Area

LEVEL−I

1. Area common to the curves $y = x^3$ and $y = \sqrt{x}$ is
   (A) $\frac{5}{12}$ (B) $\frac{5}{6}$
   (C) $\frac{5}{8}$ (D) none of these

2. The area bounded by the parabola $y^2 = x$, straight line $y = 4$ and y-axis is
   (A) $\frac{64}{3}$ (B) $\frac{16}{3}$
   (C) $7\sqrt{2}$ (D) none of these

3. The area bounded by the curves $y = |x| - 1$ and $y = -|x| + 1$ is
   (A) 1 (B) 2
   (C) $2\sqrt{2}$ (D) 4

4. The area bounded by the curve $y = \sin x$ and the x-axis , for $0 \le x \le 2\pi$ is
   (A) 2 sq. units (B) 1 sq. units
   (C) 6 sq units (D) 4 sq. units

5. The area enclosed by $y = \ln x$, its normal at (1, 0) and y-axis is
   (A) 1/2 (B) 3/2
   (C) Not defined (D) none of these

6. The area bounded by $y - 1 = |x|$, $y = 0$ and $|x| = 1/2$ will be
   (A) 3/4 (B) 3/ 2
   (C) 5/4 (D) none of these

7. The area bounded by the parabola $y^2 = 4x$ and its latus rectum is
   (A) 1 (B) ¾
   (C) 8/3 (D) none of these

8. The area of the region bounded by $y = |x-1|$ and $y = 1$ is
   (A) 1/ 2 (B) 1
   (B) 2 (D) none of these

9. The area of the region bounded by the parabola $y = x^2-3x$ with $y \le 0$ is
   (A) 3 (B) –3
   (C) –9/2 (D) 9/2

10. The area of the smaller region bounded by the circle $x^2+y^2 = 1$ and $|y| = x+1$ is
    (A) $\frac{\pi}{4}-\frac{1}{2}$ (B) $\frac{\pi}{2}-1$
    (C) $\frac{\pi}{2}$ (D) $\frac{\pi}{2}+1$

11. The area bounded by the curves $|x| + |y| \ge 1$ and $x^2 + y^2 \le 1$ is
    (A) 2 sq. units (B) π sq. units
    (C) π - 2 sq. units (D) π + 2 sq. units

12. Area bounded by f(x) = max.(sinx, cosx); $0 \le x \le \pi/2$ $x = \pi/2$ and the coordinate axes is equal to

(A) $\sqrt{2}$ sq. units (B) 2 sq. units

(C) $\frac{1}{\sqrt{2}}$ sq. units (D) None of these

13. If the area bounded by the curve , y =f(x), the lines x=1, x = b and the x-axis is (b-1) cos (3b + 4), b > 1, then f(x) is

(A) (x-5) sin (3x+4) (B) (x-1) sin (x+1)+ (x+1) cos (x-1)

(C) cos (3x+4) –3(x-1) sin (3x+4) (D) (x-5) cos (3x+4)

14. The area of region that is completely bounded by the graph of f(x) = 2x – 1 and g(x) = $x^2 - 4$ is

(A) 3 (B) $\frac{20}{3}$

(C) $\frac{32}{3}$ (D) None of these

15. The area bounded by the curves $y^2 = 4 + x$ and x + 2y = 4, is

(A) 9 (B) 18

(C) 72 (D) 36

16. The area of the region bounded by the curve $y = x^2 - 2x$ *and* $y = x$ is

(A) $\frac{9}{2}$ (B) $\frac{7}{2}$

(C) $\frac{11}{2}$ (D) None of these

17. The total area enclosed by $y = |x|$, $|x| = 1$ and y = 0, is

(A) 1 (B) 2

(C) 3 (D) 4

18. The area of the region bounded by the function $f(x) = x^3$, the x-axis and the lines x = –1 and x = 1 is

(A) $\frac{1}{4}$ (B) $\frac{1}{3}$

(C) $\frac{1}{8}$ (D) $\frac{1}{2}$

19. The area of the region bounded by the curve y = x and $y = 2 - (x-2)^2$ is

(A) $\frac{1}{3}$ (B) $\frac{1}{6}$

(C) $\frac{1}{9}$ (D) None of these

20. The area bounded by the axes and the curve $y = |x-2|$ is

(A) 1 (B) 2

(C) 4 (D) None

LEVEL–II

1. Area bounded by the curves $y = x^2 + 2$, $y = -x$, $x = 0$ and $x = 1$ is
   (A) $\frac{17}{2}$ (B) $\frac{17}{6}$
   (C) $\frac{19}{6}$ (D) $\frac{13}{6}$

