) $\frac{1}{\sqrt{2}}\log\left|\operatorname{cosec}\left(x+\frac{\pi}{4}\right)+\cot\left(x+\frac{\pi}{4}\right)\right|+c$

Q7 $\int \operatorname{cosec}^2 x\, dx =$

(A) cosec x + cot x + c

(B) -cosec x + cot x + c

(C) -cot x + c

(D) cot x + c

Q8 $\int \frac{1}{\sqrt{x}}dx =$

(A) $2\sqrt{x}+c$ (B) $\sqrt{x}$

(C) x (D) None of these

Q9 $\int \sec^2 x\, dx =$

(A) tan x + c

(B) -tan x + c

(C) sec x tan x + c

(D) -sec x tan x + c

Q10 $\int x^n dx =$

(A) nx^{n-1}

(B) $\frac{x^{n+1}}{n+1}$

(C) $\frac{x^{n+1}}{n+1}+c,\ n\neq -1$

(D) None of these

Q11 $\int \left(x+\frac{1}{x}\right)^3 dx =$

(A) $\frac{1}{4}\left(x+\frac{1}{x}\right)^4+c$

(B) $\frac{x^4}{4}+\frac{3x^2}{2}+3\log x-\frac{1}{2x^2}+c$

(C) $\frac{x^4}{4}+\frac{3x^2}{2}+3\log x+\frac{1}{x^2}+c$

(D) None of these

Q12 $\int \sin x\, dx =$

(A) cos x + c (B) -cos x + c

(C) sin x + c (D) -sin x + c

Q13 $\int \frac{1}{x} dx =$

(A) $-\frac{1}{x^2}$ (B) x^{-1}

(C) log |x| + c (D) None of these

Q14 $\int \frac{\cos 2x}{\sin x} dx =$

(A) 2x + c

(B) 2sin x - sec x tan x+c

(C) log |sec x+tan x|-2 sin x+c

(D) 2cos x-log |cosec x+cot x|+c

Q15 $\int \frac{1}{x^2}(2x+1)^3 dx =$

(A) $4x^2 + 12x + 6\log x - \frac{1}{x} + c$

(B) $4x^2 + 12x - 6\log x - \frac{2}{x} + c$

(C) $2x^2 + 8x - 3\log x - \frac{2}{x} + c$

(D) $8x^2 + 6x + 6\log x + \frac{2}{x} + c$

Q16 $\int \left(e^{5\log x} + e^{x\log 6}\right) dx =$

(A) $\frac{1}{5}e^{5\log x} + \frac{1}{\log 6}e^{x\log 6} + c$

(B) $\frac{x^6}{6} + \frac{6^x}{\log 6} + c$

(C) $5x^4 + 6^x \log 6 + c$

(D) None of these

Q17 $\int \frac{x+3}{x+2} dx =$

(A) x + log |x + 2| + c

(B) 1 + log |x + 2| + c

(C) x – log |x + 2| + c

(D) None of these

Q18 $\int \left\{\frac{(\log x - 1)}{1+(\log x)^2}\right\}^2 dx$ is equal to

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

(B) $\frac{\log x}{(\log x)^2+1} + c$

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

(D) $\frac{xe^x}{1+x^2} + c$

Q19 $\int 5^x dx =$

(A) $\frac{5^x}{\log 5} + c$

(B) $-\frac{5^x}{\log 5} + c$

(C) $(x-1)5^{x-1} + c$

(D) None of these

Q20 $\int \frac{\text{cosec } x}{\text{cosec } x + \cot x} dx =$

(A) -cot x + cosec x + c

(B) log (1 + sin x) + c

(C) cosec x + cot x + c

(D) -cosec x - cot x + c

Q21 $\int (a - a^{nx}) dx =$

(A) $ax - \frac{a^{nx}}{n\log a} + c$

(B) $ax + \frac{a^{nx}}{n\log a} + c$

(C) $\frac{ax - a^{nx}}{n\log a} + c$

(D) None of these

Q22 $\int \frac{\sin^3 x}{\cos^2 x + \cos x} dx =$

(A) log |sin x| - sin x + c

(B) log |sec x| + cos x + c

(C) log |sin x| + cos x + c

(D) None of these

Q23 $\int \frac{dx}{\tan^2 x \cdot \sec^2 x} =$

