1. The area of the figure bounded by $y^2 = 9x$ and $y = 3x$ is -
(a) 1 (b) ¼ (c) ½ (d) 2

2. The area of the figure bounded by two branches of the curve $(y - x)^2 = x^3$ and the straight line $x = 1$ is -
(a) 1/3 sq. units (b) 4/5 sq. units
(c) 5/4 sq. units (d) 3 sq. units

3. The area bounded by the curve $y = x^4 - 2x^3 + x^2 + 3$, the axis of abscissas and two ordinates corresponding to the points of minimum of the function y (x) is -
(a) 10/3 (b) 27/10 (c) 21/10 (d) None of these

4. The triangle formed by the tangent to the curve $f(x) = x^2 + bx - b$ at the point (1, 1) and the coordinate axes, lies in the first quadrant. If its area is 2, the value of 'b' -
(a) -3 (b) -2 (c) -1 (d) 0

5. The area of the region bounded by the curve $a^4y^2 = (2a - x)\,x^5$ is to that of the circle whose radius is a, is given by the ratio -
(a) 4 : 5 (b) 5 : 8 (c) 2 : 3 (d) 3 : 2

6. If the line $y = mx$ bisects the area enclosed by the lines $x = 0$, $y = 0$ $x = \frac{3}{2}$ and the curve $y = 1 + 4x - x^2$. Then the value of m is equal to-
(a) $\frac{13}{6}$ (b) $\frac{15}{6}$
(c) $\frac{13}{2}$ (d) $\frac{14}{4}$

7. The area bounded by the curve $y = f(x)$, $y = x$ and the lines $x = 1$, $x = t$ is $(t + \sqrt{1+t^2}) - \sqrt{2} - 1$ sq. units, for all $t > 1$. If $f(x)$ satisfying $f(x) > x$ for all $x > 1$, then $f(x)$ is equal to-
(a) $x + 1 + \frac{x}{\sqrt{1+x^2}}$ (b) $x + \frac{x}{\sqrt{1+x^2}}$
(c) $1 + \frac{x}{\sqrt{1+x^2}}$ (d) $\frac{x}{\sqrt{1+x^2}}$

8. The area bounded by the curve $f(x) = x + \sin x$ and its inverse function between the ordinates $x = 0$ to $x = 2\pi$ is-
(a) 4π sq. units (b) 8π sq. unsits
(c) 4 sq. units (d) 8 sq. units

9. The area of the region bounded by the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2} = 1$ and the ordinates $x = \pm ae$ where $b^2 = a^2(1 - e^2)$ and $e < 1$, is given by -
(a) $2ab\,(e\sqrt{1-e^2} + \sin^{-1} e)$ sq. units
(b) $2ab\,(e\sqrt{1-e^2} - \sin^{-1} e)$ sq. units
(c) $ab\,(e\sqrt{1-e^2} - \sin^{-1} e)$ sq. units
(d) None of these

10. The area bounded by the curve $\sqrt{|x|} + \sqrt{|y|} = \sqrt{a}$ and $x^2 + y^2 = a^2$, $a > 0$ is -
(a) $\left\{\pi a^2 - \frac{2}{3}a^2\right\}$ sq. units (b) $\left\{2\pi a^2 - \frac{a^2}{3}\right\}$ sq. units
(c) $\left\{\pi a^2 - \frac{3a^2}{2}\right\}$ sq. units (d) None of these

11. Area bounded by the curves $y = \sqrt{x}$, $x = 2y + 3$ in the first quadrant and x-axis is -
(a) $2\sqrt{3}$ (b) 18
(c) 9 (d) $\frac{34}{3}$

12. The area bounded by the curves $y = \ln x$, $y = \ln|x|$, $y = |\ln x|$ and $y = |\ln||x||$ is -
(a) 4 sq. units (b) 6 sq. units
(c) 10 sq. units (d) None of these

13. The area of the region bounded by the lines $x = 0$, $x = \frac{\pi}{2}$ and $f(x) = \sin x$, $g(x) = \cos x$ is-
(a) $2(\sqrt{2} + 1)$ (b) $\sqrt{3} - 1$
(c) $2(\sqrt{3} - 1)$ (d) $2(\sqrt{2} - 1)$

14. Compute the area of the figure bounded by the straight lines $x = 0$, $x = 2$ and the curves $y = 2^x$, $y = 2x - x^2$ -
(a) $\frac{3}{\log 2} - \frac{4}{3}$ (b) $\frac{3}{\log 2} + \frac{4}{3}$
(c) $\frac{3}{\log 2} - \frac{2}{3}$ (d) None

15. Find the area bounded by $x = 1/2$, $x = 2$, $y = \log_e x$ and $y = 2^x$ -
(a) $\frac{4-\sqrt{2}}{\log 2} + \frac{5}{2}\log 2 + \frac{3}{2}$
(b) $\frac{4-\sqrt{2}}{\log 2} - \frac{5}{2}\log 2 + \frac{3}{2}$
(c) $\frac{4+\sqrt{2}}{\log 2} - \frac{5}{2}\log 2 + \frac{3}{2}$
(d) None

16. Through any point (x, y) of a curve which passes through the origin, lines are drawn parallel to the coordinate axes. The curve, given that it divides the rectangle formed by the two lines and the axes into two areas, one of which is twice the other, represents a family of-
(a) Circles (b) Parabolas (c) Hyperbolas (d) Straight lines

17. The area enclosed between the curves $y = x^3$ and $y = \sqrt{x}$ is [in square unit] -
(a) 5/3 (b) 5/4
(c) 5/12 (d) 12/5

