JEE MAIN + ADVANCED

MATHEMATICS

TOPIC NAME

INDEFINITE INTEGRATION

(PRACTICE SHEET)

LEVEL- 1

Question based on **Inequation**

Q.1 $\int \sqrt{1+\sin 2x}\, dx$ equals-

(A) sin x + cos x + c (B) sin x – cos x + c

(C) cos x – sin x + c (D) None of these

Q.2 $\int \frac{4+5\sin x}{\cos^2 x}\, dx$ equals-

(A) 4 tan x – sec x + c

(B) 4 tan x + 5 sec x + c

(C) 9 tan x + c

(D) None of these

Q.3 $\int$ (tan x + cot x) dx equals-

(A) log (tan x) + c

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

(C) log (cx)

(D) None of these

Q.4 $\int \frac{e^{5\log_e x} - e^{4\log_e x}}{e^{3\log_e x} - e^{2\log_e x}}\, dx$ equals-

(A) $\frac{x^2}{2} + c$ (B) $\frac{x^3}{3} + c$

(C) $\frac{x^4}{4} + c$ (D) None of these

Q.5 $\int \frac{1-\cos 2x}{1+\cos 2x}$ dx equals-

(A) tan x + x + c (B) tan x – x + c

(C) sin x – x + c (D) sin x + x + c

Q.6 $\int$ cos2x sin4x dx is equal to-

(A) $\frac{1}{12}$ (cos 6x + 3 cos 2x) + c

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

(C) $-\frac{1}{12}$ (cos 6x + 3 cos 2x) + c

(D) None of these

Q.7 $\int 5^{\ell nx} dx$ is equal to

(A) $\frac{5^{\ell n x+1}}{\ell n x+1} + C$ (B) $\frac{x^{\ell n 5+1}}{\ell n 5+1} + C$

(C) $5^{\ell n x+c}$ (D) None of these

Q.8 $\int \frac{(a^x - b^x)^2}{a^x b^x}\, dx$ equals-

(A) $(a/b)^x + 2x + c$ (B) $(b/a)^x + 2x + c$

(C) $(a/b)^x - 2x + c$ (D) None of these

Q.9 $\int \frac{dx}{\sin^2 x \cos^2 x}$ equals-

(A) tan x – cot x + c (B) tan x + cot x + c

(C) cot x – tan x + c (D) None of these

Q.10 $\int \frac{\sin x}{\sqrt{1+\cos x}}\, dx$ equals-

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

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

(C) $2\sqrt{2}$ cos (x/2) + c

(D) $-2\sqrt{2}$ cos (x/2) + c

Q.11 $\int$ sec x (tan x + sec x) dx equals-

(A) tan x – sec x + c

(B) sec x – tan x+ c

(C) tan x + sec x + c

(D) None of these

Q.12 The value of $\int \frac{\sin x + \cos x}{\sqrt{1+\sin 2x}}$ dx is-

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

(C) cos x + c (D) $\frac{1}{2}$ (sinx + cos x)

Q.13 $\int a^{bx} b^{ax} dx$ is] where a, b $\in R^+$

(A) $\frac{a^{bx} b^{ax}}{\ell n (a^b b^a)} + c$ (B) $\frac{a^{bx} . b^{ax}}{\ell n a . \ell n b} + c$

(C) $\frac{a^{bx} . b^{ax}}{\ell n a^b . \ell n b^a} + c$ (D) None of these

Q.14 $\int \frac{\cos 2x + 2\sin^2 x}{\cos^2 x}\, dx$ equals-

(A) cot x + c (B) sec x + c

(C) tan x + c (D) cosec x + c

Q.15 $\int \cos x\left(\frac{1}{\sin^2 x}+\frac{\sin x}{\cos^3 x}\right)dx$ equals-

(A) sec x – cosec x + c

(B) cosec x – sec x + c

(C) sec x + cosec x + c

(D) None of these

Q.16 $\int \frac{\sin^3 x+\cos^3 x}{\sin^2 x\cos^2 x}dx$ equals-

(A) sec x – cosec x + c

(B) sec x + cosec x + c

(C) sin x – cos x + c

(D) None of these

Q.17 $\int \cos x \cos 3x\, dx$ equals-

(A) $\frac{1}{8}$ (sin 4x + 2 sin 2x) + c

(B) $\frac{1}{8}$ (sin 4x – 2 sin 2x) + c

(C) $\frac{1}{8}\sin x \sin 3x + c$

(D) None of these

Q.18 $\int \frac{2^x+3^x}{5^x}dx$ equals-

(A) $\frac{(2/5)^x}{\log_e 2/5}+\frac{(3/5)^x}{\log_e 3/5}+c$

(B) $\log_e (2x/5) + \log_e (3x/5) + c$

(C) x + c

(D) None of these

Q.19 The value of $\int \frac{\sin^2 x}{1+\cos x}dx$ is-

(A) x – sin x + c (B) x + sin x + c

(C) – x – sin x + c (D) None of these

Q.20 $\int \frac{1-\tan x}{1+\tan x}dx$ equals-

(A) log (cos x + sin x) + c

(B) log (cos x – sin x) + c

(C) log (sin x – cos x) + c

(D) None of these

Q.21 $\int \frac{\sin^4 x+\cos^4 x}{\sin^2 x\cos^2 x}dx$ equals-

(A) tan x + cot x – 2x + c

(B) tan x – cot x + 2x + c

(C) tan x – cot x – 2x + c

(D) None of these

Q.22 $\int \frac{\cos 2x-\cos 2\alpha}{\cos x-\cos\alpha}dx =$

(A) 2 [sin x + x cos α] + c

(B) 2 [sin x + sin α] + c

(C) 2 [– sin x + x cos α] + c

(D) – 2 [sin x + sin α] + c

Q.23 $\int \frac{\sin^2 x}{(1+\cos x)^2}dx$ equals-

(A) 2 tan x/2 + x + c (B) 2 tan x/2 – x + c

(C) tan x/2 – x + c (D) None of these

Q.24 $\int \frac{dx}{\sqrt{x+1}-\sqrt{x}}$ equals-

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

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

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

(D) $\frac{2}{3}[(x+1)^{3/2} + x^{3/2}] + c$

Q.25 $\int \frac{dx}{\sqrt{3x+4}-\sqrt{3x+1}}$ equals-

(A) $\frac{2}{27}[(3x+4)^{3/2} - (3x+1)^{3/2}] + c$

(B) $\frac{2}{27}[(3x+4)^{3/2} + (3x+1)^{3/2}] + c$

(C) $\frac{2}{3}[(3x+4)^{3/2} - (3x+1)^{3/2}] + c$

(D) None of these

Q.26 $\int a^{\log_a(\sec^2 x+\tan x)}dx$ equals-

(A) $e^{\tan x + \log \sec x} + c$

(B) $e^{\tan x} + e^{\log\cos x} + c$

(C) tan x + log sec x + c

(D) sec x + log cos x + c

Question based on **Integration by substitution**

Q.27 The value of $\int \frac{dx}{(\sec^{-1} x)\, x\sqrt{x^2-1}}$ is-

(A) $-\log(\sec^{-1} x) + c$

(B) $\log(\sec^{-1} x) + c$

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

(D) None of these

Q.28 $\int \frac{3x^2}{x^6+1} dx$ equals-

(A) $\log(x^6+1) + c$ (B) $\tan^{-1}(x^3) + c$

(C) $3\tan^{-1}(x^3) + c$ (D) $3\tan^{-1}(x^3/3) + c$

Q.29 $\int \frac{\cos x}{1+\sin x} dx$ is equal to-

(A) $-\log(1+\sin x) + c$

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

(C) $\log(1-\sin x) - c$

(D) $\log(1-\sin x) + c$

Q.30 Evaluate : $\int \cot x \operatorname{cosec}^2 x\, dx$.