2. The area bounded between the curves $x = y^2$ and $x = 3 - 2y^2$ is
   (A) 2 (B) 3
   (C) 4 (D) 1

3. Area bounded by the curve $ay = 3(a^2 - x^2)$ and the x-axis is
   (A) a^2 (B) $2a^2$
   (C) $3a^2$ (D) $4a^2$

4. Area bounded by the curves $x^2 = y$ and $y = x + 2$ and x-axis is
   (A) $\frac{9}{2}$ (B) $\frac{5}{3}$
   (C) $\frac{5}{6}$ (D) $\frac{7}{6}$

5. If A_m represents the area bounded by the curve $y = \ln x^m$, the x-axis and the lines $x = 1$ and $x = e$, then $A_m + m A_{m-1}$ is
   (A) m (B) m^2
   (C) $m^2/2$ (D) m^2-1

6. The area bounded by the curves $y = \ln x$, $y = |\ln x|$ and the y-axis is
   (A) 3 (B) 2
   (C) 4 (D) 8

7. If area bounded by $y = f(x)$, the coordinate axes and the line $x = a$ is given by ae^a, then f(x) is
   (A) $\pm e^x(x+1)$ (B) e^x
   (C) $x e^x$ (D) xe^x+1

8. The area common to $y^2 = x$ and $x^2 = y$ is
   (A) 1 (B) 2/3
   (C) 1/3 (D) none of these

9. The area bounded by $y = |x-1|$ and $y = 3 - |x|$ is
   (A) 2 (B) 3
   (C) 4 (D) 1

10. The area cut off from the parabola $4y=3x^2$ by the straight line $2y=3x+12$ is
    (A) 25 sq.units (B) 27 sq.units
    (C) 36 sq.units (D) 16 sq.units

11. The area bounded by the curve $y = x^2 + 2x+1$, the tangent at (1, 4) and the y-axis is
    (A) 1 (B) 1/2
    (C) 1/3 (D) 1/4

12. The area bounded by y = lnx, the x−axis and the ordinates x = 0 and x = 1 is
(A) 1 (B) 3/2
(C) −1 (D) none of these

13. The area bounded by the straight lines y = 0, x + y – 2 = 0 and the straight line which equally divides the common area included between the curves $y = x^2$ and $y = \sqrt{x}$ is equal to
(A) 1 sq. unit (B) 2sq, units
(C) 3 sq. units (D) None of these

14. The area of the smaller region bounded by the circle $x^2 + y^2 = 1$ and the lines $|y| = x + 1$ is:
(A) $\frac{\pi}{2} - \frac{1}{2}$ (B) $\frac{\pi}{2} - 1$
(C) $\frac{\pi}{2}$ (D) $\frac{\pi}{2} + 1$

15. The area of the region bounded by $1 - y^2 = |x| \quad and \quad |x| + |y| = 1$ is
(A) $\frac{1}{3}$ (B) $\frac{4}{3}$
(C) $\frac{2}{3}$ (D) $\frac{8}{3}$

16. Area enclosed by the curve $|x-2| + |y+1| = 1$ is
(A) $\frac{2}{15}$ sq. units (B) $\frac{4}{15}$ sq. units
(C) 2 sq. units (D) 4 sq. units

17. If the area bounded by a continuous function y = f(x), co-ordinate axes and the line x = a, where $a \in R^+$, is equal to $a e^a$, then one such function can be
(A) $e^x(x+1)$ (B) $-e^x(x+1)$
(C) e^x (D) None