18. Area of region satisfying $x \le 2$, $y \le |x|$ and $x \ge 0$ is-
(a) 1 sq unit (b) 4 sq unit (c) 2 sq unit (d) None of these

19. If the area above the x-axis, bounded by the curves $y = 2^{kx}$ and $x = 0$ and $x = 2$ is $\frac{3}{\log 2}$, then the value of k is -

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

20. The area bounded by the curve $f(x) = ce^x$ $(c > 0)$, the x-axis and the two ordinates $x = p$ and $x = q$, is proportional to -

(a) f(p) f(q) (b) |f(p) - f(q)|

(c) f(p) + f(q) (d) $\sqrt{f(p)f(q)}$

21. The area bounded by the loop of curve $ay^2 = x^2(a - x)$ is equal to -

(a) $\frac{4}{15}a^2$ sq unit (b) $\frac{8a^2}{15}$ sq unit

(c) $\frac{16a^2}{15}$ sq unit (d) None of these

22. The area bounded by $y = 2 - |2 - x|$ and $y = \frac{3}{|x|}$ is -

(a) $\frac{4+3\log 3}{2}$ sq unit (b) $\frac{4-3\log 3}{2}$ sq unit

(c) $\frac{3}{2}\log 3$ sq unit (d) $\frac{1}{2} + \log 3$ sq unit

23. 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 sq unit (b) $\frac{1}{2}$ sq unit

(c) 1 sq unit (d) None

24. The area of smaller portion bounded by $|y| = -x + 1$ and $y^2 = 4x$ is -

(a) 1 sq unit (b) 2 sq unit (c) 3 sq unit (d) None

25. The area bounded by the curves $y = \ell n\, x$, $y = \ell n\, |x|$, $y = |\ell n\, x|$ and $y = |\ell n|x||$ is -

(a) 4 sq unit (b) 6 sq unit (c) 10 sq unit (d) None

26. Area included between curves $y = x^2 - 3x + 2$ and $y = -x^2 + 3x - 2$ is -

(a) $\frac{1}{6}$ sq unit (b) $\frac{1}{2}$ sq unit

(c) 1 sq unit (d) $\frac{1}{3}$ sq unit

27. The area of the closed figure bounded by $x = -1$, $x = 2$ and $y = \begin{cases} -x^2+2 & , \ x \le 1 \\ 2x-1 & , \ x > 1 \end{cases}$ and the x-axis is -

(a) $\frac{16}{3}$ sq unit (b) $\frac{10}{3}$ sq unit

(c) $\frac{13}{3}$ sq unit (d) $\frac{7}{3}$ sq unit

28. Let $f(x) = \text{Min}(x + 1, \sqrt{1-x})$ for all $x \le 1$. Then area bounded by $y = f(x)$ and the x-axis is -

(a) $\frac{7}{6}$ (b) $\frac{7}{5}$

(c) $\frac{6}{7}$ (d) None of these

29. Let $f(x) = \min\{x + 1, 3 - x\}$. Then area bounded by $y = f(x)$ and x-axis, is

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

30. A curve is given by $y = \begin{cases} \sqrt{(4-x^2)} & ; 0 \le x < 1 \\ \sqrt{(3x)} & ; 1 \le x \le 3 \end{cases}$ The area lying between the curve and the x-axis is equal to

(a) $(2\pi - \sqrt{3} + 36)/6$

(b) $(2\pi - \sqrt{3} + 36)/12$

(c) $(2\pi - \sqrt{3} + 36)/3$

(d) None of these

31. The area bounded by the curves $y = 2x^2$ and $y = |x|/x$ and $x = 0$ is equal to

(a) 2/3 (b) $2\sqrt{2}/6$

(c) $\sqrt{2}/6$ (d) None of these

32. The area of the region bounded by the lines $y = |x - 2|, zx = 1, x = 3$ and the x axis is

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

33. The area of the region bounded by $y = |x - 1|$ and $y = 1$ is -

(a) 1 (b) 2

(c) $\frac{1}{2}$ (d) None of these

34. The line $y = mx$ bisects the area enclosed by the lines $x = 0$, $y = 0$, $x = \frac{3}{2}$ and the curve $y = 1 + 4x - x^2$. The value of m is -

(a) $\frac{13}{6}$ (b) $\frac{13}{8}$

(c) $\frac{8}{13}$ (d) $\frac{6}{13}$

35. The ratio in which the area bounded by the curves $y^2 = 2x$ and $x^2 = 12y$ is divided by the line $x = 3$, is -

(a) 15 : 49 (b) 13 : 48 (c) 12 : 37 (d) None of these

36. If the area bounded by the parabola $x^2 = 4y$, the x-axis and the line $x = 4$ is divided into two equal areas by the line $x = \alpha$, then the value (s) of α is (are) -

(a) $(32)^{1/3}$ (b) 4 (c) $(32)^{1/2}$ (d) 32

37. The area bounded by the parabola $y^2 = x$, the line $y = 4$ and y-axis -

(a) $\frac{16}{3}$ (b) $\frac{32}{3}$

(c) $\frac{64}{3}$ (d) $\frac{128}{3}$

38. The area bounded by the curve $|x| + y = 1$ and axis of x is given by -

(a) 2 (b) 1 (c) 4 (d) None of these

39. The area of the bounded by $y = \cos x$, $y = 0$, $|x| = 1$ is given by -

(a) sin 1 (b) 2 sin 1 (c) 4 sin 1 (d) None of these

40. The area bounded by the parabolas $y = 4x^2$, $y = \frac{x^2}{9}$ and the line $y = 2$ is -

(a) $\frac{20\sqrt{2}}{3}$ (b) $\frac{10\sqrt{2}}{3}$

(c) $\frac{40\sqrt{2}}{3}$ (d) None of these