EXERCISE LEVEL –I

EL– I

Q.1 The region enclosed by the parabola $y = x^2$ and the line $y = 2x$ (in square units) is:

(a) $\frac{2}{3}$ (b) $\frac{4}{3}$ (c) $\frac{8}{3}$ (d) 4

Q.2 The area enclosed by the curve $y = \cos x$, from $x = 0$ to $x = \pi$, is:

(a) 2 sq units (b) 4 sq units (c) 3 sq units (d) 1 sq units

Q.3 The area enclosed by the curve $y = \sqrt{16 - x^2}$ and the x-axis is:

(a) 8 π sq units (b) 20 π sq units (c) 16 sq π units (d) 256 π sq units

Q.4 The area enclosed by the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is equivalent to:

(a) $\pi^2 ab$ (b) πab (c) $\pi a^2 b$ (d) πab^2

Q.5 Determine the area of the region (in square units) enclosed by the curve $y^2=2y-x$ & y-axis and the y-axis.

(a) $\frac{8}{3}$ (b) $\frac{4}{3}$ (c) $\frac{5}{3}$ (d) $\frac{2}{3}$

Q.6 What is the area enclosed by the parabola $x^2 = y$ and the line $y = 1$?

(a) $\frac{1}{3}$ sq units (b) $\frac{2}{3}$ sq units (c) $\frac{4}{3}$ sq units (d) 2 sq units

Q.7 The area enclosed by the curve $y = x^2$ and the line $y = 16$ is:

(a) $\frac{32}{3}$ (b) $\frac{265}{3}$ (c) $\frac{64}{3}$ (d) $\frac{128}{3}$

Q.8 Determine the area enclosed by the curve $y = 4x^3$ within the interval $x = [-2, 3]$.

(a) 97 (b) 70 (c) 65 (d) 77

Q.9 The area beneath the curve $y = x^2$ and the lines $x = -1$, $x = 2$, and the x-axis is:

(a) 3 sq units (b) 5 sq units (c) 7 sq units (d) 9 sq units

Q.10 The area beneath the curve $y = x^4$ and the lines $x = 1$, $x = 5$, and the x-axis is:

(a) $\frac{3124}{3}$ sq units (b) $\frac{3124}{7}$ sq units (c) $\frac{3124}{5}$ sq units (d) $\frac{3124}{9}$ sq units

Q.11 The integral to determine the area of a circle with radius 'a' is given by:

(a) $\int_a^b \left(a^2 + x^2\right) dx$ (b) $\int_0^{2\pi} \sqrt{\left(a^2 - x^2\right)} dx$

(c) $4 \times \int_0^a \sqrt{\left(a^2 - x^2\right)} dx$ (d) $\int_0^a \sqrt{\left(a^2 - x^2\right)} dx$

Q.12 Determine the area enclosed by the curve $y = x^3$, the line $x = 2$, $x = 5$, and the x-axis.

(a) 173.50 (b) 230.25 (c) 175.35 (d) 152.25

Q.13 The region enclosed by the parabola $x = 4 - y^2$ and the y-axis, measured in square units, is:

(a) $\frac{2}{32}$ sq units (b) $\frac{32}{3}$ sq units (c) $\frac{33}{2}$ sq units (d) None of these

Q.14 The area bounded by the hyperbola $x^2 - y^2 = a^2$ between the straight-lines $x = a$ and $x = 2a$ is

(A) $2\sqrt{3}a^2 - a^2\log(2 + \sqrt{3})$ (B) $2a^2 + a^2\log(2 + \sqrt{3})$

(C) $a^2\log(2 + \sqrt{3}) - 2a^2$ (D) $2a^2 + \sqrt{3}a^2\log(2 + \sqrt{3})$

Q.15 The area common to the region determined by $y \geq \sqrt{x}$ and $x^2 + y^2 < 2$, in first quadrant, in square units is

(A) π (B) $(2\pi - 1)$

(C) $\frac{\pi}{4} - \frac{1}{6}$ (D) $(2\pi + 1)$

Q.16 The graph of $y^2 + 2xy + 40|x| = 400$ divides the plane into the regions. The area of the bounded region is

(A)400sq. units (B)800sq. units

(C)600sq. units (D)900sq. units

Q.17 The area enclosed by $y = x(x - 1)(x - 2)$ and x-axis, in square units, is

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

(C) $\frac{1}{2}$ (D) $\frac{1}{3}$

Q.18 The area bounded by the curves $y = \sin x$ and $y = \cos x$ between two consecutive points of the intersection, in square units, is

