CH - 17 INDEFINITE INTEGRALS

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I. A : JEE Advance / IIT-JEE

A. Fill in the Blanks

1) If $\int \frac{4e^x+6e^{-x}}{9e^x+4e^{-x}} = Ax + B\log\left(9e^{2x}-4\right) + C$, Then
$A = \ldots, B = \ldots and C = \ldots$ $(1990 - 2Marks)$

B. MCQs with One Correct Answer

1) The value of the integral
$\int \frac{\cos^3 x+\cos^5 x}{\sin^2 x+\sin^4 x}dx$ is $(1995S)$
a) $\sin x - 6\tan^{-1}(\sin x) + c$
b) $\sin x - 2(\sin x)^{-1} + c$
c) $\sin x - 2(\sin x)^{-1} - 6\tan^{-1}(\sin x) + c$
d) $\sin x - 2(\sin x)^{-1} - 6\tan^{-1}(\sin x) + c$

2) If $\int_{\sin x}^{1} t^2 f(t)\,dt = 1 - \sin x$, then $f\left(\frac{1}{\sqrt{3}}\right)$ is $(2005S)$

a) $\frac{1}{3}$
b) $\frac{1}{\sqrt{3}}$
c) 3
d) $\sqrt{3}$

3) $\int \frac{x^2-1}{x^3\sqrt{2x^4+2x^2+1}}$ dx = $(2006 - 3M, -1)$
a) $\frac{\sqrt{2x^4-2x^2+1}}{x^2} + c$
b) $\frac{\sqrt{2x^4-2x^2+1}}{x^3} + c$
c) $\frac{\sqrt{2x^4-2x^2+1}}{x} + c$
d) $\frac{\sqrt{2x^4-2x^2+1}}{2x^2} + c$

4) 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,the value of J - I equals (2008)

a) $\frac{1}{2}\log\left(\frac{e^{4x}-e^{2x}+1}{e^{4x}+e^{2x}+1}\right) + C$
b) $\frac{1}{2}\log\left(\frac{e^{2x}+e^{x}+1}{e^{2x}-e^{x}+1}\right) + C$
c) $\frac{1}{2}\log\left(\frac{e^{2x}-e^{x}+1}{e^{2x}+e^{x}+1}\right) + C$
d) $\frac{1}{2}\log\left(\frac{e^{4x}+e^{2x}+1}{e^{4x}-e^{2x}+1}\right) + C$

5) The Integral $\int \frac{\sec^2 x}{(\sec x+\tan x)^{\frac{9}{2}}}dx$ equals (for some arbitrary constant K) (2012)
a) $-\frac{1}{(\sec x+\tan x)^{\frac{11}{2}}}\{\frac{1}{11} - \frac{1}{7}(\sec x + \tan x)^2\} + K$
b) $\frac{1}{(\sec x+\tan x)^{\frac{11}{2}}}\{\frac{1}{11} - \frac{1}{7}(\sec x + \tan x)^2\} + K$
c) $-\frac{1}{(\sec x+\tan x)^{\frac{11}{2}}}\ \frac{1}{11} + \frac{1}{7}(\sec x + \tan x)^2\} + K$
d) $\frac{1}{(\sec x+\tan x)^{\frac{11}{2}}}\{\frac{1}{11} + \frac{1}{7}(\sec x + \tan x)^2\} + K$

C. Subjective Problems

1) Evaluate $\int \frac{\sin x}{\sin x - \cos x} dx$ (1978)
2) Evaluate $\int \frac{x^2}{(a+bx)^2} dx$ (1979)
3) Evaluate $\int \left(e^{\log x} + \sin x\right) cosx dx$ $(1981 - 2Marks)$
4) Evaluate $\int \frac{(x-1)e^x}{(x+1)^3} dx$ $(1983 - 2Marks)$