18. Value of the parameter 'a' such that the area bounded by $y = a^2x^2 + ax + 1$, co-ordinate axes and the line x = 1, attains the least value, is
(A) $-\frac{1}{4}$ (B) $-\frac{3}{4}$
(C) $-\frac{1}{2}$ (D) None of these

19. The area bounded by $y = x.e^{|x|}$ and lines $|x| = 1, \ y = 0$ is,
(A) 4 (B) 6
(C) 1 (D) 2

20. The slope of the tangent to a curve y = f(x) at (x, f(x)) is 2x + 1′. If the curve passes through the point (1, 2), then the area of the region bounded by the curve, the x-axis and the line x = 1 is:
(A) $\frac{1}{6}$ (B) 6
(C) $\frac{5}{6}$ (D) $\frac{6}{5}$

LEVEL−III

1. The area enclosed in the region $\frac{x^2}{a^2}+\frac{y^2}{b^2}\le 1$ and $\frac{x}{a}+\frac{y}{b}\ge 1$ is

   (A) $\frac{\pi ab}{4}-\frac{1}{2}ab$ (B) $\frac{\pi ab}{4}$

   (C) πab (D) none of these

2. The area of the loop of the curve $x^2 = y^2(1-y)$ is

   (A) 2/15 (B) 15/14

   (C) 4/15 (D) 8/15

3. The area common to the region determined by $y \ge \sqrt{x}$, and $x^2+y^2 < 2$ has the value

   (A) π-2 (B) 2π-1

   (C) $3\pi - \sqrt{2}/3$ (D) none of these

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) $\int_0^3 (2-2x-x^2)dx$

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

5. The area enclosed between the curves $y = \sin^2 x$ and $y = \cos^2 x$ in the interval $0 \le x \le \pi$ is

   (A) 2 (B) ½

   (C) 1 (D) None of these

6. The area between the curves $y = xe^x$ and $y = x e^{-x}$ and the line $x = 1$ is

   (A) 2e (B) e

   (C) 2/e (D) 1/e

7. If A_n is the area bounded by $y = (1-x^2)^n$ and coordinate axes, $n \in N$, then

   (A) $A_n = A_{n-1}$ (B) $A_n < A_{n-1}$

   (B) $A_n > A_{n-1}$ (D) $A_n = 2\,A_{n-1}$

8. Let $f(x) = \min\left\{(x+1), \sqrt{(1-x)}\right\}$, then area bounded by f(x) and x-axis is:

   (A) $\frac{1}{6}$ (B) $\frac{5}{6}$

   (C) $\frac{7}{6}$ (D) $\frac{11}{6}$

9. Let $f(x) = \begin{cases} x^2; & x < 0 \\ x; & x \ge 0 \end{cases}$

   Area bounded by the curve y = f(x), y = 0 and $x = \pm 3a$ is $\frac{9a}{2}$, then a =

   (A) –1 or $\frac{1}{2}$ (B) 1 or $-\frac{1}{2}$

(C) 1 or $\frac{1}{2}$ (D) None

10. The interval [a, b] such that the value of $\int_a^b \left(2+x-x^2\right)dx$ is maximum, is

(A) [–2, 1] (B) [–2, –1]
(C) [1, 2] (D) [–1, 2]

11. If A(n) represents the area bounded by the curve y = n lnx, where n $\in$ N and n > 1, the x-axis and the lines x = 1 and x= e, then the value of A(n) + n A(n – 1) is equal to

(A) $\frac{n^2}{e+1}$ (B) $\frac{n^2}{e-1}$
(C) n^2 (D) $e \cdot x^2$

12. Area of the region which consists of all the points satisfying the conditions $|x-y|+|x+y| \le 8$ and xy $\ge$ 2, is equal to:

(A) 2 (9 – ln8) sq. units (B) 4 (7 – ln2) sq. units
(C) 4 (9 – ln8) sq. units (D) 4 (7 – ln8) sq. units

13. A point 'P' moves in xy – plane in such a way that $\left[|x|\right]+\left[|y|\right]=1$, where [·] denotes the G.I .F. Area of the region representing all possible positions of the point 'P' is equal to