(A) $-\frac{3}{2}x - \cot x - \frac{1}{4}\sin 2x + c$

(B) $-\frac{1}{2}x - \tan x - \sin 2x + c$

(C) -3x - sec x - 4cot 2x+c

(D) None of these

Q24 $\int \cos x\, dx =$

(A) sin x + c (B) -sin x + c

(C) cos x + c (D) -cos x + c

Q25 $\int \text{cosec x cot } x\, dx =$

(A) -cosec x + c (B) cosec x + c

(C) cot x + c (D) -cot x + c

Q26 $\int \sec x \tan x\, dx =$

(A) sin x + c (B) tan x + c

(C) cot x + c (D) sec x + c

Q27 $\int \frac{x+1}{x^{1/2}}dx$ is equal to

(A) $-x^{3/2}+x^{1/2}+c$

(B) $x^{1/2}$

(C) $\frac{2}{3}x^{3/2}+2x^{1/2}+c$

(D) $x^{3/2}+x^{1/2}+c$

Q28 $\int \frac{1}{\sin x+\sqrt{3}\cos x}dx =$

(A) $\frac{1}{2}\log\left|\tan\left(\frac{1}{2}x-\frac{1}{6}\pi\right)\right|+c$

(B) $\frac{1}{2}\log\left|\text{cosec}\left(x+\frac{\pi}{3}\right)-\cot\left(x+\frac{\pi}{3}\right)\right|+c$

(C) $\frac{1}{2}\log\left|\sec\left(x-\frac{\pi}{6}\right)+\tan\left(x-\frac{\pi}{6}\right)\right|+c$

(D) $\frac{1}{2}\log\left|\text{cosec}\left(x+\frac{\pi}{3}\right)+\cot\left(x+\frac{\pi}{3}\right)\right|+c$

Q29 $\int \frac{1}{\sqrt{7-x^2}}dx$ is equal to

(A) $\frac{1}{2\sqrt{7}}\log\left[\frac{\sqrt{7+x}}{\sqrt{7-x}}\right]+c$

(B) $\sin^{-1}\left(\frac{x}{\sqrt{7}}\right)+c$

(C) $\log\left|x+\sqrt{x^2+7}\right|+c$

(D) $\frac{1}{2\sqrt{7}}\log\left|\frac{x-\sqrt{7}}{x+\sqrt{7}}\right|+c$

Q30 $\int\left(\frac{\cos 2x-\cos 2\alpha}{\cos x-\cos\alpha}\right)dx =$

(A) $2\sin x-2x\cos\alpha+c$

(B) $2\sin x+2x\cos\alpha+c$

(C) $2x\sin x-2x\cos\alpha+c$

(D) None of these

Answer Key

Q1	B
Q2	D
Q3	A
Q4	A
Q5	B
Q6	B
Q7	C
Q8	A
Q9	A
Q10	C
Q11	B
Q12	B
Q13	C
Q14	D
Q15	A
Q16	B
Q17	A
Q18	C
Q19	A
Q20	A
Q21	A
Q22	B
Q23	A
Q24	A
Q25	A
Q26	D
Q27	C
Q28	C
Q29	B
Q30	B

Hints & Solutions

Note: scan the QR code to watch video solution

Q1 Text Solution:

$$\int \frac{dx}{\sqrt{x+a}+\sqrt{x+b}} = \int \frac{\sqrt{x+a}-\sqrt{x+b}}{(x+a)-(x+b)}dx$$
$$= \frac{1}{(a-b)}\int (x+a)^{1/2}dx - \frac{1}{(a-b)}$$
$$\int (x+b)^{1/2}dx$$
$$= \frac{2}{3(a-b)}\left[(x+a)^{3/2} - (x+b)^{3/2}\right]+c$$

Video Solution:

Q2 Text Solution:

$$\int \frac{3x^3-2\sqrt{x}}{x}dx = \int 3x^2dx - 2\int x^{-1/2}dx$$
$$= x^3 - 4\sqrt{x} + c$$

Video Solution:

Q3 Text Solution:

$$\int \frac{1}{x^2}(2x+1)^3dx = 4x^2 + 12x + 6\log x$$
$$-\frac{1}{x} + c$$

Video Solution:

Q4 Text Solution:

$$\text{Let } I = \int \sqrt{16-9x^2}dx = 3$$
$$\int \sqrt{\left(\frac{4}{3}\right)^2 - x^2}dx$$
$$= 3\left[\frac{x}{2}\sqrt{\left(\frac{4}{3}\right)^2 - x^2} + \frac{1}{2}\times\frac{16}{9}\sin^{-1}\left(\frac{x}{4/3}\right)\right]$$
$$+C\backslash$$
$$= \frac{x}{2}\sqrt{16-9x^2} + \frac{8}{3}\sin^{-1}\left(\frac{3x}{4}\right)+C$$

