1. The area bounded by the curve f(x) = x + sin x and its inverse function between the ordinates x = 0 to x = 2π is-

(a) 4π sq. units (b) 8π sq. units

(c) 4 sq. units (d) 8 sq. units

2. If A_n is the area bounded by y = x and $y = x^n$, n∈ N, then $A_2 . A_3$ ..... A_n =

(a) $\frac{1}{n(n+1)}$

(b) $\frac{1}{2^n n(n+1)}$

(c) $\frac{1}{2^{n-1} n(n+1)}$

(d) $\frac{1}{2^{n-2} n(n+1)}$

3. If $f(x) = \frac{1}{2^{n-1}} > \frac{1}{2^n} < x \le \frac{1}{2^{n-1}}$, then the area below the graph of f(x) and above the x-axis between x = 0 and x = 1 is-

(a) 8/3 (b) 4/3 (c) 2/3 (d) 2

4. Area bounded by $y = -x^2 + 6x - 5$, $y = -x^2 + 4x - 3$ and y = 3x - 15, for x > 1, is (in sq. units)

(a) 73 (b) 13/6 (c) 73/6 (d) None of these

5. The area bounded by the curves $y = \log_e x$, $y = \log_e|x|$, $y = |\log_e x|$ and $y = |\log_e |x||$ is

(a) 5 sq. units (b) 2 sq. units

(c) 4 sq. units (d) None

6. The area of the region bounded by the curve $y = \frac{16 - x^2}{4}$ and $y = \sec^{-1} [-\sin^2 x]$ (where [.] denotes the greatest integer function) -

(a) $\frac{1}{3}(4 - \pi)^{3/2}$ (b) $8(4 - \pi)^{3/2}$

(c) $\frac{8}{3}(4 - \pi)^{3/2}$ (d) $\frac{8}{3}(4 - \pi)^{1/2}$

7. Area between $y = |\cos^{-1}(\sin x)| - |\sin^{-1}(\cos x)|$ and x-axis, where $x \in \left[\frac{3\pi}{2}, 2\pi\right]$ is -

(a) $\frac{\pi}{2}$ (b) $\frac{\pi^2}{2}$

(c) $\frac{\pi^2}{4}$ (d) $\frac{\pi}{4}$

8. The positive value of parameter 'a' for which the area of figure bounded by y = sin ax, y = 0, $x = \frac{\pi}{a}$ and $x = \frac{\pi}{3a}$ is 3 unit, is

(a) 1 (b) $\frac{1}{3}$

(c) $\frac{1}{2}$ (d) $\frac{1}{4}$

9. AOB is the positive quadrant of ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$; where OA = a, OB = b. Area between arc AB and chord AB of ellipse is

(a) πab (b) (π- 2) ab

(c) $\frac{(\pi-2)}{2}$ abC (d) $\frac{(\pi-2)}{4}$ ab

10. The smaller area enclosed by y = f(x), when f(x) is polynomial of least degree satisfying $\lim_{x\to 0}\left[1+\frac{f(x)}{x^3}\right]^{1/x} = e$ and the circle $x^2 + y^2 = 2$ above the x axis is

(a) $\frac{\pi}{2}$ (b) $\frac{3}{5}$

(c) $\frac{\pi}{2} - \frac{3}{5}$ (d) $\frac{\pi}{2} + \frac{3}{5}$

11. Area of region bounded by $[x]^2 = [y]^2$ if x ∈ [1, 5]where [.] represents the greatest integer function, is -

(a) 10 sq. units (b) 8 sq. units

(c) 6 sq. units (d) 5 sq. units

12. Area bounded by $y = f^{-1}(x)$, x = 0, $y = \frac{\pi}{6}$ & $y = \frac{5\pi}{6}$, where f(x) = x + sin x, is -

(a) $3\sqrt{3} + \frac{\pi^2}{3}$ (b) $2\sqrt{3} + \frac{\pi^2}{3}$

(c) $\sqrt{3} + \frac{\pi^2}{3}$ (d) $\frac{\pi^2}{3} - \sqrt{3}$

13. Area common to $x^2 + y^2 = 64$ and $y^2 = 4x$ is

(a) $\frac{16}{3}(4\pi + \sqrt{3})$ (b) $\frac{16}{3}(8\pi - \sqrt{3})$

(c) $\frac{16}{3}(4\pi - \sqrt{3})$ (d) $\frac{16}{3}(8\pi + \sqrt{3})$

14. Area bounded by $y = 2x - x^2$ and y = - x is given by

(a) $\frac{9}{2}$ (b) $\frac{43}{6}$

(c) $\frac{35}{6}$ (d) None of these

15. Area of the region bounded by the curve $y = \begin{cases} x^2, x < 0 \\ x, x \ge 0 \end{cases}$ and the line y = 4 is

(a) 10/3 (b) 20/3 (c) 50/3 (d) None of these

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. Ratio of the area cut off a parabola by any double ordinate is that of the corresponding rectangle contained by that double ordinate and its distance from the vertex is -

(a) ½ (b) 1/3 (c) 2/3 (d) 1

18. T`he area bounded by the graph $y = |[x - 3]|$ the x-axis and the lines $x = -2$ and $x = 3$ is ([.] denotes the greatest integer function) -

(a) 7 sq. units (b) 15 sq. units

(c) 21 sq. units (d) 28 sq. units

19. The area bounded by the curve $y = f(x) = x^4 - 2x^3 + x^2 + 3$, x-axis and ordinates corresponding to minimum of the function $f(x)$ is -

(a) 1 (b) 91/30 (c) 30/9 (d) 4

20. The area of the plane figure bounded by the interval $[-5\pi/6, \pi]$ of the x-axis, the graph of the function $y = \cos x$ and the segments of the straight lines $x = -5\pi/6$ and $x = \pi$ is -

(a) 3/2 (b) 5/2 (c) 3/4 (d) 7/2