(A) $\sqrt{2}$ (B) $2\sqrt{2}$

(C) $4\sqrt{2}$ (D) $\frac{1}{\sqrt{2}}$

Q.19 The area bounded by $y = \sin^{-1} x$, $y = \cos^{-1} x$ and the x-axis, in square units, is

(A) $\sqrt{2}$ (B) $\sqrt{2} + 1$

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

Q.20 The area bounded by the loop of the curve $4y^2 = x^2(4 - x^2)$ in square units, is

(A)$\frac{7}{3}$ (B) $\frac{8}{3}$

(C)$\frac{11}{3}$ (D) $\frac{16}{3}$

Q.21 Area bounded by the curves $y = \log_e x$ and $y = (\log_e x)^2$ in square units, is

(A) $e - 2$ (B) $3 - e$

(C) e (D) $e - 1$

Q.22 The area bounded by the curve $f(x) = x + \sin x$ and its inverse function between the ordinates $x = 0$ and $x = 2\pi$ in square units, is

(A) 4π (B) 8π

(C) 4 (D) 8

Q.23 The area bounded by the x-axis, the curve $y = f(x)$ such that $f(x) > 0$ for $x \in (1, b)$ and the lines $x = 1$ $x = b$ is equal to $\sqrt{b^2 + 1} - \sqrt{2}$ for all $b > 1$ then $f(x)$ is

(A) $\sqrt{x - 1}$ (B) $\sqrt{x + 1}$

(C) $\sqrt{x^2 + 1}$ (D) $\frac{x}{\sqrt{1+x^2}}$

Q.24 The area bounded by $y = -x^2 + 1$ and the x-axis is

(A) $\frac{1}{3}$ (B) $\frac{2}{3}$

(C) $\frac{4}{3}$ (D) $\frac{8}{3}$

Q.25 The area bounded by $y = x^2, x + y = 2$ is

(A) $\frac{9}{2}$ (B) $\frac{15}{2}$

(C) 9 (D) 15

Q.26 The area of the region bounded by $y = x^2$ and $y = 4x$, for x between 0 and 1, is equal to

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

(C) 6sq. units (D) 1 sq. unit

Q.27 The area of the region in first quadrant bounded by the curves $y = x^3$ and $y = \sqrt{x}$, is equal to

(A) $\frac{12}{5}$ sq. units (B) $\frac{5}{12}$ sq. units

(C) $\frac{5}{3}$sq. units (D) $\frac{3}{5}$ sq. units

Q.28 The area of the region bounded by the curve $y = x^2 - 2$ and line $y = 2$, is equal to

(A) $\frac{32}{3}$ sq. unit (B) $\frac{19}{2}$ sq. unit

(C) $\frac{21}{5}$ sq. unit (D) $\frac{16}{3}$ sq. unit

Q.29 The area between the curve $y^2 = 4x$, y-axis, and $y = -1$ and $y = 3$ is equal to

(A) $\frac{7}{3}$ sq. units (B) $\frac{9}{4}$ sq. units

(C) $\frac{1}{12}$ sq. units (D) $\frac{1}{4}$ sq. units

Q.30 The common area of the curves $y = \sqrt{x}$ and $x = \sqrt{y}$ is equal to

(A) 3sq. units (B) 3sq. units

(C) $\frac{1}{3}$ sq. units (D) $\frac{2}{3}$ sq. units

Q.31 The area of the region bounded by $y = |x - 1|$ and $y = 1$ is equal to

(A) 1 sq. unit (B) 2 sq. units

(C) $\frac{1}{2}$ sq. unit (D) 3 sq. units

Q.32 The area of the region bounded by the curve $y = x^2$ and $y = |x|$ is equal to

(A) $\frac{5}{3}$ sq. units (B) $\frac{1}{3}$ sq. unit

(C) $\frac{5}{6}$ sq. units (D) $\frac{1}{6}$ sq. unit

Q.33 The area bounded between curves $y^2 = x$ and $y = |x|$ is

(A) $\frac{1}{3}$ (B) $\frac{2}{3}$

(C) 1 (D) $\frac{1}{6}$

Q.34 The area between the curves $y = x^3$ and $y = x + |x|$ is equal to

(A) 0sq. unit (B) 2sq, units

(C) 1sq. unit (D) 3 sq. units

Q.35 The area bounded by the curve $y = |x| - 1$ and $y = -|x| + 1$ is

(A) 1sq. unit (B) 2 sq. units

(C) $2\sqrt{2}$ sq. units (D) 4 sq. units

Q.36 For which of the following positive value of m, the area of the region bounded by the curve $y = x - x^2$ and the line $y = mx$ equals $\frac{9}{2}$?