(A) 8 sq. units (B) 4 sq. units
(C) 16 sq. units (D) $2\sqrt{2}$ sq. units

14. Area of the region bounded by $\sqrt{2} \le 2|x+y| \le 2\sqrt{2}$ and the axes is

(A) $\frac{3}{8}$ sq. units (B) $\frac{3}{2}$ sq. units
(C) $\frac{3}{4}$ sq. units (D) None

15. The area of the smaller region in which the curve $y=\left[\frac{x^3}{100}+\frac{x}{50}\right]$, where [·] denotes G.I.F., divides the circle $(x-2)^2+(y+1)^2=4$, is equal to

(A) $\frac{2\pi-3\sqrt{3}}{3}$ sq. units (B) $\frac{3\sqrt{3}-\pi}{3}$ sq. units
(C) $\frac{5\pi-3\sqrt{3}}{3}$ sq. units (D) $\frac{4\pi-3\sqrt{3}}{3}$ sq. units

16. Area bounded by the curve $y=e^{x^2}$, x-axis and the lines x = 1, x = 2 is given to be equal to 'a' sq. units. Area bounded by the curve y = $\sqrt{\ln(x)}$, y-axis and the lines y = e and $y=e^4$ is equal to:

(A) $2e^4-e-a$ (B) e^4-e-a
(C) $2e^4-2e-a$ (D) $2e^4-e-2a$

17. Area bounded by the curves $y=e^x$, $y=2x-x^2$ and the line x = 0, x = 1 is equal to

(A) $\frac{3e-2}{3}$ sq. units (B) $\frac{4e-5}{4}$ sq. units

(C) $\frac{4e-7}{4}$ sq. units (D) $\frac{3e-5}{3}$ sq. units

18. Value of the parameter 'a' such that area bounded by $y = x^2 - 3$ and the line y = ax + 2, attain its minimum value is,
(A) –1 (B) 0
(C) 1 (D) $\pm$ 1

19. Consider a triangle OAB formed by the points O ≡ (0, 0), A ≡ (2, 0), B ≡ $\left(1, \sqrt{3}\right)$. P(x, y) is an arbitrary interior point of the triangle, moving in such a way that $d(P,OA) + d(P, AB) + d(P,OB) = \sqrt{3}$, where d(P, OA), d(P, AB) and d(P, OB) represent the distance of 'P' from the sides OA, AB and OB respectively. Area of the region representing all possible positions of the point 'P' is equal to
(A) $2\sqrt{3}$ sq. units (B) $\sqrt{6}$ sq. units
(C) $\sqrt{3}$ sq. units (D) None

20. Let f(x) = $ax^2 + bx + c$, where $a \in R^+$ and $b^2 - 4ac < 0$. Area bounded by $y = f(x)$, x-axis and the lines x = 0, x = 1 is equal to
(A) $\frac{1}{6}\left(3f(1) + f(-1) + 2f(0)\right)$ (B) $\frac{1}{12}\left(5f(1) + f(-1) + 8f(0)\right)$
(C) $\frac{1}{6}\left(3f(1) - f(-1) + 2f(0)\right)$ (D) $\frac{1}{12}\left(5f(1) - f(-1) + 8f(0)\right)$

ANSWERS

LEVEL –I

1.	A	2.	A	3.	B	4.	D
5.	B	6.	C	7.	C	8.	B
9.	D	10.	A	11.	C	12.	A
13.	C	14.	C	15.	D	16.	A
17.	A	18.	D	19.	D	20.	B

LEVEL –II

1.	B	2.	A	3.	D	4.	
5.	B	6.	B	7.	A	8.	C
9.	C	10.	B	11.	C	12.	A
13.	A	14.	B	15.	C	16.	C
17.	A	18.	B	19.	D	20.	C

LEVEL –III

1.	A	2.	C	3.	D	4.	C
5.	B	6.	C	7.	B	8.	C
9.	A	10.	D	11.	C	12.	D

13.	A	14.	C	15.	D	16.	A
17.	D	18.	B	19.	C	20.	D