EXERCISE – III SUBJECTIVE QUESTIONS

1. Find the area bounded on the right by the line $x + y = 2$, on the left by the parabola $y = x^2$ and below by the x-axis.

2. Find the value of c for which the area of the figure bounded by the curves $y = \sin 2x$, the straight lines $x = \pi/6$, $x = c$ and the abscissa axis is equal to 1/2.

3. The tangent to the parabola $y = x^2$ has been drawn so that the abscissa x_0 of the point of tangency belongs to the interval [1, 2].Find x_0 for which the triangle bounded by the tangent, the axis of ordinates and the straight line $y = x_0^2$ has the greatest area.

4. Compute the area of the region bounded by the curves $y = e.x.\ \ell nx$ and $y = \ell nx/(e.x)$ where $\ell ne = 1$.

5. A figure is bounded by the curves

$y = \left|\sqrt{2}\sin\frac{\pi x}{4}\right|$, $y = 0$, $x = 2$ and $x = 4$. At what angles to the positive x-axis straight lines must be drawn through (4, 0) so that these lines partition the figure into three parts of the same size.

6. Find the area of the region bounded by the curves, $y = \log_e x$, $y = \sin^4 \pi x$ and $x = 0$.

7. Find the area bounded by the curves $y = \sqrt{1-x^2}$ and $y = x^3 - x$. Also find the ratio in which the y-axis divided this area.

8. If the area enclosed by the parabolas $y = a - x^2$ and $y = x^2$ is $18\sqrt{2}$ sq. units. Find the value of 'a'.

9. The line $3x + 2y = 13$ divides the area enclosed by the curve, $9x^2 + 4y^2 - 18x - 16y - 11 = 0$ into two parts. Find the ratio of the larger area to the smaller area.

10. Find the area of the region enclosed by the curve $y = x^4 - 2x^2$ and $y = 2x^2$.

11. Find the values of m ($m > 0$) for which the area bounded by the line $y = mx + 2$ and $x = 2y - y^2$ is, (i) 9/2 square units and (ii) minimum. Also find the minimum area.

12. Consider two curves $C_1 : y = \frac{1}{x}$ and $C_2 : y = \ln x$ 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 $D_1 = D_2$. Find the value of 'a'.

13. Find the area enclosed between the curves : $y = \log_e (x + e)$, $x = \log_e (1/y)$ and the x-axis.

14. Find the value (s) of the parameter 'a' ($a > 0$) for each of which the area of the figure bounded by the straight line, $y = \frac{a^2 - ax}{1+a^4}$ and the parabola

$y = \frac{x^2 + 2ax + 3a^2}{1+a^4}$ is the greatest.

15. For what value of 'a' is the area bounded by the curve $y = a^2x^2 + ax + 1$ and the straight line $y = 0$, $x = 0$ and $x = 1$ the least ?

16. Find the positive value of 'a' for which the parabola $y = x^2 + 1$ bisects the area of the rectangle with vertices (0, 0), (a, 0), $(0, a^2 + 1)$ and $(a, a^2 + 1)$.

17. Compute the area of the curvilinear triangle bounded by the y-axis and the curve, $y = \tan x$ and $y = (2/3 \cos x)$.

18. Find the area bounded by the curve $y = x\, e^{-x}$; $xy = 0$ and $x = c$ where c is the x-coordinate of the curve's inflection point.

19. Find the value of 'c' for which the area of the figure bounded by the curve, $y = 8x^2 - x^5$, the straight lines $x = 1$ and $x = c$ and the abscissa axis is equal to 16/3.

20. Compute the area included between the straight lines, $x - 3y + 5 = 0$; $x + 2y + 5 = 0$ and the circle $x^2 + y^2 = 25$.

21. Find the area bounded by the curve $y = x\, e^{-x^2}$, the x-axis and the line $x = c$ where y(c) is maximum.