(A) 3 (B) 1

(C) 2 (D) 4

Q.37 The area bounded by the curve $y = (x - 1)^2, y = (x + 1)^2$ and the x-axis is

(A) $\frac{1}{3}$ (B) $\frac{2}{3}$

(C) $\frac{4}{3}$ (D) $\frac{8}{3}$

Q.38 Minimum area of triangle formed by any tangent to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with the co-ordinate axes is

(A) $\frac{a^2+b^2}{2}$ (B) $\frac{(a+b)^2}{2}$

(C) ab (D) $\frac{(a-b)^2}{2}$

Q.39 The area enclosed by the curves $y^2 = x^3$ and $|y| = 2x$, in square units, is

(A) $\frac{2}{3}$ (B) 1

(C) 4 (D) $\frac{32}{5}$

Q.40 The area bounded by curve $f(x) = x^3$ and $g(x) = \sqrt[3]{x}$ is (in square units)

(A) 1 (B) 2

(C) 3 (D) 4

Q.41 STATEMENT-1: $y = f(x)$, be such that $f(x) \geq 0$, for $x \in (a, b)$ then area bounded by $y = f(x)$, $x = a$ and $x = b$ And

STATEMENT-2 : The area of curve $y = f(x)$ between ordinates $x = a$ and $x = b$ is $\int_a^b f(x)dx$.

(A) Statement-1 is True, Statement-2 is true; Statement-2 is a correct explanation for Statement-1

(B) Statement-1 is True, Statement-2 is true; Statement-2 is NOT a correct explanation for Statement-1

(C) Statement-1 is True, Statement-2 is False

(D) Statement-1 is False, Statement-2 is true

Q.42 STATEMENT-1 : The area bounded by $y = |\sin x|$ and x axis in $x = 0, x = 2\pi$ is 4 sq. units.
and
STATEMENT-2: $\int_0^{2\pi} \sin x dx = 0$.
(A) Statement-1 is True, Statement-2 is true; Statement-2 is a correct explanation for Statement-1
(B) Statement-1 is True, Statement-2 is true; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is true

Q.43 STATEMENT-1: The area bounded by $y = \sin x, y = \cos x, x = 0$ and $x = \frac{\pi}{2}$ is $2\left(\sqrt{2} - 1\right)$ sq. units.
And
STATEMENT-2 : $\int_0^{\pi/4} (\cos x - \sin x)dx + \int_{\pi/4}^{\pi/2} (\sin x - \cos x)dx = 2(\sqrt{2} - 1)$.
(A) Statement-1 is True, Statement-2 is true; Statement-2 is a correct explanation for Statement-1
(B) Statement-1 is True, Statement-2 is true; Statement-2 is NOT a correct explanation for Statement-1
(C) Statement-1 is True, Statement-2 is False
(D) Statement-1 is False, Statement-2 is true

Let $y = f(x)$ and $y = g(x)$ be two curves such that $f(x) \geq g(x), \forall x \in [a, b]$ then area bounded by $y = f(x)$ and $y = g(x)$ between $x = a$ and $x = b$ lines is $\int_a^b (f(x) - g(x))dx$ sq. units.

Q.44 Area bounded by $y = \sin x$ and $y = 0$, between $x = 0$ and $x = \pi$ in square units is equal to
(A) 1 (B) 2
(C) π (D) 2π

Q.45 The area bounded by curves $y = x^2$ and $y = x^3$ in square units is
(A) $\frac{1}{12}$ (B) $\frac{1}{6}$
(C) $\frac{1}{3}$ (D) $\frac{1}{4}$

Q.46 The area bounded by curves $y = x^3$ and $y = x$ is
(A) $\frac{1}{2}$ sq. units (B) $\frac{1}{4}$ sq. units
(C) $\frac{1}{8}$ sq. units (D) $\frac{1}{16}$ sq. units

Q.47 The area bounded by curves $y = x^2$ and $x = y^2$ in square units is
(A) $\frac{1}{8}$ (B) $\frac{1}{4}$
(C) $\frac{1}{3}$ (D) $\frac{1}{6}$

Q.48 The area bounded by curves $y = x^2$ and $y = x^6$ in square unit is equal to
(A) $\frac{7}{53}$ (B) $\frac{9}{41}$
(C) $\frac{2}{21}$ (D) $\frac{8}{21}$

