

Assignment-1

AI24BTECH11002 - K.AKSHAY TEJA

I. SECTION A - JEE ADVANCED/ IIT-JEE

E. Subjective Problems

- 1) Evaluate the following $\int \frac{dx}{x^2(x^4+1)^{\frac{3}{4}}}$ (1984 - 2 Marks)
- 2) Evaluate the following $\int \sqrt{\frac{1-\sqrt{x}}{1+\sqrt{x}}} dx$. (1985 - 2½ Marks)
- 3) Evaluate: $\int \left[\frac{(\cos 2x)^{1/2}}{\sin x} \right] dx$ (1987 - 6 Marks)
- 4) Evaluate $\int (\sqrt{\tan x} + \sqrt{\cot x}) dx$ (1989 - 3 Marks)
- 5) Find the indefinite integral $\int \left(\frac{1}{\sqrt[4]{x+4}} + \frac{\ln(1+\sqrt[4]{x})}{\sqrt[4]{x+4}} \right) dx$ (1992 - 4 Marks)
- 6) Find the indefinite integral $\int \cos 2\theta \ln \frac{\cos \theta + \sin \theta}{\cos \theta - \sin \theta} d\theta$ (1994 - 5 Marks)
- 7) Evaluate $\int \frac{\cos \theta - \sin \theta}{x(1+xe^x)^2} dx$ (1996 - 2 Marks)
- 8) Integrate $\int \frac{x^3+3x^2}{(x^2+1)^2(x+1)} dx$ (2001 - 5 Marks)
- 9) Evaluate $\int \sin^{-1} \left(\frac{2x+2}{\sqrt{4x^2+8x+13}} \right) dx$ (2001 - 5 Marks)
- 10) For any natural number m, evaluate $\int (x^{3m} + x^{2m} + x^m)(2x^{2m} + 3x^m + 6)^{1/m} dx, x > 0$ (2002 - 5 Marks)

H. Assertion & Reason Type Questions

- 1) Let $F(x)$ be an indefinite integral of $\sin^2 x$

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. (2007 - 3 marks)

- 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 is False, Statement-2 is True

II. SECTION-B JEE MAIN/AIEEE

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

- a) $(-\cos \alpha, \sin \alpha)$
- b) $(\cos \alpha, \sin \alpha)$
- c) $(-\sin \alpha, \cos \alpha)$
- d) $(\sin \alpha, \cos \alpha)$

- 2) $\int \frac{dx}{\cos x - \sin x}$ is equal to [2004]

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

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

- 4) $\int \frac{dx}{\cos x + \sqrt{3} \sin x}$ equals [2007]

- a) $\log \tan \left(\frac{x}{2} + \frac{\pi}{12} \right) + C$
- b) $\log \tan \left(\frac{x}{2} - \frac{\pi}{12} \right) + C$
- c) $\frac{1}{2} \log \tan \left(\frac{x}{2} + \frac{\pi}{12} \right) + C$
- d) $\frac{1}{2} \log \tan \left(\frac{x}{2} + \frac{\pi}{12} \right) + C$