

Assignment-1

AI24BTECH11012- Pushkar Gudla

SECTION-A

F. MATCH THE FOLLOWING

1) Match the following:

(2006-6M)

- | | |
|-----------------------------------------------------------------------------------------------|------------------|
| a) $\int_0^{\frac{\pi}{2}} (\sin x)^{\cos x} (\cos x \cot x - \log (\sin x)^{\sin x}) dx$ | a) 1 |
| b) Area bounded by $-4y^2 = x$ and $x - 1 = -5y^2$ | b) 0 |
| c) Cosine of the angle of intersection of curves $y = 3^{x-1} \log x$ and $y = x^x - 1$ is | c) $6 \ln(2)$ |
| d) Let $\frac{dy}{dx} = \frac{6}{x+y}$ where $y(0) = 0$ then value of y when $x + y = 6$ is | d) $\frac{4}{3}$ |

2) Match the integrals in **Column I** with the values in **Column II** and indicate your answer by darkening the appropriate bubbles in the 4x4 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

- a) $\frac{1}{2} \log\left(\frac{2}{3}\right)$
 b) $2 \log\left(\frac{2}{3}\right)$
 c) $\frac{\pi}{3}$
 d) $\frac{\pi}{2}$

3)

(JEE Adv. 2014)

List-I

- a) 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
 b) 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
 c) $\int_{-2}^2 \frac{3x^2}{(1+e^x)} dx$ equals $\left(\int_{-\frac{1}{2}}^{\frac{1}{2}} \cos 2x \log\left(\frac{1+x}{1-x}\right) dx \right)$
 d) $\frac{\left(\int_{-\frac{1}{2}}^{\frac{1}{2}} \cos 2x \log\left(\frac{1+x}{1-x}\right) dx \right)}{\left(\int_0^{\frac{1}{2}} \cos 2x \log\left(\frac{1+x}{1-x}\right) dx \right)}$

List-II

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

P Q R S

- a) 3241
 b) 3214
 c) 2341
 d) 2314

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) 4π
- 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) $\frac{13}{6}$