

# Assignment-1

AI24BTECH11012- Pushkar Gudla

## SECTION-A

### F. MATCH THE FOLLOWING

1) Match the following:

(2006-6M)

- |  |                   |
|--|-------------------|
| (A) $\int_0^{\frac{\pi}{2}} (\sin x)^{\cos x} (\cos x \cot x - \log (\sin x)^{\sin x}) dx$     | (p) 1             |
| (B) Area bounded by $-4y^2 = x$ and $x - 1 = -5y^2$  | (q) 0             |
| (C) Cosine of the angle of intersection of curves $y = 3^{x-1} \log x$ and $y = x^x - 1$ is    | (r) $6 \ln 2$     |
| (D) Let $\frac{dy}{dx} = \frac{6}{x+y}$ where $y(0) = 0$ then value of $y$ when $x + y = 6$ is | (s) $\frac{4}{3}$ |

2) Match the integrals in **Column I** with the values in **Column II** and indicate your answer by darkening the appropriate bubbles in the  $4 \times 4$  matrix given in the ORS.

(2007-6M)

#### Column I

- (A)  $\int_{-1}^1 \frac{dx}{1+x^2}$   
 (B)  $\int_0^1 \frac{dx}{\sqrt{1-x^2}}$   
 (C)  $\int_2^3 \frac{dx}{1-x^2}$   
 (D)  $\int_1^2 \frac{dx}{x\sqrt{x^2-1}}$

#### Column II

- (p)  $\frac{1}{2} \log\left(\frac{2}{3}\right)$   
 (q)  $2 \log\left(\frac{2}{3}\right)$   
 (r)  $\frac{\pi}{3}$   
 (s)  $\frac{\pi}{2}$

3)

(JEE Adv. 2014)

#### List-I

- P. The number of polynomials  $f(x)$  with non-negative integer coefficients of *degree*  $\leq 2$ , satisfying  $f(0) = 0$  and  $\int_0^1 f(x) dx = 1$ , is
- 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
- R.  $\int_{-\frac{1}{2}}^2 \frac{3x^2}{(1+e^x)} dx$  equals
- S.  $\frac{\left(\int_{-\frac{1}{2}}^{\frac{1}{2}} \cos 2x \log\left(\frac{1+x}{1-x}\right) dx\right)}{\left(\int_0^{\frac{1}{2}} \cos 2x \log\left(\frac{1+x}{1-x}\right) dx\right)}$

#### List-II

- a) 8  
 b) 2  
 c) 4  
 d) 0

#### P Q R S

- (a) 3 2 4 1  
 (c) 3 2 1 4

#### P Q R S

- (b) 2 3 4 1  
 (a) 2 3 1 4

## SECTION-B JEE MAIN/AIEEE

- 1) The area (*insq.units*) of the region  $\{(x, y) : y^2 \geq 2x \text{ and } x^2 + y^2 \leq 4x, x \geq 0, y \geq 0\}$  is:

[JEE M 2016]

- a)  $\pi - \frac{4\sqrt{2}}{3}$   
 b)  $\frac{\pi}{2} - \frac{2\sqrt{2}}{3}$   
 c)  $\pi - \frac{4}{3}$   
 d)  $\pi - \frac{8}{3}$

- 2) The area (*insq.units*) of the region  $\{(x, y) : x \geq 0, x + y \leq 3, x^2 \leq 4y \text{ and } y \leq 1 + \sqrt{x}\}$  is:

[JEE M 2017]

- a)  $\frac{5}{2}$   
 b)  $\frac{59}{12}$   
 c)  $\frac{3}{2}$   
 d)  $\frac{7}{3}$

- 3) The integral  $\int_{\frac{\pi}{4}}^{\frac{3\pi}{4}} \frac{dx}{1+\cos x}$  is equal to:

[JEE M 2017]

- a) -1  
 b) -2  
 c) 42  
 d) 4

- 4) Let  $g(x) = \cos x^2, f(x) = \sqrt{x}$ , and  $\alpha, \beta (\alpha < \beta)$  be the roots of the quadratic equation  $18x^2 - 9\pi x + \pi^2 = 0$ . Then the area (*insq.units*) bounded by the curve  $y = (g \circ f)(x)$  and the lines  $x = \alpha, x = \beta$  and  $y = 0$ , is:

[JEE M 2018]

- a)  $\frac{1}{2}(\sqrt{3} + 1)$   
 b)  $\frac{1}{2}(\sqrt{3} - \sqrt{2})$   
 c)  $\frac{1}{2}(\sqrt{2} - 1)$   
 d)  $\frac{1}{2}(\sqrt{3} - 1)$

- 5) The value of  $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{\sin^2 x}{1+2^x} dx$  is:

[JEE M 2018]

- a)  $\frac{\pi}{2}$   
 b)  $4\pi$   
 c)  $\frac{\pi}{4}$   
 d)  $\frac{\pi}{8}$

- 6) The value of  $\int_0^\pi |\cos x|^3 dx$  is:

[JEE M 2019-9 Jan(M)]

- a) 0  
 b)  $\frac{4}{3}$   
 c)  $\frac{2}{3}$   
 d)  $\frac{-2}{3}$

- 7) The area (*insq.units*) bounded by the parabola  $y = x^2 - 1$ , the tangent at the point

(2, 3) to it and the y-axis is:

[JEE M 2019-9Jan(M)]

- a)  $\frac{8}{3}$   
 b)  $\frac{32}{3}$   
 c)  $\frac{56}{3}$   
 d)  $\frac{14}{3}$

- 8) The value of  $\int_0^{\frac{\pi}{2}} \frac{\sin^3 x}{\sin x + \cos x} dx$  is:

[JEE M 2019-9 April(M)]

- a)  $\frac{\pi-2}{8}$   
 b)  $\frac{\pi-1}{4}$   
 c)  $\frac{\pi-2}{4}$   
 d)  $\frac{\pi-1}{2}$

- 9) The area (*insq.units*) of the region  $A = \{(x, y) : x^2 \leq y \leq x + 2\}$  is:

[JEE M 2019-9 April(M)]

- a)  $\frac{10}{3}$   
 b)  $\frac{9}{2}$   
 c)  $\frac{31}{6}$   
 d)  $\frac{13}{6}$