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

(C) $-\frac{1}{2}\cos^2 x - c$ (D) None of these

Q.31 Evaluate : $\frac{\log(x+\sqrt{1+x^2})}{\sqrt{1+x^2}}$ dx

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

(B) $\left[\log(x+\sqrt{1+x^2})\right]^2 + c$

(C) $\frac{1}{2}\left[\log(x+\sqrt{1+x^2})\right] + c$

(D) None of these

Q.32 The value of $\int \frac{\tan(\log x)}{x}$ is-

(A) $\log\cos(\log x) + c$

(B) $\log\sin(\log x) + c$

(C) $\log\sec(\log x) + c$

(D) $\log\operatorname{cosec}(\log x) + c$

Q.33 $\int \frac{dx}{e^x + e^{-x}}$ equals-

(A) $\log(e^x + e^{-x}) + c$ (B) $\log(e^x - e^{-x}) + c$

(C) $\tan^{-1}(e^x) + c$ (D) $\tan^{-1}(e^{-x}) + c$

Q.34 $\int \sqrt{\frac{a+x}{a-x}} dx$ is equal to-

(A) $\sin^{-1}(x/a) - \sqrt{a^2-x^2} + c$

(B) $\cos^{-1}(x/a) - \sqrt{a^2-x^2} + c$

(C) $a\sin^{-1}(x/a) - \sqrt{a^2-x^2} + c$

(D) $a\cos^{-1}(x/a) - \sqrt{a^2-x^2} + c$

Q.35 $\int \frac{\sec^2 x}{\tan x\sqrt{\tan^2 x - 1}} dx$ is equal to -

(A) $\sec^{-1}(\tan x) + c$ (B) $\sec(\tan^{-1} x) + c$

(C) $\operatorname{cosec}^{-1}(\tan x) + c$ (D) None of these

Q.36 $\int \tan^3 x \sec^2 x\, dx$-

(A) $\int (\tan x)^3 d(\tan x) = \frac{1}{4}\tan^4 x + c$

(B) $\int (\cos x)^3 d(\tan x) = \frac{1}{3}\tan^4 x + c$

(C) $\int (\tan x)^3 d(\tan x) = -\frac{1}{4}\tan^4 x + c$

(D) None of these

Q.37 $\int \frac{(\sec x \operatorname{cosec} x)}{\log\tan x} dx$ equals-

(A) $\log\log\cot x + c$ (B) $\cot\log x + c$

(C) $\log(\log\tan x) + c$ (D) $\tan\log x + c$

Q.38 $\int \frac{x^{e-1} - e^{x-1}}{x^e - e^x} dx$ is equal to-

(A) $\log(x^e - e^x) + c$

(B) $e\log(x^e - e^x) + c$

(C) $-\log(x^e - e^x) + c$

(D) $(1/e)\log(x^e - e^x) + c$

Q.39 $\int \sec^4 x \tan x.\, dx$ is equal to-

(A) $\frac{\sec^4 x}{4} + c$ (B) $\frac{\tan^4 x}{4} + c$

(C) $\frac{\sec^5 x}{5} + c$ (D) None of these

Q.40 $\int x^2 \cos x^3 \, dx$ is equal to-

(A) 1/3 sin (x^3) + c (B) 3 sin (x^3) + c

(C) sin (x^3) + c (D) –1/3 sin (x^3) + c

Q.41 Primitive of $(\sec\theta / \tan^2\theta)$ is -

(A) $\frac{1}{2}\sec^2\theta + c$ (B) $-\cot\theta + c$

(C) $\sin^2(\theta/3) + c$ (D) $-\text{cosec}\,\theta + c$

Q.42 $\int \frac{x^2 \tan^{-1} x^3}{1+x^6} dx$ is equal to-

(A) $\frac{1}{3}(\tan^{-1}x^3)^2 + c$ (B) $\frac{1}{6}(\tan^{-1}x)^3 + c$

(C) $\frac{1}{6}(\tan^{-1}x)^2 - c$ (D) $\frac{1}{6}(\tan^{-1}x^3)^2 + c$

Q.43 $\int \frac{1+\cos x}{x+\sin x} dx$ equals-

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

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

(C) log (1–sin x) + c

(D) None of these

Q.44 $\int\left(1+x+\frac{x^2}{2!}+\frac{x^3}{3!}+....\right) dx$ equals-

(A) sin x + c (B) e^{-x} + c

(C) e^x + c (D) 1

Q.45 $\int \tan(3x-5)\sec(3x-5)\, dx$ equals-

(A) sec (3x – 5) + c (B)1/3sec(3x–5)+ c

(C) tan (3x – 5) + c (D) None of above

Q.46 $\int \frac{\tan^2 x \sec^2 x}{1+\tan^6 x} dx$ is equal to-

(A) $\tan^{-1}(\tan^3 x) + c$ (B) $3\tan^{-1}(\tan^3 x) + c$

(C) $\frac{1}{3}\tan^{-1}(\tan^3 x) + c$ (D) None of these

Q.47 $\int \frac{dx}{(1+x^2)\sqrt{p^2+q^2(\tan^{-1}x)^2}} =$

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

(B) $\log[q\tan^{-1}x+\sqrt{p^2+q^2(\tan^{-1}x)^2}\,]+c$

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

(D) None of the above

Q.48 $\int x^2 e^{x^3}\cos(e^{x^3})dx$ equals-

(A) $\sin e^{x^3} + c$ (B) $3\sin e^{x^3} + c$

(C) $\frac{1}{3}\sin e^{x^3} + c$ (D) $-\frac{1}{3}\sin n e^{x^3} + c$

Q.49 $\int \frac{\sin^p x}{\cos^{p+2} x} dx$ equals-

(A) $\frac{\tan^{p+1} x}{p+1} + c$ (B) $\tan^{p+1}x + c$

(C) $(p+1)\tan^{p+1} x + c$ (D) None of these

Q.50 $\int \frac{e^{\sqrt{x}}\cos(e^{\sqrt{x}})}{\sqrt{x}} dx$ equals-

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

(C) $\sin(e^{\sqrt{x}}) + c$ (D) $-\sin(e^{\sqrt{x}}) + c$

Q.51 $\int \frac{ax^2-b}{x\sqrt{c^2x^2-(ax^2+b)^2}} dx$ is

(A) $\sin^{-1}\left(\frac{ax+b/x}{c}\right)+k$

(B) $\sin^{-1}\left(\frac{ax^2+b/x^2}{c}\right)+k$

(C) $\cos^{-1}\left(\frac{ax+b/x}{c}\right)+k$

(D) None of these

Q.52 $\int \frac{\cos x}{\sqrt{1+\sin x}} dx$ is equal to-

(A) $\sqrt{1+\sin x} + c$

(B) $\sqrt{1-\sin x} + c$

(C) $2\sqrt{1+\sin x} + c$

(D) $2\sqrt{1-\sin x} + c$

Q.53 $\int \frac{\sin 2x}{a^2\sin^2 x + b^2\cos^2 x} dx$ is equal to-

(A) $\frac{1}{b^2-a^2}\log(a^2\sin^2 x + b^2\cos^2 x) + c$

(B) $\frac{1}{a^2-b^2}\log(a^2\sin^2 x + b^2\cos^2 x) + c$

(C) $\log(a^2\sin^2 x - b^2\cos^2 x) + c$

(D) None of these

Q.54 $\int \frac{(x+1)(x+\log x)^2}{x}$ dx equals-

(A) 3 $(x + \log x)^3 + c$ (B) $(x + \log x)^3 + c$

(C) $\frac{1}{3}(x + \log x)^3 + c$ (D) None of these

Q.55 $\int \tan^3 2x \sec 2x$ dx equals-

(A) $\sec^3 2x - 3 \sec 2x + c$

(B) $\sec^3 2x + 3 \sec 2x + c$

(C) $\frac{1}{6}[\sec^3 2x - 3 \sec 2x] + c$

(D) $\frac{1}{6}[\sec^3 2x + 3 \sec 2x] + c$

Q.56 $\int \frac{1}{x^2} \sin \frac{1}{x} dx$ equals-

(A) x sin (1/x) + c (B) – cot (1/x) + c

(C) cos (1/x) + c (D) x cos (1/x) + c

Q.57 $\int \frac{(1+\log x)^2}{x} dx$ equals-

(A) $3 (1 + \log x)^3 + c$

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

(C) $(1+ \log x)^3 + c$

(D) None of these

Q.58 $\int \frac{x \tan^{-1} x^2}{1+x^4} dx$ equals-

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

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

(C) $(\tan^{-1} x^2)^2 + c$

(D) None of these

Q.59 $\int x^2 \sec x^3 dx$ equals-

(A) $\frac{1}{3}\log (\sec x^3 + \tan x^3) + c$

(B) $\log (\sec x^3 + \tan x^3) + c$

(C) $\frac{1}{3}\log (\sec x^3 - \tan x^3) + c$

(D) None of these

Q.60 $\int \cos x \cot (\sin x) dx$ equals-

(A) log cos (sin x) + c (B) log sin (sin x) + c

(C) – log cos (sin x) + c (D) – log sin (sin x) + c

Q.61 $\int \left(1+\frac{1}{x^2}\right) e^{\left(x-\frac{1}{x}\right)} dx$ is equal to-

(A) $e^{x-\frac{1}{x}} + c$ (B) $e^{x+\frac{1}{x}} + c$

(C) $e^{x^2-\frac{1}{x}} + c$ (D) $e^{x^2+\frac{1}{x^2}} + c$

Q.62 $\int \cos^3 x dx$ is equal to-

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

(B) $\sin x + \frac{1}{3}\sin^3 x + c$

(C) $\sin x - \frac{1}{3}\sin^3 x + c$

(D) $\cos x + \frac{1}{3}\cos^3 x + c$

Q.63 $\int \frac{dx}{x\sqrt{x^4-1}}$ equals-

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

(C) $2 \sec^{-1} x^2 + c$ (D) $\text{cosec}^{-1} x^2 + c$

Q.64 $\int \frac{x}{\sqrt{4-x^4}} dx$ is equal to-

(A) $\sin^{-1}\frac{x^2}{2} + c$ (B) $\cos^{-1}\frac{x^2}{2} + c$

(C) $\frac{1}{2}\sin^{-1}\frac{x^2}{2} + c$ (D) $\frac{1}{2}\cos^{-1}\frac{x^2}{2} + c$

Q.65 $\int \frac{\sin 2x}{1+\sin^2 x} dx$ is equal to-

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

(C) log sin 2 x + c (D) $\tan^{-1} (\sin x) + c$

Q.66 $\int \frac{1+\tan^2 x}{1+\tan x} dx$ is equal to-

(A) –log (1 – tan x) + c

(B) log (2 + tan x) – c

(C) log (1 – tan x) – c

(D) log (1 + tan x) + c

Q.67 $\int \frac{x^3}{\sqrt{1-x^8}}\,dx$ equals-

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

(C) $\frac{1}{4}\sin^{-1} x^2 + c$ (D) $\frac{1}{4}\sin^{-1} x^4 + c$

Q.68 $\int \frac{\cos^2 x}{\sin^6 x}\,dx$ equals-

(A) $\frac{1}{3}\cot^3 x - \frac{1}{5}\cot^5 x + c$

(B) $-\frac{1}{3}\cot^3 x + \frac{1}{5}\cot^5 x + c$

(C) $-\frac{1}{3}\cot^3 x - \frac{1}{5}\cot^5 x + c$

(D) None of these

Q.69 $\int \frac{\tan x}{1+2\tan^2 x}\,dx$ is equal to-

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

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

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

(D) None of these

Q.70 $\int \sqrt{2+\sin 3x}\,.\cos 3x\,dx =$

(A) $\frac{2}{9}(2 + \sin 3x)^{1/2} + c$

(B) $\frac{2}{3}(2 + \sin 3x)^{2/3} + c$

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

(D) $\frac{2}{9}(2 + \sin 3x)^{3/2} + c$

Q.71 $\int \frac{\sin x - \cos x}{\sqrt{1-\sin 2x}} e^{\sin x}\cos x\,dx = \left\{\text{if } x \in \left(\frac{\pi}{4}, \frac{3\pi}{4}\right)\right\}$

