JEE

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I. Section-A JEE Advanced/ IIT-JEE

1) $f(x) = \begin{vmatrix} \sec(x) & \cos(x) & \sec^2(x)+\cot(x)+\text{cosec}(x) \\ \cos^2(x) & \cos^2(x) & \text{cosec}^2(x) \\ 1 & \cos^2(x) & \cos^2(x) \end{vmatrix}$
Then $\int_0^{\frac{\pi}{2}} f(x)\,dx =$ _____ (1987 - 2 Marks)

2) The integral $\int_0^{1.5} \left(x^2\right) dx,$ (1988 - 2 Marks)
Where $[d]$enotes the greatest integer finction, equals _____

3) The value of $\int_{-2}^{2} \left|1-x^2\right| dx$ is _____ (1989 - 2 Marks)

4) The value of $\int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} \frac{\phi}{1+\sin\phi} d\phi$ (1993 - 2 Marks)

5) The value of $\int_2^3 \frac{\sqrt{x}}{\sqrt{5-x}+\sqrt{x}} dx$ (1994 - 2 Marks)

6) If for nonzero x, $af(x)+bf\left(\frac{1}{x}\right) = \frac{1}{x}-5$ where $a \neq b$, then $\int_1^2 f(x)dx =$ _____ (1996 - 1 Mark)

7) If$n > 0$, $\int_1^{2\pi} \frac{x\sin^{2n}x}{\sin^{2n}x+\cos^{2n}x} dx$ (1996 -1 Mark)

8) The value of $\int_1^{e^{37}} \frac{\pi\sin(\pi ln x)}{x} dx$ is _____ (1997 - 2 Marks)

9) Let $\frac{d}{dx}F(x) = \frac{e^{\sin(x)}}{x}, x > 0$.If $\int_1^4 \frac{2e^{\sin\left(x^2\right)}}{x} = F(k) - F(1)$ then one of the possible valued of$k$ is _____ (1997 - 2 Marks)

II. Section B True/False

1) The value of the intrgral $\int_0^{2a} \frac{f(x)}{(f(x)+f(2a-x))} dx$ is equal to a (1988 - 1 Mark)

III. Section C MCQs with One Correct Answer

1) The value of the definite integral $\int_0^{2a}(1+e^{-x^2})dx$ is
   a) -1
   b) 2
   c) $1+e^{-1}$
   d) none of these

(1981 - 2 Marks)

2) Let a, b, c be non-zero real numbers such that $\int_0^1 \left(1+\cos^8(x)\right)\left(ax^2+bx+c\right)dx = \int_0^2 \left(1+\cos^8(x)\right)\left(ax^2+bx+c\right)dx.$
Then the quadratic equation $ax^2+bx+c=0$ has
   a) no roots in$(0,2)$
   b) at least one root in$(0,2)$
   c) double root in$(0,2)$
   d) two imagenary roots

(1981 - 2 Marks)

3) The area bounded by the curves $y = f(x)$, the x-axis and the ordinate $x = 1$ and $x = b$ is $(b-1)\sin(3b+4)$. Then $f(x)$ is
   a) $(x-1)\cos(3x+4)$
   b) $\sin(3x+4)$
   c) $\sin(3x+4)+3(x-1)\cos(3x+4)$
   d) none of the above

(1982 - 2 Marks)

4) the value of the integral $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\cot(x)}}{\sqrt{\cot(x)}+\sqrt{\tan(x)}} dx$ is
   a) $\frac{\pi}{4}$
   b) $\frac{\pi}{2}$
   c) π
   d) none of the above

(1983 - 1 Marks)

5) For any integer n the integral- $\int_0^{\pi} e^{\cos^2(x)}\cos^3(2n+1)x dx$ has the value
   a) π
   b) 1
   c) 0
   d) none of these

(1985 - 2 Marks)