EXERCISE – I SINGLE CORRECT (OBJECTIVE QUESTIONS)

1. The area of the region bounded by the curves $y = |x - 2|$, $x = 1$, $x = 3$ and the x-axis is
(A) 3 (B) 2 (C) 1 (D) 4

2. The area enclosed between the curve $y = \log_e(x + e)$ and the coordinate axes is
(A) 4 (B) 3 (C) 2 (D) 1

3. The area of the figure bounded by the curves $y = \ell nx$ & $y = (\ell nx)^2$ is
(A) e + 1 (B) e – 1 (C) 3 – e (D) 1

4. The area enclosed by the curves $y=\cos x$, $y=1+\sin 2x$ and $x = \frac{3\pi}{2}$ as x varies from 0 to $\frac{3\pi}{2}$, is
(A) $\frac{3\pi}{2} - 2$ (B) $\frac{3\pi}{2}$ (C) $2 + \frac{3\pi}{2}$ (D) $1 + \frac{3\pi}{2}$

5. Let 'a' be a positive constant number. Consider two curves $C_1 : y = e^x$, $C_2 : y = e^{a - x}$. Let S be the area of the part surrounding by C_1, C_2 and the y-axis, then $\lim\limits_{a \to 0} \frac{S}{a^2}$ equals
(A) 4 (B) 1/2 (C) 0 (D) 1/4

6. Suppose $y = f(x)$ and $y = g(x)$ are two functions whose graphs intersect at the three points (0, 4), (2, 2) and (4, 0) with $f(x) > g(x)$ for $0 < x < 2$ and $f(x) < g(x)$ for $2 < x < 4$.

If $\int_0^4 [f(x) - g(x)]\,dx = 10$ and $\int_2^4 [g(x) - f(x)]\,dx = 5$, then area between two curves for $0 < x < 2$, is
(A) 5 (B) 10 (C) 15 (D) 20

7. The area enclosed by the curve $y^2 + x^4 = x^2$ is
(A) $\frac{2}{3}$ (B) $\frac{4}{3}$ (C) $\frac{8}{3}$ (D) $\frac{10}{3}$

8. The area of the region (s) enclosed by the curves $y = x^2$ and $y = \sqrt{|x|}$ is
(A) 1/3 (B) 2/3 (C) 1/6 (D) 1

9. The area of the closed figure bounded by $y = x$, $y = -x$ & the tangent to the curve $y = \sqrt{x^2 - 5}$ at the point (3, 2) is
(A) 5 (B) $2\sqrt{5}$ (C) 10 (D) $\frac{5}{2}$

10. The area bounded by the curve $y = xe^{-x}$; $xy = 0$ and $x = c$ where c is the x-coordinate of the curve's inflection point, is
(A) $1-3e^{-2}$ (B) $1 - 2e^{-2}$ (C) $1 - e^{-2}$ (D) 1

11. The line $y = mx$ bisects the area enclosed by the curve $y = 1 + 4x - x^2$ & the line $x = 0$, $x = \frac{3}{2}$ & $y = 0$. Then the value of m is
(A) $\frac{13}{6}$ (B) $\frac{6}{13}$ (C) $\frac{3}{2}$ (D) 4

12. The area bounded by the curves $y = -\sqrt{-x}$ and $x = -\sqrt{-y}$ where $x, y \le 0$
(A) cannot be determined (B) is 1/3
(C) is 2/3
(D) is same as that of the figure bounded by the curves $y = \sqrt{-x}$; $x \le 0$ and $x = \sqrt{-y}$; $y \le 0$

13. If (a, 0) ; a > 0 is the point where the curve $y = \sin 2x - \sqrt{3} \sin x$ cuts the x-axis first, A is the area bounded by this part of the curve, the origin and the positive x-axis, then
(A) 4A + 8 cosa = 7 (B) 4A + 8sina = 7
(C) 4A – 8 sin a = 7 (D) 4A – 8 cos a = 7

14. Consider two curves $C_1 : y = \frac{1}{x}$ and $C_2 : y = \ell nx$ on the xy plane. Let D_1 denotes the region surrounded by C_1, C_2 and the line $x = 1$ and D_2 denotes the region surrounded by C_1, C_2 and the line $x = a$. If $D_1 = D_2$ then the value of 'a'
(A) $\frac{e}{2}$ (B) e (C) e – 1 (D) 2(e – 1)

15. The area bounded by the curve y = f(x), the x-axis & the ordinates x = 1 & x = b is (b – 1) sin (3b + 4). Then f(x) is
(A) (x – 1) cos (3x + 4)
(B) sin (3x + 4)
(C) sin (3x + 4) + 3(x – 1). cos (3x + 4)
(D) none

16. The area of the region for which $0 < y < 3 - 2x - x^2$ & 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) $\int_1^3 (3-2x-x^2)dx$

17. The area bounded by the curves $y = x(1 - \ell nx)$; $x = e^{-1}$ and positive x-axis between $x = e^{-1}$ and x = e is

(A) $\left(\frac{e^2-4e^{-2}}{5}\right)$ (B) $\left(\frac{e^2-5e^{-2}}{4}\right)$

(C) $\left(\frac{4e^2-e^{-2}}{5}\right)$ (D) $\left(\frac{5e^2-e^{-2}}{4}\right)$

18. The curve $f(x) = Ax^2 + Bx + C$ passes through the point (1, 3) and line 4x + y = 8 is tangent to it at the point (2, 0). The area enclosed by y = f(x), the tangent line and the y-axis is

(A) $\frac{4}{3}$ (B) $\frac{8}{3}$ (C) $\frac{16}{3}$ (D) $\frac{32}{3}$

19. Let y = g(x) be the inverse of a bijective mapping $f : R \to R$ $f(x) = 3x^3 + 2x$. The area bounded by graph of g(x), the x-axis and the ordinate at x = 5 is

(A) $\frac{5}{4}$ (B) $\frac{7}{4}$ (C) $\frac{9}{4}$ (D) $\frac{13}{4}$

20. A function y = f(x) satisfies the differential equation, $\frac{dy}{dx} - y = \cos x - \sin x$, with initial condition that y is bounded when $x \to \infty$. The area enclosed by y = f(x), y = cosx and the y-axis in the 1st quadrant

(A) $\sqrt{2}-1$ (B) $\sqrt{2}$ (C) 1 (D) $\frac{1}{\sqrt{2}}$