(A) $e^{\sin x} + c$ (B) $e^{\sin x - \cos x} + c$

(C) $e^{\sin x + \cos x} + c$ (D) $e^{\cos x - \sin x} + c$

Q.72 $\int \frac{dx}{\sqrt{x+x\sqrt{x}}}$ equals-

(A) $\log\sqrt{x+x\sqrt{x}} + c$ (B) $\sqrt{1+\sqrt{x}} + c$

(C) $4\sqrt{1+\sqrt{x}} + c$ (D) $2\sqrt{x+x\sqrt{x}} + c$

Q.73 If $f(x) = \lim_{n\to\infty}[2x + 4x^3 + \ldots.. + 2nx^{2n-1}]$,

$(0 < x < 1)$ then $\int f(x)\,dx$ is equal to

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

(C) $\frac{1}{x^2-1}$ (D) $\frac{1}{1-x^2}$

Q.74 $\int \frac{dx}{x\log x.\log(\log x)}$ is equals to -

(A) log (x log x) +c

(B) log (log x) +c

(C) x log (log x) +c

(D) log({log(log x)} +c

Q.75 The value of $\int (1+\tan x)^{3/2}\sec^2 x\,dx$ is-

(A) $\frac{2}{5}(1+\tan x)^{1/2} + c$

(B) $\frac{5}{2}(1+\tan x)^{5/2} + c$

(C) $\frac{2}{5}(1+\tan x)^{5/2} + c$

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

Q.76 $\int \frac{\sec^4 x}{\sqrt{\tan x}}\,dx$ is equal to-

(A) $\frac{2}{5}\sqrt{\tan x}\,(5 + \tan^2 x) + c$

(B) $\frac{1}{5}\sqrt{\tan x}\,(5 + \tan^2 x) + c$

(C) $\frac{2}{5}\sqrt{\tan x}\,(3 + \tan^2 x) + c$

(D) None of these

Q.77 $\int \frac{x^2}{\sqrt{1-x^3}}\,dx$ equals-

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

(C) $\frac{1}{3}\sqrt{1-x^3}+c$ (D) $-\frac{1}{3}\sqrt{1-x^3}+c$

Q.78 $\int \frac{1}{x}\sqrt{\frac{x-1}{x+1}}\,dx$ equals-

(A) $\log\left|x+\sqrt{x^2-1}\right|+\sec^{-1}x+c$

(B) $\log\left|x+\sqrt{x^2-1}\right|-\sec^{-1}x+c$

(C) $\log\left|x+\sqrt{x^2-1}\right|-\text{sech}^{-1}x+c$

(D) None of these

Q.79 $\int x\sqrt{\frac{1-x^2}{1+x^2}}\,dx =$

(A) $\frac{1}{2}[\sin^{-1}x^2+\sqrt{1-x^4}\,]+c$

(B) $\frac{1}{2}[\sin^{-1}x^2+\sqrt{1-x^4}\,]+c$

(C) $\sin^{-1}x^2+\sqrt{1-x^4}+c$

(D) $\sin^{-1}x^2+\sqrt{1-x^4}+c$

Q.80 $\int \frac{dx}{\sqrt{x}(1+x)}$ is equal to-

(A) $\tan^{-1}\sqrt{x}+c$

(B) $\cot^{-1}\sqrt{x}+c$

(C) $2\tan^{-1}\sqrt{x}+c$

(D) $2\cot^{-1}\sqrt{x}+c$

Q.81 $\int \frac{dx}{x+\sqrt{x}}$ is equal to-

(A) $\log(1+\sqrt{x})+c$

(B) $\log(x+\sqrt{x})+c$

(C) $2\log(x+\sqrt{x})+c$

(D) $2\log(1+\sqrt{x})+c$

Question based on **Integration by Parts**

Q.82 $\int \frac{\log(\log x)}{x}\,dx$ equals-

(A) $\log x \log\left(\frac{\log x}{e}\right)+c$

(B) $\log(e/x^2)+c$

(C) $\log(x^2/e)+c$

(D) $\log x.\log(e/x)+c$

Q.83 $\int x^3 e^{x^2}\,dx$ is equal to-

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

(B) $\frac{1}{2}(x^2-1)\,e^{x^2}+c$

(C) $\frac{1}{2}(1-x^2)\,e^{x^2}+c$

(D) None of these

Q.84 $\int \frac{x-\sin x}{1-\cos x}\,dx =$

(A) $x\cot\frac{x}{2}+c$ (B) $-x\cot\frac{x}{2}+c$

(C) $\cot\frac{x}{2}+c$ (D) None of these

Q.85 $\int e^{2x}\left[\frac{1+\sin 2x}{1+\cos 2x}\right]dx$ -

(A) $\frac{1}{2}e^{2x}\cot x+c$ (B) $\frac{1}{2}e^{2x}\tan x+c$

(C) $-\frac{1}{2}e^{2x}\cot x+c$ (D) none

Q.86 $\int x\log(1+x)^2\,dx$ is equal to-

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

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

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

(D) None of these

Q.87 The value of $\int e^x (\cot x + \log \sin x)dx$ is-

(A) $e^x \log \sin x + c$ (B) $e^x \log \cos x + c$
(C) $e^x \log \tan x + c$ (D) $-e^x \log \cos x + c$

Q.88 $\int \sin^{-1}(3x - 4x^3)\, dx$ is equal to -

(A) $x \sin^{-1}x + \sqrt{1-x^2} + c$

(B) $x \sin^{-1}x - \sqrt{1-x^2} + c$

(C) $2\,[x \sin^{-1}x + \sqrt{1-x^2}\,] + c$

(D) $3\,[x \sin^{-1}x + \sqrt{1-x^2}\,] + c$

Q.89 $\int e^x[\log (\sec x + \tan x) + \sec x]\, dx$ equals-

(A) $e^x \log \sec x + c$
(B) $e^x \log \tan x + c$
(C) $e^x \log (\tan x + \sec x) + c$
(D) None of these

Q.90 $\int (e^{\log x} + \sin x) \cos x\, dx$ equals-

(A) $x \sin x + \cos x + (1/2) \cos 2x + c$
(B) $x \sin x - \cos x + (1/4) \cos 2x + c$
(C) $x \sin x + \cos x - (1/4) \cos 2x + c$
(D) None of these

Q.91 $\int \frac{\log x}{(1+\log x)^2}\, dx$ equals-

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

(C) $-\frac{x}{1+\log x} + c$ (D) $-\frac{1}{1+\log x} + c$

Q.92 $\int \cot^{-1} \frac{1}{x}\, dx$ equals-

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

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

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

(D) None of these

Q. 93 $\int \frac{1}{x^2} \log (x^2 + a^2)\, dx =$

(A) $\frac{1}{x} \log (x^2 + a^2) + \frac{2}{a} \tan^{-1} \frac{x}{a} + c$

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

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

(D) None of these

Q.94 $\int e^x \left[\frac{1 + nx^{n-1} - x^{2n}}{(1-x^n)\sqrt{1-x^{2n}}} \right] dx$

(A) $e^x \sqrt{\frac{1-x^n}{1+x^n}} + c$ (B) $e^x \sqrt{\frac{1+x^n}{1-x^n}} + c$

(C) $-e^x \sqrt{\frac{1-x^n}{1+x^n}} + c$ (D) $-e^x \sqrt{\frac{1+x^n}{1-x^n}} + c$

Q.95 $\int x \sin x \sec^3 x\, dx$ equals-

(A) $\frac{1}{2} [\sec^2 x - \tan x] + c$

(B) $\frac{1}{2} [x \sec^2 x - \tan x] + c$

(C) $\frac{1}{2} [x \sec^2 x + \tan x] + c$

(D) $\frac{1}{2} [\sec^2 x + \tan x] + c$

Q.96 $\int \cos(\log x)\, dx$ is equal to-

(A) $\frac{x}{2} \cos (\log x - \pi/4) + c$

(B) $\frac{x}{2} \cos (\log x + \pi/4) + c$

(C) $\frac{x}{\sqrt{2}} \cos (\log x + \pi/4) + c$

(D) $\frac{x}{\sqrt{2}} \cos (\log x - \pi/4) + c$

Q.97 $\int \frac{\log x - 1}{(\log x)^2}\, dx$ equals-

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

(C) $-\frac{x}{\log x} + c$ (D) None of these

Q.98 $\int \sin^{-1}\left(\frac{2x}{1+x^2}\right) dx$ equals-

(A) $x \tan^{-1} x + \log (1+ x^2) + c$
(B) $x \tan^{-1} x - \log (1+ x)^2 + c$
(C) $2x \tan^{-1} x - \log (1+ x^2) + c$
(D) None of these

Q.99 $\int e^x\, [\tan x - \log \cos x]\, dx$

$= f(x) \log \sec x + c$ then range of f(x) is

(A) R (B) R – {0}
(C) R^+ (D) None of these

Question based on **Integration of rational function**

Q.100 $\int \frac{dx}{x\,[(\log x)^2 + 4\log x - 1]} =$

(A) $\frac{1}{2\sqrt{5}} \log\left[\frac{\log x + 2 - \sqrt{5}}{\log x + 2 + \sqrt{5}}\right] + c$

(B) $\frac{1}{\sqrt{5}} \log\left[\frac{\log x + 2 - \sqrt{5}}{\log x + 2 + \sqrt{5}}\right] + c$

(C) $\frac{1}{2\sqrt{5}} \log\left[\frac{\log x + 2 + \sqrt{5}}{\log x + 2 - \sqrt{5}}\right] + c$

(D) $\frac{1}{\sqrt{5}} \log\left[\frac{\log x + 2 + \sqrt{5}}{\log x + 2 - \sqrt{5}}\right] + c$

Q.101 $\int \frac{3x+1}{2x^2 - 2x + 3} dx$ equals-

(A) $\frac{1}{4}\log(2x^2 - 2x + 3) - \frac{\sqrt{5}}{2}\tan^{-1}\left(\frac{2x-1}{\sqrt{5}}\right) + c$

(B) $\frac{3}{4}\log(2x^2 - 2x + 3) + \frac{\sqrt{5}}{2}\tan^{-1}\left(\frac{2x-1}{\sqrt{5}}\right) + c$

(C) $\frac{3}{4}\log(2x^2 - 2x + 3) + \frac{\sqrt{5}}{2}\tan^{-1}\left(\frac{4x-2}{5}\right) + c$

(D) None of these

Q.102 $\int \frac{x^3 - x - 2}{(1 - x^2)} dx =$

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

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

Q.103 $\int \frac{x}{(x^2+1)(x^2+2)} dx$ equals-

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

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

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

(D) $\log\left(\frac{x^2+2}{x^2+1}\right) + c$

Q.104 The value of $\int \frac{x^2-1}{x^4+1} dx$ equals-

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

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

(C) $\frac{1}{\sqrt{2}}\tan^{-1}\frac{x^2-1}{\sqrt{2}x} + C$

(D) None of these

Q.105 The value of $\int \frac{dt}{t^2 + 2xt + 1}$ $(x^2 > 1)$ is-

(A) $\frac{1}{\sqrt{1-x^2}}\tan^{-1}\left(\frac{t+x}{\sqrt{1-x^2}}\right) + c$

(B) $\frac{1}{2\sqrt{x^2-1}}\log\left(\frac{t + x - \sqrt{x^2-1}}{t + x + \sqrt{x^2-1}}\right) + c$