Q.49 The area bounded by the curve $y = \sin x, x \in [0,2\pi]$ and the x-axis, is equal to
(A) 4 sq. units (B) 0 sq. unit
(C) 2 sq. units (D) 6 sq. units

Q.50 The area of the region bounded by the x-axis, the function $y = -x^2 + 4x - 8$ and the lines $x = -1$ and$x = 4$, is equal to

(A) $31\frac{2}{3}$ sq. units (B) 31 sq. units

(C) $32\frac{2}{3}$ sq. units (D) 32 sq. units

Q.51 The area of the region bounded by the curvey $= x^2$ and $y = x$ is equal to

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

(C) $\left(e - \frac{1}{e}\right)^2$ sq. units (D) $\frac{1}{6}$ sq. units

Q.52 The area of the region bounded by the functionf$(x) = x^3$, the x-axis and the lines $x = -1$ and$x = 1$ is equal to

(A) $\frac{1}{4}$ sq. unit (B) $\frac{1}{2}$ sq. unit

(C) 1sq. unit (D) $\frac{1}{8}$ sq. unit

Q.53 The value of $\int_{-1}^{10}$ f(x)dx, wheref$(x) = \min\{x - [x], -x - [-x]\}$, where [ ] is G.I.F., is

(A) 20 (B) 40

(C) 5 (D) 30

Q.54 The ratio in which the area bounded by the curvey$^2 = 12x$ and $x^2 = 12y$ is divided by the line $x = 3$, is equal to

(A) 15: 16 (B) 15: 49

(C) 1: 2 (D) 15: 29

Q.55 The smaller area bounded by $\frac{x^2}{16} + \frac{y^2}{9} = 1$ and the line $3x + 4y = 12$ is

(A) 3π sq. units (B) $(3\pi - 6)$ sq. units

(C) $(3\pi - 2)$ sq. units (D) $(3\pi - 4)$ sq. units

Q.56 The area bounded by curve $|x| + |y| \geq 1$ and$x^2 + y^2 \leq 1$ for $x \geq 0$ is

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

(C) $\frac{(\pi-2)}{2}$ sq. units (D) $(\pi - 2)$ sq. units

Q.57 Area bounded by the curves $y = x^2 - 1, x + y = 3$ is

(A) $\frac{9}{2}$ sq. units (B) 4 sq. units

(C) $\frac{7\sqrt{17}}{2}$ sq. units (D) $\frac{17\sqrt{17}}{6}$ sq. units

Q.58 The area of the figure bounded by the parabolay $= -x^2 - 4x + 5$, and the line tangent to it at the point $M(2, -7)$ and the y-axis is

(A) $\frac{8}{3}$ sq. units (B) $\frac{15}{7}$ sq. units

(C) $\frac{10}{3}$ sq. units (D) $\frac{13}{3}$ sq. units

Q.59 The area of the region enclosed by the curvesy $= x\log x$ and $y = 2x - 2x^2$ is

(A) $\frac{7}{12}$ sq. units (B) $\frac{1}{2}$ sq. units

(C) $\frac{5}{12}$ sq. units (D) $\frac{1}{4}$ sq. units

Q.60 If area bounded by the curve $x = ay^2$ and $y = ax^2$ is 1 sq. unit, then the positive value of a is equal to

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

(C) $\frac{1}{2}$ (D) 3

Q.61 The slope of the tangent to the curve $y = f(x)$ at a point (x, y) is $2x + 1$ and the curve passes through the point $(1,2)$. The area of the region bounded by the curve, the x-axis and the line $x = 1$ is equal to

(A) $\frac{5}{3}$ sq. units (B) $\frac{5}{6}$ sq. units

(C) $\frac{6}{5}$ sq. units (D) 6 sq. units

Q.62 Area bounded by the curves $y = 2^x, y = 2x - x^2, x = 0$ and $x = 2$ is equal to

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

(C) $3\log 2 + \frac{4}{3}$ sq. units (D) $3\log 2 - \frac{4}{3}$ sq. units

Q.63 The parabola $y^2 = 4x$ and $x^2 = 4y$ divide the square region bounded by the lines $x = 4$ Y = 4 and the coordinate axes. If S_{1} S_{2} S_{3} are respectively the areas of these parts numbered from top to bottom, then $S_1 : S_2 : S_3$ is

(A) 1 : 1 : 1 (B) 2 : 1 : 2

(C) 1 : 2 : 3 (D) 1 : 2 : 1

Q.64 The area of region bounded by the curves $y = a^x (a > 1)$ and $y = b^{-x} (b >$ 1) and the straight line$x = 1$ is

