

Date Planned : __ / __ / __	Daily Tutorial Sheet - 3	Expected Duration : 90 Min
Actual Date of Attempt : __ / __ / __	JEE Advanced (Archive)	Exact Duration : _____

21. The value of $\int_{-2}^2 |1-x^2| dx$ is..... (1989)
22. The integral $\int_0^{1.5} [x^2] dx$, where $[\cdot]$ denote the greatest function, equals..... (1988)
23. Match the conditions/expressions in Column I with statement in Column II. (2015)

Column I		Column II	
(A)	$\int_{-1}^1 \frac{dx}{1+x^2}$	(p)	$\frac{1}{2} \log\left(\frac{2}{3}\right)$
(B)	$\int_0^1 \frac{dx}{\sqrt{1-x^2}}$	(q)	$2 \log\left(\frac{2}{3}\right)$
(C)	$\int_2^3 \frac{dx}{1-x^2}$	(r)	$\frac{\pi}{3}$
(D)	$\int_1^2 \frac{dx}{x\sqrt{x^2-1}}$	(s)	$\frac{\pi}{2}$

24. Match List I with List II and select the correct answer using codes given below the lists. (2014)

Column I		Column II	
(P)	The number of polynomials $f(x)$ with non-negative integer coefficients of degree ≤ 2 , satisfying $f(0) = 0$ and $\int_0^1 f(x) dx = 1$, is	(i)	8
(Q)	The number of points in the interval $[-\sqrt{13}, \sqrt{13}]$ at which $f(x) = \sin(x^2) + \cos(x^2)$ attains its maximum value, is	(ii)	2
(R)	$\int_{-2}^2 \frac{3x^2}{1+e^x} dx$ equals	(iii)	4
(S)	$\frac{\left(\int_{-1/2}^{1/2} \cos 2x \log\left(\frac{1+x}{1-x}\right) dx\right)}{\left(\int_0^{1/2} \cos 2x \log\left(\frac{1+x}{1-x}\right) dx\right)}$ equals	(iv)	0

Codes

	P	Q	R	S		P	Q	R	S
(A)	(iii)	(ii)	(iv)	(i)	(B)	(ii)	(iii)	(iv)	(i)
(C)	(iii)	(ii)	(i)	(iv)	(D)	(ii)	(iii)	(i)	(iv)

25. The value of $\frac{(5050) \int_0^1 (1-x^{50})^{100} dx}{\int_0^1 (1-x^{50})^{101} dx}$ is: (2006) 
26. Evaluate $\int_0^\pi e^{|\cos x|} \left[2 \sin \left(\frac{1}{2} \cos x \right) + 3 \cos \left(\frac{1}{2} \cos x \right) \right] \sin x \, dx$. (2005)
27. Evaluate $\int_{-\pi/3}^{\pi/3} \frac{\pi + 4x^3}{2 - \cos \left(\left| x \right| + \frac{\pi}{3} \right)} dx$. (2004)
28. If f is an even function, then prove that $\int_0^{\pi/2} f(\cos 2x) \cos x \, dx = \sqrt{2} \int_0^{\pi/4} f(\sin 2x) \cos x \, dx$. (2003)
29. Evaluate $\int_0^\pi \frac{e^{\cos x}}{e^{\cos x} + e^{-\cos x}} dx$. (1999)
30. Prove that $\int_0^1 \tan^{-1} \left(\frac{1}{1-x+x^2} \right) dx = 2 \int_0^1 \tan^{-1} x \, dx$. (1998)
- Hence or otherwise, evaluate the integral $\int_0^1 \tan^{-1}(1-x+x^2) dx$.