

Topic : Definite Integration

Type of Questions		M.M., Min.
Single choice Objective (no negative marking) Q.1,2,3,4,5	(3 marks, 3 min.)	[15, 15]
Subjective Questions (no negative marking) Q.6,7	(4 marks, 5 min.)	[8, 10]
Match the Following (no negative marking) Q.8	(8 marks, 8 min.)	[8, 8]

1.  $\int_2^4 \left( \log_x 2 - \frac{(\log_x 2)^2}{\ln 2} \right) dx$  equals to :

- (A) 0                      (B) 1                      (C) 2                      (D) 4

2. The value of  $\int_1^2 ([x^2] - [x]^2) dx$ , where [.] denotes the greatest integer function, is equal to :

- (A)  $4 + \sqrt{2} - \sqrt{3}$       (B)  $4 - \sqrt{2} + \sqrt{3}$       (C)  $4 - \sqrt{3} - \sqrt{2}$       (D) none of these

3. The area of the closed figure bounded by  $x = -1$ ,  $x = 2$  and  $y = \begin{cases} -x^2 + 2, & x \leq 1 \\ 2x - 1, & x > 1 \end{cases}$  and the abscissa axis is

- (A)  $16/3$  sq. units      (B)  $10/3$  sq. units      (C)  $13/3$  sq. units      (D)  $7/3$  sq. units

4. The area of the region for which  $0 < y < 3 - 2x - x^2$  and  $x > 0$  is

- (A)  $\int_1^3 (3 - 2x - x^2) dx$                       (B)  $\int_0^3 (3 - 2x - x^2) dx$   
 (C)  $\int_0^1 (3 - 2x - x^2) dx$                       (D)  $\int_{-1}^3 (3 - 2x - x^2) dx$

5. The area bounded by the curves  $\sqrt{x} + \sqrt{y} = 1$  and  $x + y = 1$  is

- (A)  $\frac{1}{3}$                       (B)  $\frac{1}{6}$                       (C)  $\frac{1}{2}$                       (D) none of these



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

7. For  $\theta \in (0, \pi) \cup (\pi, 2\pi)$  show that  $\int_0^\infty \frac{dx}{x^2 + 2x\cos\theta + 1} = 2 \int_0^1 \frac{dx}{x^2 + 2x\cos\theta + 1}$

8. **Column – I**

**Column – II**

(A) Let  $f : \mathbb{R} \rightarrow \mathbb{R}$  be a differentiable function and  $f(1) = 1, f'(1) = 3$ . (P) 2

Then the value of  $\lim_{x \rightarrow 1} \frac{\int_1^{x^2} (f(t) - t) dt}{(x-1)^2}$  is

(B) If  $\int_0^3 (3ax^2 + 2bx + c) dx = \int_1^3 (3ax^2 + 2bx + c) dx$  where  $a, b, c$  are constants, then  $a + b + c =$  (Q) 0

(C) Number of rational points  $P \equiv (\alpha, \beta)$  lying on  $(x - \sqrt{2})^2 + (y - \sqrt{3})^2 = 4$  is (R) 1  
is (rational point means  $x$  and  $y$  co-ordinate both are rational)

(D) Number of integral values of 'a' for which the function  $f(x) = x^3 + (a + 2)x^2 + 3ax + 5$  is monotonic in  $\mathbb{R}$  is (S) 4



# Answers Key

1. (A)      2. (C)      3. (A)      4. (C)

5. (A)      6.  $\frac{\pi}{2\sqrt{3}}$

8. (A)  $\rightarrow$  (S), (B)  $\rightarrow$  (Q), (C)  $\rightarrow$  (Q), (D)  $\rightarrow$  (S)