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

(D) None of these

Q.106 $\int \frac{4x^2 + x + 1}{x^3 - 1} dx$ equals-

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

(B) $\log\{(x - 1)/(x^3 - 1)\} + c$

(C) $\log\{(x^3 - 1)(x - 1)\} + c$

(D) None of these

Q.107 $\int \frac{x}{x^4 + x^2 + 1} dx$ equals-

(A) $\frac{1}{\sqrt{3}}\tan^{-1}\left(\frac{2x^2+1}{\sqrt{3}}\right) + c$

(B) $\frac{1}{3}\tan^{-1}\left(\frac{2x^2+1}{3}\right) + c$

(C) $\frac{2}{\sqrt{3}}\tan^{-1}\left(\frac{2x^2+1}{\sqrt{3}}\right) + c$

(D) $\frac{1}{\sqrt{3}}\tan^{-1}\left(\frac{2x^2+1}{3}\right) + c$

Q.108 If $\int \frac{dx}{x^2+x^3} = \frac{A}{x} + B\,\ell n\left|\frac{x}{x+1}\right| + C$

(A) $A = \frac{1}{2}$, $B = 1$ (B) $A = 1$, $B = -\frac{1}{2}$

(C) $A = -1$, $B = -1$ (D) None of these

Q.109 $\int \frac{dx}{(x^2+1)(x^2+4)}$ is equal to-

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

(B) $\frac{1}{3}\tan^{-1} x - \frac{1}{6}\tan^{-1} x/2 + c$

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

(D) $\tan^{-1} x - 2\tan^{-1} x/2 + c$

Q.110 $\int \frac{x^3-7x+6}{x^2+3x} dx$ is equal to-

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

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

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

(D) None of these

Q.111 $\int \frac{dx}{2x^2+x-1}$ is equal to-

(A) $\log\left(\frac{2x-1}{x+1}\right) + c$ (B) $\log\left(\frac{x+1}{2x-1}\right) + c$

(C) $\frac{1}{3}\log\left(\frac{2x-1}{2(x+1)}\right) + c$ (D) $\frac{1}{3}\log\left(\frac{x+1}{2x-1}\right) + c$

Q.112 $\int \frac{dx}{x(x^n+1)}$ dx is equal to-

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

(B) $\frac{1}{n}\log\left(\frac{x^n+1}{x^n}\right) + c$

(C) $\log\left(\frac{x^n}{x^n+1}\right) + c$

(D) None of these

Q.113 $\int \frac{dx}{x(x^4+1)}$ is equal to-

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

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

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

(D) None of these

Q.114 $\int \frac{\cos x}{(1+\sin x)(2+\sin x)} dx$ equals-

(A) $\log\left(\frac{2+\sin x}{1+\sin x}\right) + c$

(B) $\log\left(\frac{1+\sin x}{2+\sin x}\right) + c$

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

(D) None of these

Q.115 $\int \frac{dx}{x(x^4-1)}$ equals-

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

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

(C) $\log\left(\frac{x^4-1}{x^4}\right) + c$

(D) None of these

Q.116 $\int \frac{(x^3+8)(x-1)}{x^2-2x+4} dx$ equals-

(A) $\frac{x^3}{3} + \frac{x^2}{2} - 2x + c$

(B) $x^3 + x^2 - 2x + c$

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

(D) None of these

Question based on **Integration of irrational function**

Q.117 $\int \frac{dx}{\sqrt{5x-6-x^2}}$ equals-

(A) $\sin^{-1}(2x+5)+c$

(B) $\cos^{-1}(2x+5)+c$

(C) $\sin^{-1}(2x-5)+c$

(D) $\log\left|2X-5+\sqrt{4X^2-20X+24}\right|+c$

Q.118 $\int \frac{2x+3}{\sqrt{x^2+1}}dx$ is equal to-

(A) $2\sqrt{x^2+1}+3\log\left|x+\sqrt{x^2+1}\right|+c$

(B) $\sqrt{x^2+1}+3\log\left|x+\sqrt{x^2+1}\right|+c$

(C) $2\sqrt{x^2+1}+3\log\left|x+\sqrt{x^2-1}\right|+c$

(D) None of these

Q.119 $\int \frac{1+x^2}{\sqrt{1-x^2}}dx$ equals-

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

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

(C) $\frac{1}{2}[\sin^{-1}x-x\sqrt{1-x^2}]+c$

(D) None of these

Q.120 $\int \frac{2x+1}{\sqrt{x^2+x+1}}dx$ equals-

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

(C) $\frac{1}{2}\sqrt{x^2+x+1}+c$ (D) None of these

Q.121 $\int \frac{dx}{\sqrt{x(1-x)}}$ equals-

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

(B) $\log\left|1-2x+\sqrt{4x^2-4x+2}\right|+c$

(C) $\sin^{-1}(2x-1)+c$

(D) $\log\left|2x-1+\sqrt{4x^2-4x}\right|+c$

Q.122 $\int \frac{dx}{\sqrt{2x^2-x+2}}$ equals-

(A) $\log\left|\frac{4x-1}{\sqrt{15}}+\sqrt{\frac{4x^2-8x+16}{15}}\right|+c$

(B) $\log\left|\frac{4x+1}{\sqrt{15}}+\sqrt{\frac{4x^2+8x-14}{15}}\right|+c$

(C) $\frac{1}{\sqrt{2}}\log\left|\frac{4x-1}{4}+\sqrt{\frac{2x^2-x+2}{2}}\right|+c$

(D) $\frac{1}{\sqrt{2}}\log\left|\frac{4x+1}{\sqrt{15}}+\sqrt{\frac{4x^2+8x-14}{15}}\right|+c$

Q.123 $\int \frac{dx}{\sqrt{2-3x-x^2}}$ is equal to-

(A) $\tan^{-1}\left(\frac{2x+3}{\sqrt{17}}\right)+c$ (B) $\sec^{-1}\left(\frac{2x+3}{\sqrt{17}}\right)+c$

(C) $\sin^{-1}\left(\frac{2x+3}{\sqrt{17}}\right)+c$ (D) $\cos^{-1}\left(\frac{2x+3}{\sqrt{17}}\right)+c$

Question based on **Integration of trigonometric function**

Q.124 $\int \frac{dx}{\sqrt{1+\sin x}}=$

(A) $\sqrt{2}\log\tan\left(\frac{x}{4}+\frac{\pi}{8}\right)+c$

(B) $\sqrt{2}\log\tan\left(\frac{x}{4}-\frac{\pi}{8}\right)+c$

(C) $\sqrt{2}\log\sin\left(\frac{x}{4}+\frac{\pi}{8}\right)-c$

(D) $\sqrt{2}\log\sec\left(\frac{x}{4}+\frac{\pi}{8}\right)-c$

Q.125 The value of $\int \frac{\sin x}{\sin x-\cos x}dx$ equals-

(A) $\frac{1}{2}x+\frac{1}{2}\log(\sin x-\cos x)+c$

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

(C) $x+\log(\sin x+\cos x)+c$

(D) None of these

Q.126 $\int \frac{dx}{a\sin x + b\cos x}$ equals-

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

(B) $\frac{1}{\sqrt{a^2+b^2}} \log\left[\tan\left(x + \tan^{-1}\frac{b}{a}\right)\right] + c$

(C) $\frac{1}{\sqrt{a^2+b^2}} \log\left[\tan\frac{1}{2}\left(x - \tan^{-1}\frac{b}{a}\right)\right] + c$

(D) None of these

Q.127 $\int \frac{dx}{1+2\sin x + \cos x}$ equals-

(A) log (1 + 2 tan x/2) + c

(B) log (1 – 2 tan x/2) + c

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

(D) $\frac{1}{2}$ log (1 – 2 tan x/2) + c

Q.128 $\int \frac{\cos 2x}{(\sin x + \cos x)^2} dx$ is equal to-

(A) log (sin x – cos x) + c

(B) log (cos x – sin x) + c

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

(D) none of these

Q.129 $\int \frac{dx}{9\sin^2 x + 4\cos^2 x}$ is equal to-

(A) $\tan^{-1}\left(\frac{3}{2}\tan x\right) + c$

(B) $\tan^{-1}\left(\frac{2}{3}\tan x\right) + c$

(C) $6\tan^{-1}\left(\frac{3}{2}\tan x\right) + c$

(D) $\frac{1}{6}\tan^{-1}\left(\frac{3}{2}\tan x\right) + c$

Q.130 $\int \frac{dx}{5-4\cos x}$ equals-

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

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

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

(D) None of these

Q.131 $\int \frac{\sin x\, dx}{1+\sin x}$ equals-

(A) $x + 2\,[1 + \tan(x/2)]^{-1} + c$

(B) $x + [1 + \tan(x/2)]^{-1} + c$

(C) $x - 2\,[1 + \tan(x/2)]^{-1} + c$

(D) None of these

Q.132 $\int \sin^3 x\, dx$ is equal to-

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

(B) $\frac{1}{3}\cos^3 x - \cos x + c$

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

(D) None of these

Q.133 $\int \frac{dx}{\sqrt{1-\sin 2x}}$ equals-

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

(B) $\frac{1}{\sqrt{2}} \log\tan\left(\frac{x}{2} - \frac{\pi}{8}\right) + c$

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

(D) None of these

Q.134 $\int \sin^2 x \cos^3 x\, dx$ is equal to-

(A) $\frac{1}{3}\sin^3 x - \frac{1}{5}\sin^5 x + c$

(B) $\frac{1}{3}\cos^3 x - \frac{1}{5}\sin^5 x + c$

(C) $\frac{1}{5}\sin^3 x - \frac{1}{3}\sin^5 x + c$

(D) $\frac{1}{3}\tan^3 x - \frac{1}{5}\sin^5 x + c$

Q.135 $\int \frac{x^2}{\sqrt{1-x}}\,dx$ is equal to-

(A) $\frac{2}{3}(1-x)^{3/2}(3x^2+4x+5)$

(B) $\frac{-1}{15}\log(1-x)(3x^2+4x+8)$

(C) $\frac{-2}{15}\sqrt{1-x}\,(3x^2+4x+8)$

(D) None of these

Question based on **Some integration of different Expression of e^x**

Q.136 $\int \frac{e^x-1}{e^x+1}\,dx$ is equal to-

(A) $\log(e^x+1)+c$

(B) $\log(e^x-1)+c$

(C) $2\log(e^{x/2}+e^{-x/2})+c$

(D) None of these

Q.137 $\sqrt{e^x+1}\,dx$ is equal to -

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

(B) $2\left[\sqrt{e^x+1}-\log\left|e^{-\frac{x}{2}}+\sqrt{e^{-x}+1}\right|\right]+c$

(C) $2\left[\sqrt{e^x+1}-\sin^{-1}(e^{-x/2})\right]+c$

(D) None of these

Q.138 $\int \frac{e^{-x}}{1+e^x}\,dx =$

(A) $\log(1+e^x)-x-e^{-x}+c$

(B) $\log(1+e^x)+x-e^{-x}+c$

(C) $\log(1+e^x)-x+e^{-x}+c$

(D) $\log(1+e^x)+x+e^{-x}+c$

Q.139 $\int \frac{dx}{(1+e^x)(1-e^{-x})}$ equals-

(A) $\log\left(\frac{e^x-1}{e^x+1}\right)+c$ (B) $\log\left(\frac{e^x+1}{e^x-1}\right)+c$

(C) $\frac{1}{2}\log\left(\frac{e^x+1}{e^x-1}\right)+c$ (D) $\frac{1}{2}\log\left(\frac{e^x-1}{e^x+1}\right)+c$

Q.140 $\int \frac{a}{b+ce^x}\,dx$ is equal to-

(A) $\frac{a}{b}\log\left(\frac{e^x}{b+ce^x}\right)+k$ (B) $\frac{a}{b}\log\left(\frac{b+ce^x}{e^x}\right)+k$

(C) $c\log(b+ce^x)+k$ (D) None of these

Q.141 $\int \frac{dx}{\sqrt{1-e^{2x}}} =$

(A) $\log\left(e^{-x}+\sqrt{e^{-2x}-1}\right)$

(B) $\log\left(e^{-x}-\sqrt{e^{-2x}-1}\right)$

(C) $\log\left(e^x+\sqrt{e^{2x}+1}\right)$

(D) $\log\left(e^x+\sqrt{e^{2x}-1}\right)$

LEVEL- 2

Q.1 $\int \frac{x^5}{1+x^{12}}\,dx$ is equal to-

(A) $\tan^{-1}x^6 + c$ (B) $2\tan^{-1}x^6 + c$

(C) $\frac{1}{6}\tan^{-1}x^6 + c$ (D) None of these

Q.2 $\int \sin\sqrt{x}\,dx$ is equal to-

(A) $2(\sin\sqrt{x} - \cos\sqrt{x}) + c$

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

(C) $2(\sin\sqrt{x} - \sqrt{x}\cos\sqrt{x}) + c$

(D) $2(\sin\sqrt{x} + \sqrt{x}\cos\sqrt{x}) + c$

Q.3 $\int \frac{dx}{x + x\log x}$ is equal to-

(A) $\log x + \log(\log x) + c$

(B) $\log\log(1+\log x) + c$

(C) $\log(1+\log x) + c$

(D) None of these

Q.4 $\int e^{x/2}\sin\left(\frac{x}{2}+\frac{\pi}{4}\right)dx$ is equal to-

(A) $e^{x/2}\sin x/2 + c$ (B) $e^{x/2}\cos x/2 + c$

(C) $\sqrt{2}\,e^{x/2}\sin x/2 + c$ (D) $\sqrt{2}\,e^{x/2}\cos x/2 + c$

Q.5 $\int \{\sin(\log x) + \cos(\log x)\}\,dx$ is equal to-

(A) $\sin(\log x) + c$ (B) $\cos(\log x) + c$

(C) $x\sin(\log x) + c$ (D) $x\cos(\log x) + c$

Q.6 $\int \log_{10} x\,dx$ is equal to-

(A) $\log_{10} x + c$

(B) $x\log_{10} x + c$

(C) $x(\log_{10} x + \log_{10} e) + c$

(D) $x(\log_{10} x - \log_{10} e) + c$

Q.7 $\int [(\log 2x)/x]\,dx$ equals-

(A) $x\log 2x + c$

(B) $(\log x \log 2x)/2 + c$

(C) $(\log x \log 4x)/2 + c$

(D) None of these

Q.8 $\int \sqrt{\frac{x}{a^3 - x^3}}\,dx$ is equal to-

(A) $\sin^{-1}\left(\frac{x}{a}\right)^{3/2} + c$ (B) $\frac{2}{3}\sin^{-1}\left(\frac{x}{a}\right)^{3/2} + c$

(C) $\frac{3}{2}\sin^{-1}\left(\frac{x}{a}\right)^{3/2} + c$ (D) $\frac{3}{2}\sin^{-1}\left(\frac{x}{a}\right)^{2/3} + c$

Q.9 $\int \frac{dx}{\sin(x-a)\cos(x-b)}$ is equal to-

(A) $\cos(a-b)\log\frac{\sin(x-a)}{\cos(x-b)} + c$

(B) $\sec(a-b)\log\frac{\sin(x-a)}{\cos(x-b)} + c$

(C) $\sin(a-b)\log\frac{\cos(x-a)}{\sin(x-b)} + c$

(D) $\operatorname{cosec}(a-b)\log\frac{\cos(x-a)}{\sin(x-b)} + c$

Q.10 $\int x\cos^2 x\,dx$ is equal to-

(A) $\frac{x^2}{4} - \frac{1}{4}x\sin 2x - \frac{1}{8}\cos 2x + c$

(B) $\frac{x^2}{4} - \frac{1}{4}x\sin 2x + \frac{1}{8}\cos 2x + c$

(C) $\frac{x^2}{4} + \frac{1}{4}x\sin 2x - \frac{1}{8}\cos 2x + c$

(D) $\frac{x^2}{4} + \frac{1}{4}x\sin 2x + \frac{1}{8}\cos 2x + c$

Q.11 $\int x^{51}(\tan^{-1}x + \cot^{-1}x)\,dx$ is equal to-

(A) $\frac{x^{52}}{52}(\tan^{-1}x + \cot^{-1}x) + c$

(B) $\frac{x^{52}}{52}(\tan^{-1}x - \cot^{-1}x) + c$

(C) $\frac{x^{52}}{52} + \frac{\pi}{2} + c$

(D) $-\frac{\pi x^{52}}{104} + \frac{\pi}{2} + c$

Q.12 $\int \frac{\sin^8 x - \cos^8 x}{1 - 2\sin^2 x \cos^2 x}\, dx$ is equal to-

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

(C) $\frac{1}{2}\sin 2x + c$ (D) $-\sin 2x + c$

Q.13 If $\int f(x)\, dx = F(x)$, then $\int x^3 f(x^2)\, dx$ equals

(A) $\frac{1}{2}\left[x^2 F(x^2) - \int F(x^2)\, dx^2\right]$

(B) $\frac{1}{2}\left[x^2 F(x^2) - \int F(x^2)\, dx\right]$

(C) $\frac{1}{2}\left[x^2 F(x) - \frac{1}{2}\int F(x^2)\, dx\right]$

(D) none of these

Q.14 If $I = \int e^x \sin 2x\, dx$, then for what value of k, $kI = e^x(\sin 2x - 2\cos 2x) + \text{constant}$-

(A) 1 (B) 3 (C) 5 (D) 7

Q.15 $\int \frac{\cos 4x + 1}{\cot x - \tan x}\, dx$ equals-

(A) $-\frac{1}{2}\cos 4x + c$ (B) $-\frac{1}{2}\cos 4x + c$

(C) $-\frac{1}{8}\cos 4x + c$ (D) None of these

Q.16 $\int \frac{x^2 + 1}{(x+1)^2} e^x\, dx$ equal to-

(A) $\frac{x-1}{x+1} e^x + c$ (B) $\frac{x+1}{x-1} e^x + c$

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

Q.17 $\int \frac{3\tan\frac{x}{3} - \tan^3\frac{x}{3}}{1 - 3\tan^2\frac{x}{3}}\, dx$ is equal to-

(A) $-\log|\sec x| + c$

(B) $-\log|(\cos x)| + c$

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

(D) $\log|\tan x| + c$

Q.18 $\int \cos^3 x\, e^{\log(\sin x)}\, dx$ is equal to-

(A) $\frac{1}{4} e^{\sin x} + c$ (B) $-\frac{1}{4}\sin^4 x + c$

(C) $-\frac{1}{4}\cos^4 x + c$ (D) None of these

Q.19 $\int e^{\tan^{-1} x}\left(\frac{1 + x + x^2}{1 + x^2}\right) dx$ is equal to-

(A) $xe^{\tan^{-1} x} + c$ (B) $x^2 e^{\tan^{-1} x}$

(C) $\frac{1}{x} e^{\tan^{-1} x} + c$ (D) None of these

Q.20 $\int \sqrt{\frac{\cos x - \cos^3 x}{1 - \cos^3 x}}\, dx$ is equal to-

(A) $\frac{2}{3}\sin^{-1}(\cos^{3/2} x) + c$

(B) $\frac{3}{2}\sin^{-1}(\cos^{3/2} x) + c$

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

(D) None of these

Q.21 If $\int \frac{dx}{x\sqrt{1 - x^3}} = a \log\left[\frac{\sqrt{1 - x^3} - 1}{\sqrt{1 - x^3} + 1}\right] + b$, then-

(A) $a = \frac{1}{3}$ (B) $a = \frac{2}{3}$

(C) $a = -\frac{1}{3}$ (D) $a = -\frac{2}{3}$

Q.22 $\int \frac{x \tan^{-1} x}{(1 + x^2)^{3/2}}\, dx$ equals to-

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

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

(C) $\frac{\tan^{-1} x - x}{\sqrt{1 + x^2}} + c$

(D) None of these

Q.23 $\int \frac{3\cos x + 2\sin x}{4\sin x + 5\cos x} dx$ is equal to-

(A) $\frac{23}{41} x + \frac{2}{41} \log (4 \sin x + 5 \cos x) + c$

(B) $\frac{23}{41} x - \frac{2}{41} \log (4 \sin x + 5 \cos x) + c$

(C) $\frac{23}{41} x - \frac{2}{41} \log (4 \sin x - 5 \cos x) + c$

(D) None of these

Q.24 $\int \frac{x^2 + 1}{x(x^2 - 1)} dx$ is equal to-

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

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

Q.25 $\int x^n \log x \, dx$ equals-

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

(B) $\frac{x^{n+1}}{n+1}\left\{\log x + \frac{2}{n+1}\right\}$

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

(D) $\frac{x^{n+1}}{n+1}\left\{\log x - \frac{1}{n+1}\right\} + c$

Q.26 $\int \tan^{-1} (\sec x + \tan x) \, dx$ equals-

(A) $\frac{x}{2} + c$ (B) $\frac{\sec x}{\sec x + \tan x} + c$

(C) $\frac{x}{4}(\pi + x) + c$ (D) None of these

Q.27 $\int \frac{4x - 7}{x^2 + x - 2} dx$ equals-

(A) $2 \log (x^2 + x - 2) - 3 \log\left(\frac{x-1}{x+2}\right) + c$

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

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

(D) None of these

Q.28 $\int \cos^2 (ax + b) \sin (ax + b) \, dx$ equals-

(A) $-\frac{\cos^3(ax+b)}{3a} + c$

(B) $\frac{\cos^3(ax+b)}{3a} + c$

(C) $\frac{\sin^3(ax+b)}{3a} + c$

(D) $-\frac{\sin^3(ax+b)}{3a} + c$

Q.29 $\int \sqrt{1 + \sec x} \, dx$ equals-

(A) $2 \sin^{-1}(\sqrt{2} \sin x/2) + c$

(B) $-2 \sin^{-1}(\sqrt{2} \sin x/2) + c$

(C) $2 \log \left|\sqrt{2}\sin\frac{x}{2} + \sqrt{2\sin^2\frac{x}{2} - 1}\right|$

(D) None of these

Q.30 $\int \frac{\sin x}{\sin 3x} dx$ is equal to-

(A) $\frac{1}{2\sqrt{3}} \log\left(\frac{\sqrt{3} + \tan x}{\sqrt{3} - \tan x}\right) + c$

(B) $\frac{1}{2\sqrt{3}} \log\left(\frac{\sqrt{3} - \tan x}{\sqrt{3} + \tan x}\right) + c$

(C) $\frac{1}{\sqrt{3}} \log\left(\frac{\sqrt{3} + \tan x}{\sqrt{3} - \tan x}\right) + c$

(D) None of these

Q.31 $\int \frac{1 - \cos x}{\cos x (1 + \cos x)} dx$ is equal to-

(A) $\log (\sec x + \tan x) - 2 \tan x/2 + c$

(B) $\log (\sec x + \tan x) + 2 \tan x/2 + c$

(C) $\log (\sec x - \tan x) - \tan x/2 + c$

(D) None of these

Q.32 $\int e^x \sqrt{1+e^x}\, dx$ is equal to-

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

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

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

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

Q.33 $\int \frac{e^{\log[1+(1/x^2)]}}{[x^2+(1/x^2)]} dx$ equals-

(A) $e^{\log[1+(1/x^2)]} + c$

(B) $\frac{1}{\sqrt{2}} \tan^{-1}\left(\frac{x^2-1}{x\sqrt{2}}\right) + c$

(C) $\frac{1}{\sqrt{2}} \tan^{-1}\left(\frac{x^2+1}{x\sqrt{2}}\right) + c$

(D) $\tan^{-1}\left(\frac{x^2-1}{x\sqrt{2}}\right) + c$

Q.34 $\int u\frac{d^2v}{dx^2} dx - \int v\frac{d^2u}{dx^2} dx$ is equal to -

(A) uv + c (B) $2\frac{du}{dx} + \frac{dv}{dx} + c$

(C) $u\frac{dv}{dx} - v\frac{du}{dx} + c$ (D) $u\frac{dv}{dx} + v\frac{du}{dx} + c$

Q.35 If $\int f(x)\, dx = f(x)$, then $\int \{f(x)\}^2\, dx$ is equal to

(A) $\frac{1}{2}\{f(x)\}^2$ (B) $\{f(x)]^3$

(C) $\frac{1}{3}\{f(x)]^3$ (D) $\{f(x)]^2$

Q.36 $\int \frac{x^3-1}{x^3+x} dx$ equal to-

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

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

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

(D) None of these

Q.37 $\int \frac{x^5 dx}{\sqrt{1+x^3}}$ equals-

(A) $\frac{2}{3}\sqrt{(1+x^3)}\ (x^2 + 2) + c$

(B) $\frac{2}{9}\sqrt{(1+x^3)}\ (x^3 - 4) + c$

(C) $\frac{2}{9}\sqrt{(1+x^3)}\ (x^3 + 4) + c$

(D) $\frac{2}{9}\sqrt{(1+x^3)}\ (x^3 - 2) + c$

Q.38 $\int (\sqrt{\tan x} + \sqrt{\cot x})\, dx$ equals-

(A) $\sqrt{2}\tan^{-1}\frac{1}{\sqrt{2}}(\sqrt{\tan x} - \sqrt{\cot x}) + c$

(B) $\sqrt{2}\tan^{-1}\frac{1}{\sqrt{2}}(\sqrt{\tan x} + \sqrt{\cot x}) + c$

(C) $\tan^{-1}\frac{1}{\sqrt{2}}(\sqrt{\tan x} - \sqrt{\cot x}) + c$

(D) None of these

Q.39 $\int 5^{5^{5^x}} . 5^{5^x} . 5^x\, dx$ is equal to-

(A) $\frac{5^{5^x}}{(\log 5)^3} + c$ (B) $\frac{5^{5^{5^x}}}{(\log 5)^3} + c$

(C) $(5^{5^{5^x}} \log 5)^3 + c$ (D) None of these

Q.40 $\int [1+ 2\tan x (\tan x + \sec x)]^{1/2} dx$ equals-

(A) log sec x + log (sec x + tan x) + c

(B) log sec x – (sec x + tan x) + c

(C) log (sec x + tan x) / sec x + c

(D) None of these

Q.41 $\int \frac{dx}{\sqrt{(x-\alpha)(\beta-x)}}$, $(\beta > \alpha)$ equals-

(A) $2\sin^{-1}\sqrt{\frac{x+\alpha}{\beta-\alpha}} + c$

(B) $\frac{1}{2}\sin^{-1}\sqrt{\frac{x+\alpha}{\beta-\alpha}} + c$

(C) $2\sin^{-1}\sqrt{\frac{x-\alpha}{\beta-\alpha}} + c$

(D) None of these

Q.42 $\int \sin\left\{\tan^{-1}\frac{x}{\sqrt{1-x^2}}\right\}dx$ equals-

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

(C) $\cos\sqrt{1-x^2}+c$ (D) $-\cos\sqrt{1-x^2}+c$

Q.43 $\int\frac{\sin 2x}{\sin^4 x+\cos^4 x}dx$ is equal to-

(A) $\frac{1}{2}\tan^{-1}(\tan^2 x)+c$ (B) $2\cot^{-1}(\tan^2 x)+c$

(C) $\tan^{-1}(\tan^2 x)+c$ (D) None of these

Q.44 $\int\log(x+\sqrt{x^2+a^2})\,dx$ is equal to-

(A) $x\log\left(x+\sqrt{x^2+a^2}\right)+\sqrt{x^2+a^2}+C$

(B) $x\log\left(x+\sqrt{x^2+a^2}\right)-2\sqrt{x^2+a^2}+C$

(C) $x\log\left(x+\sqrt{x^2+a^2}\right)-\sqrt{x^2+a^2}+C$

(D) None of these

Q.45 Integral of $\frac{1}{1+(\log x)^2}$ w.r.t. log x is-

(A) $\frac{\tan^{-1}(\log x)}{x}+C$

(B) $\tan^{-1}(\log x)+C$

(C) $\frac{\tan^{-1}x}{x}+C$

(D) none of these

Q.46 Integral of $\frac{1}{\sqrt{x^2+4}}$ w.r.t. (x^2+3) is equal to-

(A) $\sqrt{x^2+4}+C$

(B) $\frac{1}{\sqrt{x^2+4}}+C$

(C) $2\sqrt{x^2+4}+C$

(D) None of these

Q.47 If f(x) is the primitive of $\frac{\sin x^{1/3}\log(1+3x)}{(\tan^{-1}\sqrt{x})^2(e^{x^{1/3}}-1)}$, $x\neq 0$ then $\lim\limits_{x\to 0} f'(x)$ is:

(A) 0 (B) 3/5

(C) 5/3 (D) None of these

LEVEL- 3

Q.1 If $\int \frac{2^x}{\sqrt{1-4^x}}\,dx = K \sin^{-1}(2^x) + C$, then K is equal to-

(A) log 2 (B) $\frac{1}{2}$ log 2

(C) $\frac{1}{2}$ (D) $\frac{1}{\log 2}$

Q.2 If $\int g(x)\,dx = g(x)$, then $\int g(x)\{f(x) + f'(x)\}$ is equal to-

(A) g(x) f(x) – g(x) f '(x) + C

(B) g(x) f '(x) + C

(C) g(x)f(x) + C

(D) g(x) $f^2(x)$ + C

Q.3 $\int f'(ax + b)\{f(ax + b)\}^n\,dx$ is equal to

(A) $\frac{1}{n+1}\{f(ax + b)\}^{n+1}$+ C, $\forall$ n except n = –1

(B) $\frac{1}{(n+1)}\{f(ax+b)\}^{n+1}$+ C, $\forall$ n

(C) $\frac{1}{a(n+1)}\{f(ax+b)\}^{n+1}$ + C, $\forall$ n except n = –1

(D) $\frac{1}{a(n+1)}\{f(ax + b)\}^{n+1}$ + C, $\forall$ n

Q.4 $\int \frac{1}{\sqrt{\sin^3 x \cos x}}\,dx$ is equal to-

(A) $\frac{-2}{\sqrt{\tan x}}$ + C (B) $2\sqrt{\tan x}$ + C

(C) $\frac{2}{\sqrt{\tan x}}$ + C (D) $-2\sqrt{\tan x}$ + C

Q.5 The value of the integral $\int \frac{\log(x+1) - \log x}{x(x+1)}\,dx$ is-

(A) $-\frac{1}{2}[\log(x+1)]^2 - \frac{1}{2}(\log x)^2 + \log(x+1)\log x + C$

(B) $-[\log(x+1)]^2 - (\log x)^2 + \log(x+1)\log x + C$

(C) $-\frac{1}{2}[\log(1+1/x)]^2 + C$

(D) (A) and (C) is correct

Q.6 If $\int x \log(1 + 1/x)\,dx = f(x).\log(x+1) + g(x).x^2 + Ax + C$, then -

(A) $f(x) = \frac{1}{2}x^2$

(B) g(x) = log x

(C) A = 1

(D) None of these

Q.7 If $\int \frac{1}{(x^2+1)(x^2+4)}\,dx = A\tan^{-1}x + B\tan^{-1}\frac{x}{2} + C$, then -

(A) A = 1/3 (B) B = –1/6

(C) A = –1/3 (D) (A) and (B)

Q.8 If $\int \frac{\cos^4 x}{\sin^2 x}\,dx = A\cot x + b\sin 2x + C$ x/2 + D, then -

(A) A = – 2 (B) B = – 1/4

(C) C = – 3 (D) (B) and (C)

Q.9 $\int \frac{2x^2+3}{(x^2-1)(x^2+4)}\,dx$

$= a\log\left(\frac{x+1}{x-1}\right) + b\tan^{-1}\frac{x}{2}$, then (a, b) is-

(A) (–1/2, 1/2) (B) (1/2, 1/2)

(C) (–1, 1) (D) (1, – 1)

Q.10 $\int \frac{d(\cos\theta)}{\sqrt{1-\cos^2\theta}}$ is equal to-

(A) $\cos^{-1}\theta$ + C (B) θ + C

(C) $\sin^{-1}\theta$ + C (D) $\sin^{-1}(\cos\theta)$ + C

Q.11 $\left(\int \log(1+\cos x) - x\tan\frac{x}{2}\right)dx$ is equal to -

(A) x tan $\frac{x}{2}$

(B) log (1 + cos x)

(C) x log (1 + cos x)

(D) None of these

Q.12 $\int e^x\left(\frac{1-x}{1+x^2}\right)^2 dx$ is equal to-

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

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

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

(D) None of these

Q.13 $\int\frac{x^2}{(x^2+a^2)(x^2+b^2)}dx$ is equal to-

(A) $\frac{1}{(b^2-a^2)}\left(b\tan^{-1}\frac{x}{b}-a\tan^{-1}\frac{x}{a}\right)+C$

(B) $\frac{1}{b^2-a^2}\left(b\tan^{-1}\frac{x}{b}+a\tan^{-1}\frac{x}{a}\right)+C$

(C) $\frac{1}{b^2-a^2}\left(-b\tan^{-1}\frac{x}{b}+a\tan^{-1}\frac{x}{a}\right)+C$

(D) None of these

Q.14 $\int\frac{1-x^7}{x(1+x^7)}dx$

(A) $\ell nx+\frac{2}{7}\ \ell n\ (1+x^7)+c$

(B) $\ell nx\ \frac{-2}{7}\ \ell n\ (1-x^7)+c$

(C) $\ell nx-\frac{2}{7}\ \ell n\ (1+x^7)+c$

(D) $\ell nx+\frac{2}{7}\ \ell n\ (1-x^7)+c$

Q.15 $\int\frac{x\,dx}{\sqrt{1+x^2+\sqrt{(1+x^2)^3}}}$

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

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

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

(D) None

Q.16 $\int\frac{\cos x+x\sin x}{x^2+\cos^2 x}dx$

(A) $\ell n\left(\frac{\cos x}{x}\right)+c$ (B) $\ell n\left(\frac{x+\cos x}{x}\right)+c$

(C) $\ell n\left(\frac{x}{x+\cos x}\right)+c$ (D) None

Q.17 $\int\frac{dx}{\sqrt{2e^x-1}}$ equals-

(A) $\sec^{-1}\sqrt{2e^x}+c$ (B) $\sec^{-1}(\sqrt{2}e^x)+c$

(C) $2\sec^{-1}(\sqrt{2}\ e^x)+c$ (D) $2\sec^{-1}\sqrt{2e^x}+c$

Q.18 $\int\frac{\sin^3 x}{\sqrt[3]{\cos^2 x}}dx$ equals-

(A) $3\sqrt[3]{\cos x}\ \left(\frac{1}{7}\cos^2 x-1\right)+c$

(B) $3\sqrt[3]{\cos^2 x}\ (7\cos^2 x-1)+c$

(C) $\log\sqrt{\cos^3 x-1}+c$

(D) None of these

Q.19 $\int\frac{\cos x-\sin x}{\sqrt{\sin 2x}}dx$ equals-

(A) $\log|\sin x+\cos x+\sqrt{\sin 2x+2}\ |+c$

(B) $\log|\sin x+\cos x+\sqrt{\sin 2x}\ |+c$

(C) $\log(\sin x+\cos x)-\sqrt{\sin 2x+2}+c$

(D) None of these

Q.20 $\int\frac{\cos x+\sin x}{\sqrt{\sin 2x}}dx$ is equal to-

(A) $\log|\sin x-\cos x+\sqrt{2-\sin 2A}\ |+c$

(B) $\sin^{-1}(\sin x-\cos x)+c$

(C) $\log|\sin x+\cos x+\sqrt{\sin 2A}\ |+c$

(D) $\cos^{-1}(\sin x+\cos x)+c$

Q.21 If $\int\frac{4e^x+6e^{-x}}{9e^x-4e^{-x}}dx=Ax+B\log(9e^{2x}-4)+c$, then values of A and B are-

(A) – 19/36, – 35/36 (B) 3/2, 35/36

(C) –3/2,–35/36 (D) –3/2, 35/36

➢ Statement type Questions

Each of the questions given below consists of Statement-I and Statement-II. Use the following key to choose the appropriate answer.

(A) **If both Statement-I Statement-II are true, and Statement-II is the correct explanation of Statement-I.**

(B) **If both Statement-I and Statement-II are true but Statement-II is not the correct explanation of Statement-I**

(C) **If Statement-I is true but Statement-II is false**

(D) **If Statement-I is false but Statement-II is true.**

Q.22 **Observe the following statements:**

Statement- I: $\int \frac{x^2-1}{x^2} e^{\left(\frac{x^2+1}{x}\right)} dx = e^{\frac{x^2+1}{x}} + c$

Statement- II: $\int f'(x) e^{f(x)}\, dx = e^{f(x)} + c.$

Q.23 **Statement- I:** $\int \frac{x^{9/2}}{\sqrt{1+x^{11}}} dx = \frac{2}{11} \log$

$| x^{\frac{11}{2}} + \sqrt{1+x^{11}} | + c$

Statement- II: $\int \frac{dx}{\sqrt{1-x^2}} = \log |x + \sqrt{1+x^2}| + c$

Q.24 **Statement- I:**

$\int \frac{10x^9 + 10^x \log_e 10}{10^x + x^{10}} dx = \log |10^x + x^{10}| + c$

Statement- II: $\int \frac{f'(x)}{f(x)} dx = \log |f(x)| + c$

Q.25 **Statement- I:** $\int \tan 3x \tan 2x \tan x\, dx$

$= \frac{\ell n |\sec 3x|}{3} - \frac{\ell n |\sec 2x|}{2} - \ell n |\sec x| + c$

Statement- II: $\tan 3x - \tan 2x - \tan x$

$= \tan 3x \tan 2x \tan x$

Q.26 **Statement- I:**

$\int e^x (\sin x + \cos x) dx = e^x \sin x + c$

Statement- II:

$\int e^x (f(x) + f'(x) dx = e^x f(x) + c$

Q.27 **Statement- I:** $\int \frac{5-2x}{\sqrt{2+2x-x^2}} dx$

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

Statement- II: $\int \frac{1}{\sqrt{a^2-x^2}} dx$

$= \frac{x}{2}\sqrt{a^2-x^2} + \frac{a^2}{2} \sin^{-1} \frac{x}{a}$

LEVEL- 4

(Question asked in previous AIEEE and IIT-JEE)

SECTION –A

Q.1 $\int \frac{\cos 2x - 1}{\cos 2x + 1} dx =$ **[AIEEE 2002]**

(A) tan x – x + c (B) x + tan x + c

(C) x – tan x + c (D) – x – cot x + c

Q.2 If $\int \frac{\sin x}{\sin(x-\alpha)} dx = Ax + B \log \sin (x - \alpha) + C$, then value of (A,B) is- **[AIEEE 2004]**

(A) (sin α, cos α) (B) (cos α, sin α)

(C) (–sin α, cos α) (D) (–cos α, sin α)

Q.3 $\int \frac{dx}{\cos x - \sin x}$ is equal to- **[AIEEE 2004]**

(A) $\frac{1}{\sqrt{2}} \log \left| \tan\left(\frac{x}{2} - \frac{\pi}{8}\right) \right| + C$

(B) $\frac{1}{\sqrt{2}} \log \left| \cot\left(\frac{x}{2}\right) \right| + C$

(C) $\frac{1}{\sqrt{2}} \log \left| \tan\left(\frac{x}{2} - \frac{3\pi}{8}\right) \right| + C$

(D) $\frac{1}{\sqrt{2}} \log \left| \tan\left(\frac{x}{2} + \frac{3\pi}{8}\right) \right| + C$

Q.4 $\int \left\{ \frac{(\log x - 1)}{1 + (\log x)^2} \right\}^2 dx$ is equal to- **[AIEEE-2005]**

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

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

Q.5 $\int \frac{dx}{\cos x + \sqrt{3} \sin x}$ equals- **[AIEEE 2007]**

(A) $\frac{1}{2} \log \tan\left(\frac{x}{2} + \frac{\pi}{12}\right) + C$

(B) $\frac{1}{2} \log \tan\left(\frac{x}{2} - \frac{\pi}{12}\right) + C$

(C) $\log \tan\left(\frac{x}{2} + \frac{\pi}{12}\right) + C$

(D) $\log \tan\left(\frac{x}{2} - \frac{\pi}{12}\right) + C$

Q.6 The value of $\sqrt{2} \int \frac{\sin x \, dx}{\sin\left(x - \frac{\pi}{4}\right)}$ is -

[AIEEE 2008]

(A) x – log | sin (x – $\frac{\pi}{4}$) | + c

(B) x + log | sin (x – $\frac{\pi}{4}$) | + c

(C) x – log | cos (x – $\frac{\pi}{4}$) | + c

(D) x + log | cos (x – $\frac{\pi}{4}$) | + c

Q.7 If the integral $\int \frac{5 \tan x}{\tan x - 2} dx$ = x + a ln |sin x – 2 cos x| + k then a is equal to : **[AIEEE 2012]**

(A) –2 (B) 1

(C) 2 (D) –1

Q.8 If $\int f(x)dx = \psi(x)$, then $\int x^5 f(x^3)dx$ is equal to – **[JEE Main - 2013]**

(A) $\frac{1}{3} x^3 \psi(x^3) - \int x^2 \psi(x^3)dx + C$

(B) $\frac{1}{3}\left[x^3 \psi(x^3) - \int x^3 \psi(x^3)dx\right] + C$

(C) $\frac{1}{3}\left[x^3 \psi(x^3) - \int x^2 \psi(x^3)dx\right] + C$

(D) $\frac{1}{3} x^3 \psi(x^3) - 3\int x^3 \psi(x^3)dx + C$

SECTION-B

Q.1 $\int \frac{dx}{(x-p)\sqrt{(x-p)(x-q)}}$ is equal to-

[IIT -1996]

(A) $\frac{2}{p-q} \sqrt{\frac{x-p}{x-q}} + c$ (B) $-\frac{2}{p-q} \sqrt{\frac{x-q}{x-p}} + c$

(C) $\frac{1}{\sqrt{(x-p)(x-q)}} + c$ (D) None of these

Q.2 $\int \frac{(x+1)}{x(1+x\,e^x)^2}\,dx$ is equal- **[IIT- 1996]**

(A) $\log\left(\frac{x\,e^x}{1+x\,e^x}\right)+\frac{1}{1+x\,e^x}+c$

(B) $\log\left(\frac{x}{1+x\,e^x}\right)+\frac{1}{1+x\,e^x}+c$

(C) $\log\left(\frac{1+x\,e^x}{x\,e^x}\right)+\frac{1}{1+x\,e^x}+c$

(D) None of these

Q.3 $\int \frac{\cos x-\sin x}{\cos x+\sin x}\,(2+2\sin 2x)\,dx$ is equal to **[IIT 1997]**

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

(C) $\tan 2x + c$ (D) None of these

Q.4 $\int \frac{dx}{(2x-7)\sqrt{x^2-7x+12}}$ is equal to- **[IIT 1997]**

(A) $2\sec^{-1}(2x-7)+c$

(B) $\sec^{-1}(2x-7)+c$

(C) $\frac{1}{2}\sec^{-1}(2x-7)+2$

(D) None of these

Q.5 $\int \cos x \log\left(\tan\frac{x}{2}\right)dx$ is equal to- **[IIT-1998]**

(A) $\sin x \log\left(\tan\frac{x}{2}\right)+c$

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

(C) $\sin x \log\left(\tan\frac{x}{2}\right)+x+c$

(D) None of these

Q.6 Let F(x) be an indefinite integral of $\sin^2 x$. **[IIT- 2007]**

STATEMENT-1: The function F(x) satisfies $F(x+\pi)=F(x)$ for all real x.

because

STATEMENT-2: $\sin^2(x+\pi)=\sin^2 x$ for all real x.

(A) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1

(B) Statement-1, is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1

(C) Statement-1 is True, Statement-2 is False

(D) Statement-1, False, Statement-2 is True

Q.7 Let $I=\int \frac{e^x}{e^{4x}+e^{2x}+1}\,dx$,

$J=\int \frac{e^{-x}}{e^{-4x}+e^{-2x}+1}\,dx$ then for an arbitrary constant c, then the value of J – I equals **[IIT- 2008]**

(A) $\frac{1}{2}\log\left(\frac{e^{4x}-e^{2x}+1}{e^{4x}+e^{2x}+1}\right)+c$

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

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

(D) $\frac{1}{2}\log\left(\frac{e^{4x}+e^{2x}+1}{e^{4x}-e^{2x}+1}\right)+c$

Q.8 The integral $\int \frac{\sec^2 x}{(\sec x+\tan x)^{9/2}}\,dx$ equals (for some arbitrary constant K) **[IIT- 2012]**

(A) $\frac{-1}{(\sec x+\tan x)^{11/2}}\left\{\frac{1}{11}-\frac{1}{7}(\sec x+\tan x)^2\right\}+K$

(B) $\frac{1}{(\sec x+\tan x)^{11/2}}\left\{\frac{1}{11}-\frac{1}{7}(\sec x+\tan x)^2\right\}+K$

(C) $\frac{-1}{(\sec x+\tan x)^{11/2}}\left\{\frac{1}{11}+\frac{1}{7}(\sec x+\tan x)^2\right\}+K$

(D) $\frac{1}{(\sec x+\tan x)^{11/2}}\left\{\frac{1}{11}+\frac{1}{7}(\sec x+\tan x)^2\right\}+K$

ANSWER KEY

LEVEL-1

Q.No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	B	B	A	B	B	C	B	D	A	D	C	B	A	C	A	A	A	A	A	A
Q.No.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans.	C	A	B	D	B	C	B	B	B	A	A	C	C	C	A	A	C	D	A	A
Q.No.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	D	D	A	C	B	C	A	C	A	A	A	C	B	C	C	C	B	A	A	B
Q.No.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
Ans.	A	C	B	C	A	D	D	C	A	D	A	C	D	D	C	A	B	B	A	C
Q.No.	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
Ans.	D	A	B	B	B	A	A	D	C	C	A	B	B	B	B	D	A	C	C	A
Q.No.	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120
Ans.	B	D	A	A	B	C	A	C	B	A	C	A	B	B	B	A	C	A	A	B
Q.No.	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140
Ans.	C	C	C	A	A	A	C	C	D	B	A	B	B	A	C	C	B	A	D	A
Q.No.	141																			
Ans.	B																			

LEVEL-2

Q.No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	C	C	C	C	C	D	C	B	B	D	A	B	A	C	C	A	B	C	A	C
Q.No.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans.	A	B	A	A	D	C	A	A	A	A	A	A	B	C	A	A	D	A	B	A
Q.No.	41	42	43	44	45	46	47													
Ans.	C	B	C	C	B	C	D													

LEVEL-3

Q.No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	D	C	C	A	D	D	D	D	A	D	C	C	A	C	B	D	D	A	B	B
Q.No.	21	22	23	24	25	26	27													
Ans.	D	A	C	A	A	A	C													

LEVEL-4

SECTION-A

Q.No.	1	2	3	4	5	6	7	8
Ans.	C	B	D	D	A	B	C	A

SECTION-B

1.[B] $\int \frac{dx}{(x-p)\sqrt{(x-p)(x-q)}}$ $\because$ m + n = 2

$= \int \frac{dx}{(x-p)^2\sqrt{\frac{x-q}{x-p}}}$

Let $\frac{x-q}{x-p} = t^2$

$\Rightarrow \frac{q-p}{(x-p)^2}dx = 2tdt$

$I = \frac{-1}{p-q}\int \frac{2tdt}{t}$

$= \frac{-2t}{p-q} + C$

$= \frac{-2}{p-q}\cdot\sqrt{\frac{x-q}{x-p}} + c$

2.[A] $\int \frac{x+1}{x(1+xe^x)^2}dx$

Let $1 + xe^x = t \Rightarrow e^x(1 + x)dx = dt$

$I = \int \frac{dt}{(t-1)t^2} = \int\left(\frac{1}{t-1} - \frac{1}{t} - \frac{1}{t^2}\right)dt$

$= \log (t - 1) - \log t + \frac{1}{t} + c$

$= \log\left(\frac{t-1}{t}\right) + \frac{1}{t} + c$

$= \log\left(\frac{xe^x}{1+xe^x}\right) + \frac{1}{1+xe^x} + c$

3.[A] $\int \frac{\cos x - \sin x}{\cos x + \sin x}(2 + 2\sin 2x)\, dx$

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

$= 2\int (\cos^2 x - \sin^2 x)dx = 2\int \cos 2x\, dx$

$= \sin 2x + c$

4.[B] $\int \frac{dx}{(2x-7)\sqrt{x^2 - 7x + 12}}$

$= \frac{1}{2}\int \frac{dx}{(x-7/2)\sqrt{(x-7/2)^2 - 1/4}}$

$= \frac{1}{2}.2\sec^{-1}\left(\frac{x-7/2}{1/2}\right) + c$

$= \sec^{-1}(2x - 7) + c$

5.[B] $\int \cos x \log\left(\tan\frac{x}{2}\right)dx$

$= \sin x \log\tan\frac{x}{2} - \int \frac{\sec^2 x/2}{2\tan x/2}.\sin x\, dx + c$

$= \sin x \log\tan\frac{x}{2} - \int dx + c$

$= \sin x \log\tan\frac{x}{2} - x + c$

6.[D] $F(x) = \int \sin^2 x\, dx$

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

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

$F(x + \pi) \neq F(x)$

Statement-I is false

But $\sin^2(x + \pi) = \sin^2 x\ \forall\ x$

Statement-2 is true

7.[C] $I = \int \frac{e^x}{e^{4x} + e^{2x} + 1}dx$,

$J = \int \frac{e^{-x}}{e^{-4x} + e^{-2x} + 1}dx$

$J - I = \int\left(\frac{e^{3x}}{e^{4x} + e^{2x} + 1} - \frac{e^x}{e^{4x} + e^{2x} + 1}\right)dx$

$= \int \frac{e^x(e^{2x} - 1)}{e^{4x} + e^{2x} + 1}dx$

Let $e^x = t \Rightarrow e^x dx = dt$

$= \int \frac{t^2 - 1}{t^4 + t^2 + 1}dt$

$= \int \frac{1 - 1/t^2}{t^2 + 1/t^2 + 1}dt$

$= \int \frac{1 - 1/t^2}{(t + 1/t)^2 - 1}dt$

Let $t + \frac{1}{t} = u \Rightarrow \left(1 - \frac{1}{t^2}\right)dt = du$

$J - I = \int \frac{du}{u^2 - 1} = \frac{1}{2}\ell n\left|\frac{u-1}{u+1}\right| + c$

$= \frac{1}{2}\ell n\left|\frac{t^2 - t + 1}{t^2 + t + 1}\right| + c = \frac{1}{2}\ell n\left|\frac{e^{2x} - e^x + 1}{e^{2x} + e^x + 1}\right| + c$

8.[C] $I = \int \frac{\sec^2 x}{(\sec x + \tan x)^{9/2}}dx$

sex x + tan x = t

$(\sec x \tan x + \sec^2 x)\, dx = dt$

$\sec x\, dx = \frac{dt}{t}$

also, $\sec x - \tan x = \frac{1}{t}$

$\sec x = \frac{1}{2}\left(t + \frac{1}{t}\right)$

So, $I = \frac{1}{2}\int \frac{\left(t + \frac{1}{t}\right)dt}{t^{11/2}}$

$= \frac{1}{2}\int\left(\frac{1}{t^{9/2}} + \frac{1}{t^{13/2}}\right)dt$

$= \frac{1}{2}\left[-\frac{2}{7}\frac{1}{t^{7/2}} - \frac{2}{11}\frac{1}{t^{11/2}}\right] + K$

$= -\frac{1}{t^{11/2}}\left[\frac{t^2}{7} + \frac{1}{11}\right] + K$

$= -\frac{1}{(\sec x + \tan x)^{11/2}}\left[\frac{1}{7}(\sec x + \tan x)^2 + \frac{1}{11}\right] + K$