(A) $\frac{1}{\log a}(a - 1) + \frac{1}{\log b}\left(\frac{1}{b} - 1\right)$ sq. units

(B) $\log a(a - 1) + \log b\left(\frac{1}{b} - 1\right)$ sq. units

(C) $\frac{1}{\log a}(a - 1) + \frac{1}{\log b}(b - 1)$ sq. units

(D) $\log a(a - 1) + \log b \cdot (b - 1)$ sq. units

Q.65 The area bounded by curve$f(x) = ||\tan x + \cot x||\tan x - \cot x|$ between lines$x = 0$, $x = \frac{\pi}{2}$ and x-axis, is

(A) log 4 sq. units (B) $\log \sqrt{2}$ sq. units

(C) 2 log4 sq. units (D) $\sqrt{2}\log 2$ sq. units

Q.66 Area bounded by curves $y = [\cos A + \cos B + \cos C], y = \left[5 \sin\frac{A}{2} \cdot \sin\frac{B}{2} \sin\frac{C}{2}\right]$; where $[\ \cdot\ ]$ represents greatest integer function and A, B, C are angles of a triangle, and the curve $y - |x - 4| = 0$ is (in square units)

(A) 5 (B) 3

(C) 2 (D) 1

Q.67 The area (in sq. units) bounded by the parabola$y = x^2 - 1$, the tangent at the point (2,3) to it and the y-axis is

(A) $\frac{32}{3}$ (B) $\frac{8}{3}$

(C) $\frac{56}{3}$ (D) $\frac{14}{3}$

Q.68 The area of the region $A = \{(x, y): 0 \le y \le x|x| + 1 \text{ and } -1 \le x \le 1\}$ in sq. units, is

(A) 2 (B) $\frac{4}{3}$

(C) $\frac{2}{3}$ (D) $\frac{1}{3}$

Q.69 If the area enclosed between the curves $y = kx^2$ and $x = ky^2$, $(k > 0)$, is 1 square unit. Then k is

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

(C) $\frac{\sqrt{3}}{2}$ (D) $\frac{2}{\sqrt{3}}$

Q.70 The area (in sq. units) of the region bounded by the curve $x^2 = 4y$ and the straight line $x = 4y - 2$ is

(A) $\frac{7}{8}$ (B) $\frac{5}{4}$

(C) $\frac{9}{8}$ (D) $\frac{3}{4}$

Q.71 The area (in sq. units) in the first quadrant bounded by the parabola, $y = x^2 + 1$, the tangent to it at the point $(2,5)$ and the coordinate axes is

(A) $\frac{187}{24}$ (B) $\frac{8}{3}$

(C) $\frac{14}{3}$ (D) $\frac{37}{24}$

Q.72 The area (in sq. units) of the region bounded by the parabola, $y = x^2 + 2$ and the lines, $y = x + 1, x = 0$ and $x = 3$, is

(A) $\frac{15}{2}$ (B) $\frac{21}{2}$

(C) $\frac{15}{4}$ (D) $\frac{17}{4}$

Q.73 The area (in sq. units) of the region$A = \{(x, y) \in R \times R \mid 0 \leq x \leq 3, 0 \leq y \leq 4, y \leq x^2 + 3x\}$ is:

(A) $\frac{26}{3}$ (B) $\frac{59}{6}$

(C) 8 (D) $\frac{53}{6}$

Q.74 Let $S(\alpha) = \{(x, y): y^2 \leq x, 0 \leq x \leq \alpha\}$ and $A(\alpha)$ is area of the region $S(\alpha)$. If for aλ, $0 < \lambda < 4$,$A(\lambda): A(4) = 2: 5$, then λ equals

(A) $2\left(\frac{2}{5}\right)^{\frac{1}{3}}$ (B) $2\left(\frac{4}{25}\right)^{\frac{1}{3}}$

(C) $4\left(\frac{2}{5}\right)^{\frac{1}{3}}$ (D) $4\left(\frac{4}{25}\right)^{\frac{1}{3}}$

Q.75 The area (in sq. units) of the region$A = \{(x, y): x^2 \leq y \leq x + 2\}$ is

(A) $\frac{31}{6}$ (B) $\frac{10}{3}$

(C) $\frac{9}{2}$ (D) $\frac{13}{6}$

Q.76 The area (in sq. units) of the region$A = \{(x, y): \frac{y^2}{2} \leq x \leq y + 4\}$ is

(A) 18 (B) 16

(C) $\frac{53}{3}$ (D) 30

Q.77 The region represented by $|x - y| \leq 2$ and$|x + y| \leq 2$ is bounded by a

(A) Square of side length $2\sqrt{2}$ units

(B) Square of area 16sq. units

(C) Rhombus of side length 2 units

(D) Rhombus of area $8\sqrt{2}$ sq. units

Q.78 The area (in sq. units) of the region bounded by the curves $y = 2^x$ and $y = |x + 1|$, in the first quadrant is :

(A) $\frac{3}{2} - \frac{1}{\log_e 2}$ (B) $\frac{1}{2}$

(C) $\log_e 2 + \frac{3}{2}$ (D) $\frac{3}{2}$

Q.79 If the area (in sq. units) of the region $\{(x, y): y^2 \leq 4x, x + y \leq 1, x \geq 0, y \geq 0\}$ is $a\sqrt{2} + b$, then $a - b$ is equal to

(A) $-\frac{2}{3}$ (B) 6

(C) $\frac{10}{3}$ (D) $\frac{8}{3}$

Q.80 If the area (in sq. units) bounded by the parabola $y^2 = 4\lambda x$ and the line $y = \lambda x, \lambda > 0$, is $\frac{1}{9}$, then λ is equal to

(A) 48 (B) 24

(C) $4\sqrt{3}$ (D) $2\sqrt{6}$

Q.81 The area of the region, enclosed by the circle $x^2 + y^2 = 2$ which is not common to the region bounded by the parabola $y^2 = x$ and the straight line $y = x$, is

(A) $\frac{1}{6}(24\pi - 1)$ (B) $\frac{1}{6}(12\pi - 1)$

(C) $\frac{1}{3}(12\pi - 1)$ (D) $\frac{1}{3}(6\pi - 1)$

Q.82 The area (in sq. units) of the region $\{(x, y) \in R^2 \mid 4x^2 \leq y \leq 8x + 12\}$ is

(A) $\frac{128}{3}$ (B) $\frac{125}{3}$

(C) $\frac{127}{3}$ (D) $\frac{124}{3}$

Q.83 For $a > 0$, let the curves $C_1: y^2 = ax$ and $C_2: x^2 = ay$ intersect at origin O and a point P. Let the line $x = b(0 < b < a)$ intersect the chord OP and the x-axis at points Q and R, respectively. If the line $x = b$ bisects the area bounded by the curves, C_1 and C_2, and the area of $\triangle OQR = \frac{1}{2}$, then ' a ' satisfies the equation

(A) $x^6 + 6x^3 - 4 = 0$ (B) $x^6 - 12x^3 - 4 = 0$

(C) $x^6 - 6x^3 + 4 = 0$ (D) $x^6 - 12x^3 + 4 = 0$

Q.84 The area (in sq. units) of the region $\{(x, y) \in R^2: x^2 \leq y \leq 3 - 2x\}$, is

(A) $\frac{31}{3}$ (B) $\frac{29}{3}$

(C) $\frac{34}{3}$ (D) $\frac{32}{3}$

Q.85 Given $f(x) = \begin{cases} x, 0 \leq x < \frac{1}{2} \\ \frac{1}{2}, x = \frac{1}{2} \\ 1 - x, \frac{1}{2} < x \leq 1 \end{cases}$

and $g(x) = \left(x - \frac{1}{2}\right)^2, x \in R$. Then the area (in sq. units) of the region bounded by the curves, $y = f(x)$ and $y = g(x)$ between the lines, $2x = 1$ and $2x = \sqrt{3}$, is

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

(C) $\frac{1}{2} - \frac{\sqrt{3}}{4}$ (D) $\frac{1}{2} + \frac{\sqrt{3}}{4}$

Q.86 Area (in sq. units) of the region outside $\frac{|x|}{2}+\frac{|y|}{3}=1$ and inside the ellipse $\frac{x^2}{4}+\frac{y^2}{9}=1$ is

(A) $3(4-\pi)$ (B) $6(4-\pi)$

(C) $6(\pi-2)$ (D) $3(\pi-2)$

Q.87 Consider a region $R=\{(x,y)\in R^2: x^2\le y\le 2x\}$. if a line $y=\alpha$ divides the area of region R into two equal parts, then which of the following is true?