Video Solution:

Q5 Text Solution:

$$\frac{d}{dx}(f(x)) = \frac{1}{1+x^2} \Rightarrow f(x) = \int \frac{dx}{1+x^2}$$
$$\Rightarrow f(x) = \tan^{-1}(x)+c \Rightarrow f\left(x^3\right)$$
$$= \tan^{-1}\left(x^3\right)+c$$
$$\therefore \frac{d}{dx}\left(f\left(x^3\right)\right) = \frac{1}{1+\left(x^3\right)^2}\times 3x^2 = \frac{3x^2}{1+x^6}$$

Video Solution:

Q6 **Text Solution:**

$$\int \frac{1}{\sin x+\cos x}dx = \frac{1}{\sqrt{2}}\int \frac{dx}{\frac{1}{\sqrt{2}}\sin x+\frac{1}{\sqrt{2}}\cos x}$$

$$= \frac{1}{\sqrt{2}}\int \frac{dx}{\cos\left(x-\frac{\pi}{4}\right)}$$

$$= \frac{1}{\sqrt{2}}\int \sec\left(x-\frac{\pi}{4}\right)dx$$

$$= \frac{1}{\sqrt{2}}\log\left|\sec\left(x-\frac{\pi}{4}\right)+\tan\left(x-\frac{\pi}{4}\right)\right|+c$$

Video Solution:

Q7 **Text Solution:**

$$\int \operatorname{cosec}^2 x\, dx = -\cot x + c$$

Video Solution:

Q8 **Text Solution:**

$$\int \frac{1}{\sqrt{x}}dx = 2\sqrt{x}+c$$

Video Solution:

Q9 **Text Solution:**

$$\int \sec^2 x\, dx = \text{tanx+c}$$

Video Solution:

Q10 **Text Solution:**

$$\int x^n dx = \frac{x^{n+1}}{n+1}+c,\ n\neq -1$$

Video Solution:

Q11 **Text Solution:**

$$\int \left(x+\frac{1}{x}\right)^3 dx = \int\left(x^3+\frac{1}{x^3}+3x+\frac{3}{x}\right)dx$$

$$= \frac{x^4}{4}+\frac{3x^2}{2}+3\log x-\frac{1}{2x^2}+c$$

Video Solution:

Q12 **Text Solution:**

$$\int \sin x\, dx = -\cos x + c$$

Video Solution:

Q13 **Text Solution:**

$\int \frac{1}{x} dx = \log|x| + c$

Video Solution:

Q14 **Text Solution:**

$$\int \frac{\cos 2x}{\sin x} dx = \int \frac{1 - 2\sin^2 x}{\sin x} dx$$

$$= \int (\operatorname{cosec} x - 2\sin x)\, dx$$

$$= -\log|\operatorname{cosec} x + \cot x| + 2\cos x + c$$

Video Solution:

Q15 **Text Solution:**

$\int \frac{1}{x^2}(2x+1)^3 dx = 4x^2 + 12x + 6\log x$

$-\frac{1}{x} + c$

Video Solution:

Q16 **Text Solution:**

$\int \left(e^{5\log x} + e^{x\log 6}\right) dx = \int \left(x^5 + 6^x\right) dx$

$= \frac{x^6}{6} + \frac{6^x}{\log 6} + c$

Video Solution:

Q17 **Text Solution:**

$\int \frac{x+3}{x+2} dx = \int \frac{x+2+1}{x+2} dx$

$= \int \left(1 + \frac{1}{x+2}\right) dx = x + \log|x+2| + c$

Video Solution:

Q18 **Text Solution:**

$$\text{Consider, } f(x) = \frac{x}{(\log x)^2 + 1}$$

$$\Rightarrow f'(x) = \frac{1 + (\log x)^2 - \frac{2x\log x}{x}}{\left(1 + (\log x)^2\right)^2}$$

$$\Rightarrow f'(x) = \frac{1 + (\log x)^2 - 2\log x}{\left(1 + \log^2 x\right)^2}$$

$$= \left(\frac{(1 - \log x)}{1 + (\log x)^2}\right)^2$$

$$\Rightarrow \int \left(\frac{1 - \log x}{1 + (\log x)^2}\right)^2 dx = \frac{x}{1 + (\log x)^2} + c$$

Video Solution:

