MATHEMATICS

DPP

DAILY PRACTICE PROBLEMS

DPP No. 70

Total Marks : 34

Max. Time : 36 min.

Topic : Definite Integration

Type of Questions		**M.M., Min.**
Single choice Objective ('–1' negative marking) Q.2,3,4	**(3 marks, 3 min.)**	**[9, 9]**
Multiple choice objective ('–1' negative marking) Q.5	**(5 marks, 4 min.)**	**[5, 4]**
Subjective Questions ('–1' negative marking) Q.1,6,7	**(4 marks, 5 min.)**	**[12, 15]**
Match the Following (no negative marking) Q.8	**(8 marks, 8 min.)**	**[8, 8]**

1. Evaluate : $\int_{-1}^{3}\left(\tan^{-1}\frac{x}{x^2+1}+\tan^{-1}\frac{x^2+1}{x}\right)dx$

2. Given $\int_{0}^{\pi/2}\frac{dx}{1+\sin x+\cos x}=\ell n\ 2$, then the value of $\int_{0}^{\pi/2}\frac{\sin x}{1+\sin x+\cos x}dx$ is equal to:

(A) $\frac{1}{2}\ \ell n\ 2$ (B) $\frac{\pi}{2}-\ell n\ 2$ (C) $\frac{\pi}{4}-\frac{1}{2}\ \ell n\ 2$ (D) $\frac{\pi}{2}+\ell n\ 2$

3. If $I=\int_{0}^{\pi/2}\ell n(\sin x)\,dx$ then $\int_{-\pi/4}^{\pi/4}\ell n(\sin x+\cos x)\,dx =$

(A) $\frac{I}{2}$ (B) $\frac{I}{4}$ (C) $\frac{I}{\sqrt{2}}$ (D) I

4. Let $u=\int_{0}^{1}\frac{\ell n(x+1)}{x^2+1}dx$ and $v=\int_{0}^{\pi/2}\ell n(\sin 2x)\,dx$, then

(A) u = 4v (B) 4u + v = 0 (C) u + 4v = 0 (D) 2u + v = 0

5. If $A_n=\int_{0}^{\pi/2}\frac{\sin(2n-1)x}{\sin x}dx$; $B_n=\int_{0}^{\pi/2}\left(\frac{\sin nx}{\sin x}\right)^2dx$; for $n\in N$, then :

(A) $A_{n+1}=A_n$ (B) $B_{n+1}=B_n$ (C) $A_{n+1}-A_n=B_{n+1}$ (D) $B_{n+1}-B_n=A_{n+1}$

6. Prove that $\int_{0}^{1}\tan^{-1}\left(\frac{1}{1-x+x^2}\right)dx=2\int_{0}^{1}\tan^{-1}x\,dx$. Hence or otherwise,

evaluate the integral $\int_{0}^{1}\tan^{-1}\left(1-x+x^2\right)dx$

7. Given that, $F(x) = \frac{1}{x^2}\int_4^x (4t^2 - 2F'(t))\,dt$, find $F'(4)$.

8.

	Column – 1		**Column – 2**
(A)	The value of $\int_{-1}^{1} \max.(\|x\|, x^2, x^4)dx$ is equal to	(p)	-1
(B)	If for a continuous f(x), $\int_{-a}^{a} f(x)\,dx = \|k\| \int_0^a (f(x)+f(-x))\,dx$, then k is/are	(q)	$\frac{17}{3}$
(C)	If $\int_0^{\infty} e^{-2x}(\sin 2x + \cos 2x)\,dx = -\frac{k}{2}$, then value of k is/are	(r)	$\frac{5}{2}$
(D)	$\lim_{x\to 0} \frac{\int_0^x (\sin^2 4t + t^2)\,dt}{x^3}$ is equal to	(s)	1

Answers Key

1. π **2.** (C) **3.** (A) **4.** (B)

5. (A)(D) **6.** $\ell n\, 2$ **7.** 32/9

8. (A) $\rightarrow$ (s), (B) $\rightarrow$ (p, s), (C) $\rightarrow$ (p), (D) $\rightarrow$ (q)