(A) $3\alpha^2-8\alpha+8=0$ (B) $\alpha^3-6\alpha^{3/2}-16=0$

(C) $3\alpha^2-8\alpha^{3/2}+8=0$ (D) $\alpha^3-6\alpha^2+16=0$

Q.88 The area (in sq. units) of the region$\{(x,y): 0\le y\le x^2+1, 0\le y\le x+1, \frac{1}{2}\le x\le 2\}$ is

(A) $\frac{79}{16}$ (B) $\frac{23}{6}$

(C) $\frac{79}{24}$ (D) $\frac{23}{16}$

Q.89 The area (in sq. units) of the region $A=\{(x,y): (x-1)[x]\le y\le 2\sqrt{x}, 0\le x\le 2\}$, where [t] denotes the greatest integer function, is

(A) $\frac{8}{3}\sqrt{2}-1$ (B) $\frac{4}{3}\sqrt{2}+1$

(C) $\frac{8}{3}\sqrt{2}-\frac{1}{2}$ (D) $\frac{4}{3}\sqrt{2}-\frac{1}{2}$

Q.90 The area (in sq. units) of the region $A=\{(x,y): |x|+|y|\le 1, 2y^2\ge |x|\}$ is

(A) $\frac{1}{6}$ (B) $\frac{7}{6}$

(C) $\frac{5}{6}$ (D) $\frac{1}{3}$

Q.91 The area (in sq. units) of the region enclosed by the curves $y=x^2-1$ and $y=1-x^2$ is equal to

(A) $\frac{7}{2}$ (B) $\frac{4}{3}$

(C) $\frac{8}{3}$ (D) $\frac{16}{3}$

Q.92 The area of the region : $R=\{(x,y): 5x^2\le y\le 2x^2+9\}$ is

(A) $6\sqrt{3}$ sq. units (B) $11\sqrt{3}$ sq. units

(C) $12\sqrt{3}$ sq. units (D) $9\sqrt{3}$ sq. units

Q.93 The area (in sq. units) of the part of the circle$x^2+y^2=36$, which is outside the parabola$y^2=9x$, is

(A) $12\pi+3\sqrt{3}$ (B) $24\pi+3\sqrt{3}$

(C) $12\pi-3\sqrt{3}$ (D) $24\pi-3\sqrt{3}$

Q.94 Let A_1 be the area of the region bounded by the curves $y=\sin x, y=\cos x$ and y-axis in the first quadrant.

Also, let A_2 be the area of the region bounded by the curves $y=\sin x, y=\cos x$, x-axis and $x=\frac{\pi}{2}$ in the first quadrant. Then,

(A) $A_1: A_2=1:\sqrt{2}$ and $A_1+A_2=1$ (B) $A_1: A_2=1:2$ and $A_1+A_2=1$

(C) $2A_1=A_2$ and $A_1+A_2=1+\sqrt{2}$ (D) $A_1=A_2$ and $A_1+A_2=\sqrt{2}$

Q.95 The area bounded by the curve $4y^2=x^2(4-x)(x-2)$ is equal to

(A) $\frac{3\pi}{8}$ (B) $\frac{3\pi}{2}$

(C) $\frac{\pi}{8}$ (D) $\frac{\pi}{16}$

Q.96 The area (in sq. units) of the region, given by the set $\{(x, y) \in R \times R \mid x \geq 0, 2x^2 \leq y \leq 4 - 2x\}$ is

(A) $\frac{8}{3}$ (B) $\frac{7}{3}$

(C) $\frac{17}{3}$ (D) $\frac{13}{3}$

Q.97 The area of the region bounded by $y - x = 2$ and $x^2 = y$ is equal to

(A) $\frac{2}{3}$ (B) $\frac{4}{3}$

(C) $\frac{16}{3}$ (D) $\frac{9}{2}$

Q.98 If the area of the bounded region

$R = \{(x, y): \max\{0, \log_e x\} \leq y \leq 2^x, \frac{1}{2} \leq x \leq 2\}$

is, $\alpha(\log_e 2)^{-1} + \beta(\log_e 2) + \gamma$, then the value of $(\alpha + \beta - 2\gamma)^2$ is equal to

(A) 2 (B) 1

(C) 8 (D) 4

Q.99 The area, enclosed by the curves $y = \sin x + \cos x$ and $y = |\cos x - \sin x|$ and the lines $x = 0, x = \frac{\pi}{2}$, is

(A) $4(\sqrt{2} - 1)$ (B) $2\sqrt{2}(\sqrt{2} + 1)$

(C) $2\sqrt{2}(\sqrt{2} - 1)$ (D) $2(\sqrt{2} + 1)$

Q.100 The area of the region bounded by the parabola $(y - 2)^2 = (x - 1)$, the tangent to it at the point whose ordinate is 3 and the x-axis is

(A) 4 (B) 6

(C) 10 (D) 9

Q.1 Find the area between the curve $f(x) = 3 + 2x - x^2$ and the x-axis.

Q.2 Find the area to the left of $g(y) = 3 - y^2$ and to the right of $x = -1$

For problems 3 – 11, find the area of the region bounded by the provided set of curves.

Q.3 $y = x^2 + 2$, $y = \sin(x)$, $x = -1$ and $x = 2$

Q.4 $y = \frac{8}{x}, y = 2x$ and $x = 4$

Q.5 $x = 3 + y^2$, $x = 2 - y^2$, $y = 1$ and $y = -2$

Q.6 $x = y^2 - y - 6$ and $x = 2y + 4$

Q.7 $y = x\sqrt{x^2+1}, y = e^{-\frac{1}{2}x}, x = -3$ and the y-axis.

Q.8 $y = 4x + 3$, $y = 6 - x - 2x^2$, $x = -4$ and $x = 2$

Q.9 $y = \frac{1}{x+2}, y = (x+2)^2, x = -\frac{3}{2}, x = 1$

Q.10 $x = y^2 + 1$, $x = 5$, $y = -3$ and $y = 3$

Q.11 $x = e^{1+2y}, x = e^{1-y}, y = -2$ and $y = 1$

Q.12 Find area bounded by curve $y = x$, x-axis and $x = 1$ (using integration).

Q.13 Find the area bounded by curve $y^2 = 4x$ and its latus rectum.

Q.14 Find the area bounded by the curve $y = x^3$, the x-axis and the ordinates $x = -2$ and $x = 1$.

Q.15 Find the area bounded by the curve $y = \log_e x$, the x-axis and the straight line $x = e$.

Q.16 Find the area bounded by the circle $x^2 + y^2 = 16$ and the line $y = x$ in the first quadrant.

Q.17 AOB is the positive quadrant of the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

where $OA = a$, $OB = b$. Then find the area between the arc AB and the chord AB of the ellipse.

Q.18 Find area bounded by curve $y = x^2$ and $y = x^3$.

Q.19 Sketch the graph of $y = |x + 3|$ and evaluate $\int_{-6}^{0} |x + 3| dx$.

Q.20 The area bounded by the y-axis; $y = \cos x, y = \sin x$ when $0 \le x \le \frac{\pi}{2}$ is given by

Q.21 Sketch the curves and identify the region bounded by $x = \frac{1}{2}, x = 2, y = \log_e x$ and $y = 2^x$. Find the area of the region.

Q.22 Find the area of the region $\{(x, y): y^2 \le 4x, 4x^2 + 4y^2 \le 9\}$.

ANSWER KEY – LEVEL – I

Q.	1	2	3	4	5	6	7	8	9	10
Ans.	B	A	A	B	B	C	B	A	A	C
Q.	11	12	13	14	15	16	17	18	19	20
Ans.	C	D	B	A	C	B	C	B	C	D
Q.	21	22	23	24	25	26	27	28	29	30
Ans.	B	D	D	C	A	B	B	A	A	C
Q.	31	32	33	34	35	36	37	38	39	40
Ans.	A	B	D	C	B	D	B	C	D	A
Q.	41	42	43	44	45	46	47	48	49	50
Ans.	C	B	A	B	A	A	C	D	A	B
Q.	51	52	53	54	55	56	57	58	59	60
Ans.	D	C	B	A	B	C	C	C	D	D
Q.	61	62	63	64	65	66	67	68	69	70
Ans.	B	C	B	C	B	C	B	A	B	C
Q.	71	72	73	74	75	76	77	78	79	80
Ans.	D	A	B	D	C	A	A	A	B	B
Q.	81	82	83	84	85	86	87	88	89	90
Ans.	B	A	D	D	A	C	C	C	C	C
Q.	91	92	93	94	95	96	97	98	99	100
Ans.	C	C	D	A	B	B	D	A	C	D

ANSWER KEY – LEVEL – II

Q.1 $\frac{32}{3}$

Q.2 $\frac{32}{3}$

Q.3 8. 04355

Q.4 6.4548

Q.5 9

Q.6 $\frac{343}{6}$

Q.7 $-\frac{7}{3}+2\mathbf{e}^{\frac{3}{2}}+\frac{1}{3}10^{\frac{3}{2}}=17.17097$

Q.8 $\frac{343}{12}$

Q.9 7.9695

Q.10 $\frac{46}{3}$

Q.11 22.9983