Q19 **Text Solution:**

$$\int 5^x dx = \frac{5^x}{\log 5}$$

$$+ c\left(\text{use} \quad \int a^x dx = \frac{a^x}{\log a} + c\right)$$

Video Solution:

Q20 **Text Solution:**

$$\int \frac{\text{cosec } x(\text{cosec } x - \cot x)}{\text{cosec}^2 x - \cot^2 x} dx =$$

$$\int \left(\text{cosec}^2 x - \text{cosec } x \cot x\right) dx$$

$$= -\cot x + \text{cosec } x + c$$

Video Solution:

Q21 **Text Solution:**

$$\int (a - a^{nx}) dx = ax - \frac{a^{nx}}{n \log a} + c$$

Video Solution:

Q22 **Text Solution:**

$$\int \frac{\sin x \cdot \sin^2 x}{\cos x(1+\cos x)} dx = \int \frac{\sin x(1-\cos^2 x)}{\cos x(1+\cos x)} dx$$

$$= \int \frac{\sin x(1-\cos x)(1+\cos x)}{\cos x(1+\cos x)} dx$$

$$= \int \left(\frac{\sin x - \cos x \sin x}{\cos x}\right) dx$$

$$= \int (\tan x - \sin x) dx = \log|\sec x| + \cos x + c$$

Video Solution:

Q23 **Text Solution:**

$$\int \frac{dx}{\tan^2 x \sec^2 x} = \int \frac{(\sec^2 x - \tan^2 x)}{\sec^2 x \cdot \tan^2 x} dx$$

$$= \int \left(\frac{1}{\tan^2 x} - \frac{1}{\sec^2 x}\right) dx$$

$$= \int \left(\cot^2 x - \cos^2 x\right) dx$$

$$= \int \left(cosec^2 x - 1\right) dx - \int \left(\frac{1+\cos 2x}{2}\right) dx$$

$$= -\cot x - x - \frac{1}{2}x - \frac{\sin 2x}{4} + c$$

$$= -\frac{3}{2}x - \cot x - \frac{1}{4}\sin 2x + c$$

Video Solution:

Q24 **Text Solution:**

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

Video Solution:

Q25 **Text Solution:**

$\int cosec\ x\ \cot\ x\ dx = -co\sec x\ + c$

Video Solution:

Q26 **Text Solution:**

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

Video Solution:

Q27 **Text Solution:**

$\int \frac{x+1}{x^{1/2}} dx = \int \sqrt{x} dx + \int \frac{1}{\sqrt{x}} dx$

$= \frac{2}{3}x^{3/2} + 2x^{1/2} + c$

Video Solution:

Q28 **Text Solution:**

$\sin x + \sqrt{3}\cos x = 2\left(\frac{1}{2}\sin x + \frac{\sqrt{3}}{2}\cos x\right)$

$\int \frac{1}{\sin x + \sqrt{3}\cos x} dx$

$= \frac{1}{2}\int \frac{dx}{\frac{1}{2}\sin x + \frac{\sqrt{3}}{2}\cos x} = \frac{1}{2}\int \frac{dx}{\cos\left(x - \frac{\pi}{6}\right)}$

$= \frac{1}{2}\int \sec\left(x - \frac{\pi}{6}\right) dx$

$= \frac{1}{2}\log\left|\sec\left(x - \frac{\pi}{6}\right) + \tan\left(x - \frac{\pi}{6}\right)\right| + c$

Video Solution:

Q29 **Text Solution:**

$\int \frac{1}{\sqrt{7 - x^2}} dx = \int \frac{1}{\sqrt{\left(\sqrt{7}\right)^2 - x^2}} dx$

$\int \frac{1}{\sqrt{a^2 - x^2}} dx = \sin^{-1}\left(\frac{x}{a}\right) + c.$

$\Rightarrow \sin^{-1}\left(\frac{x}{\sqrt{7}}\right) + c$

Video Solution:

Q30 Text Solution:

$$\int \left(\frac{\cos 2x-\cos 2\alpha}{\cos x-\cos\alpha}\right)dx = \int \frac{\left(2\cos^2 x-1\right)-\left(2\cos^2\alpha-1\right)}{(\cos x-\cos\alpha)}$$

$$= 2\int \frac{\left(\cos^2 x-\cos^2\alpha\right)}{(\cos x-\cos\alpha)}dx = 2\int (\cos x+\cos\alpha)dx$$

$$= 2 \int \cos x dx + 2\cos\alpha$$

$$\int dx = 2\sin x + 2x\cos\alpha + c$$

Video Solution: