3. INDEFINITE INTEGRATION

I. MCQ (2marks)

Q1) $\int \frac{\sqrt{\tan x}}{\sin x \cos x}\, dx$ =...

a) $\frac{1}{2}\sqrt{\tan x} + c$ b) $2\sqrt{\tan x} + c$

c) $\sqrt{2}\tan x + c$ d) $\frac{1}{\sqrt{2\tan x}} + c$

Q2) $\int \frac{1}{\sqrt{x}+\sqrt{x^3}}\, dx$ =...

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

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

Q3) $\int \frac{1}{\sqrt{(x-3)(x-2)}}\, dx$ =...

a) $\frac{1}{2}\log\left[(2x-1)+\sqrt{x^2-x-6}\right] + c$ b) $\tan^{-1}(2x-1) + c$

c) $\log\left[\left(x-\frac{1}{2}\right)+\sqrt{x^2-x-6}\right] + c$ d) $\log\left[\left(x-\frac{1}{2}\right)+\sqrt{x^2+x+6}\right] + c$

Q4) $\int \frac{1}{\cos x - \sin x}\, dx$ =...

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

b) $\sqrt{2}\log\left[\operatorname{cosec}\left(x+\frac{\pi}{4}\right)+\cot\left(x+\frac{\pi}{4}\right)\right] + c$

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

d) $\sqrt{2}\log\left[\sec\left(x+\frac{\pi}{4}\right)-\tan\left(x+\frac{\pi}{4}\right)\right] + c$

Q5) $\int \frac{x^2}{\sqrt{1-x^6}}\, dx$ =...

a) $-\sin^{-1}(x^3) + c$ b) $\cos^{-1}(x^3) + c$

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

Q6) $\int \frac{e^x}{x}[x(\log x)^2 + 2\log x]dx$ =...

a) $e^x \log x + c$ b) $e^x(\log x)^2 + c$

c) $e^{2x}\log x + c$ d) $e^{2x}(\log x)^2 + c$

Q7)$\int \sqrt{x^2+2x+5}\,dx$ =...

a)$(x+1)\sqrt{x^2+2x+5}+\log\left[(x+1)+\sqrt{x^2+2x+5}\right]+c$

b) $(x+2)\sqrt{x^2+2x+5}+\log\left[(x+2)+\sqrt{x^2+2x+5}\right]+c$

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

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

Q8)If $f(x)=\frac{\sin^{-1}x}{\sqrt{1-x^2}}$, $g(x)=e^{\sin^{-1}x}$, then $\int f(x)g(x)dx$ =...

a)$e^{\sin^{-1}x}(\sin^{-1}x-1)+c$

b) $e^{\sin^{-1}x}(1-\sin^{-1}x)+c$

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

d) $-e^{\sin^{-1}x}(\sin^{-1}x+1)+c$

Q9)$\int \frac{\sin^m x}{\cos^{m+2}x}dx$ =...

a)$(m+2)\tan^{m+1}x+c$ b)$\frac{\tan^m x}{m}+c$

c) $(m+1)\tan^{m+1}x+c$ d) $\frac{\tan^{m+1}x}{m+1}+c$

Q10)$\int \frac{2}{\sqrt{x}-\sqrt{x+3}}dx$ =...

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

c)$\frac{4}{9}\left[x^{\frac{3}{2}}-(x+3)^{\frac{3}{2}}\right]+c$ d)$-\frac{4}{9}\left[x^{\frac{3}{2}}+(x+3)^{\frac{3}{2}}\right]+c$

Q11)$\int \cos\sqrt{x}\,dx$ =...

a)$2\left[\sqrt{x}\sin\sqrt{x}+\cos\sqrt{x}\right]+c$ b) $\sqrt{x}\sin\sqrt{x}+\cos\sqrt{x}+c$

c) $2\left[\sqrt{x}\cos\sqrt{x}+\sin\sqrt{x}\right]+c$ d) $\frac{1}{2}\left[\sqrt{x}\sin\sqrt{x}-\cos\sqrt{x}\right]+c$

Q12)$\int \frac{2(\cos^2 x-\sin^2 x)}{\cos^2 x+\sin^2 x}dx$ =...

a)$\sin 2x+c$ b)$\cos 2x+c$

c)$\tan 2x+c$ d)$2\sin 2x+c$

Q13)$\int \frac{\log x}{(\log ex)^2}\,dx$ =...

a)$x(1+\log x)+c$ b)$\frac{x}{1+\log x}+c$

c) $\frac{1}{1+\log x}+c$ d) $\frac{1}{1-\log x}+c$

Q14)If $\int \frac{1}{x+x^5}\,dx = f(x)+c$, then $\int \frac{x^4}{x+x^5}\,dx$ =...

a)$f(x)-\log x+c$ b) $f(x)+\log x+c$

c)$\log x - f(x)+c$ d)$\frac{1}{5}x^5 f(x)+c$

Q15)$\int \frac{e^x(x-1)}{x^2}\,dx$ =...

a)$xe^{-x}+c$ b)$\frac{e^x}{x^2}+c$

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

II. Very Short Answers (1 mark)

Q1)$\int \sqrt{1+\sin 2x}\ \mathrm{d}x$

Q2) $\int \frac{\sin 4x}{\cos 2x}\,\mathrm{d}x$

Q3) $\int \frac{e^{3x}}{e^{3x}+1}\,\mathrm{d}x$

Q4) $\int \frac{1}{\sqrt{3x^2+8}}\,\mathrm{d}x$

Q5) $\int \frac{\log x}{x}\,\mathrm{d}x$

Q6) $\int (2+\cot x-\mathrm{cosec}^2 x)e^x\,\mathrm{d}x$

Q7) $\int e^x\left[\frac{(x+3)}{(x+4)^2}\right]\mathrm{d}x$

Q8) $\int \frac{e^{2x}+e^{-2x}}{e^x}\,\mathrm{d}x$

Q9) $\int x^x(1+\log x)\,\mathrm{d}x$

Q10)$\int \frac{1}{x\sin^2(\log x)}\,dx$

Q11)$\int \sqrt{x}\sec(x)^{\frac{3}{2}}\tan(x)^{\frac{3}{2}}\,dx$

Q12)$\int \frac{\cos 2x}{\sin^2 x}\,dx$

Q13)$\int \frac{\cos 2x}{(\sin x+\cos x)^2}\,dx$

Q14)$\int \cot^2 x\,dx$

Q15)$\int \frac{x}{x+2}\,dx$

III. Short Answers (2 marks)

Q1)$\int \frac{sinx}{1+sinx}\,dx$

Q2)$\int \frac{(2x-7)}{\sqrt{4x-1}}\,dx$

Q3)$\int \frac{1}{4x+5x^{-11}}\,dx$

Q4)$\int e^{3logx}(x^4+1)^{-1}\,dx$

Q5)$\int \frac{\sin(x-a)}{\cos(x+b)}\,dx$

Q6)$\int cos^7 x\,dx$

Q7)$\int \frac{x^7}{(1+x^4)^2}\,dx$

Q8)$\int \frac{1}{\sqrt{2x^2-5}}\,dx$

Q9)$\int \frac{\log(\log x)}{x}\,dx$

Q10)$\int x^2\sqrt{a^2-x^6}\,dx$

Q11)$\int \sqrt{4^x(4^x+4)}\,dx$

Q12)$\int [cosec(logx)][1-\cot(logx)]dx$

Q13)$\int \frac{cos2x}{sin^2x\,cos^2x}\,dx$

Q14)$\int sin4x\,cos3x\,dx$

Q15)$\int \frac{e^x\log(sine^x)}{tane^x}\,dx$

IV. Short answers (3 Marks)

Q1)$\int \frac{1}{x(x^3-1)}\,dx$

Q2)If $f'(x) = x - \frac{3}{x^3}$, $f(1) = \frac{11}{2}$ find $f(x)$

Q3)$\int \frac{(x^2+2)}{x^2+1} a^{x+tan^{-1}x}\,dx$

Q4)$\int \frac{7+4x+5x^2}{(2x+3)^{\frac{3}{2}}}\,dx$

Q5)$\int \sqrt{\frac{9+x}{9-x}}\,dx$

Q6)$\int \frac{1}{4x^2-20x+17}\,dx$

Q7)$\int \frac{sinx}{sin3x}\,dx$

Q8)$\int \frac{1}{2+cosx-sinx}\,dx$

Q9)$\int sec^3x\ dx$

Q10)$\int \sin(logx)\,dx$

Q11)$\int sec^2x\sqrt{tan^2x + tanx - 7}\,dx$

Q12)$\int e^{sin^{-1}x}\left[\frac{x+\sqrt{1-x^2}}{\sqrt{1-x^2}}\right]dx$

Q13)$\int e^x \frac{(1+x^2}{(1+x)^2}\ dx$

Q14)$\int \frac{x^2+x-1}{x^2+x-6}\ dx$

Q15)$\int \frac{6x^3+5x^2-7}{3x^2-2x-7}\ dx$

V. Long answers (4 Marks)

Q1)$\int \frac{dx}{2+3tanx}$

Q2)$\int \sqrt{tanx} + \sqrt{cotx}\,dx$

Q3)$\int \frac{3x+4}{\sqrt{2x^2+2x+1}}\,dx$

Q4)$\int \sqrt{\frac{e^{3x}-e^{2x}}{e^x+1}}\,dx$

Q5)$\int x^3 tan^{-1}x\,dx$

Q6)$\int xsin2x\,cos5x\,dx$

Q7)$\int \frac{x+sinx}{1-cosx}\,dx$

Q8)$\int \frac{x^2}{(x^2+1)(x^2-2)(x^2+3)}\,dx$

Q9)$\int \frac{dx}{x^3-1}$

Q10)$\int \frac{5e^x}{(e^x+1)(e^{2x}+9)}\,dx$

Q11)$\int \frac{1}{sinx(3+2cosx)}\,dx$

Q12)$\int xcos^3x\;\,dx$

Q13)$\int \frac{sin2x}{3sin^4x-4sin^2x+1}\,dx$

Q14)$\int \frac{3e^{2x}+5}{4e^{2x}-5}\,dx$

Q15)$\int \frac{(2logx+3)}{x(3logx+2)[(logx)^2+1]}\,dx$

Q16) Integrate the functions *w. r. t. x*

i) $(3x-2)\sqrt{x^2+x+1}$

ii) $x\sqrt{1+x-x^2}$

iii) $(x-5)\sqrt{x^2-1}$

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

v) $(2x+3)\sqrt{3x^2+2x-5}$