

4 – Marks

- (1) Find the equation of the circle which passes through the point (4, 1) and (6, 5) and whose centre lies on the line  $4x + y = 16$ .
- (2) Find the **vertex, focus, latus rectum, axis** and **directrix** of the parabola :  $4y^2 + 12x - 20y + 67 = 0$
- (3) A man is running on a racecourse notes that the sum of the distances from the two flag posts from him is always **10m** and the distance between the flag posts **8m**. Find the equation of the path traced out by the man.
- (4) Using section formula, prove that the three points **A(-4, 6, 10), B(2, 4, 6)** and **C(14, 0, -2)** are collinear. Also find the ratio in which **C** divides **AB**.
- (5) Find the coordinates of the point where the line through (3, -4, -5) and (2, -3, 1) crosses the plane  $2x + y + z = 7$ .
- (6) Find the lengths of the medians of the triangle with vertices **A(0, 0, 6), B(0, 4, 0)** and **C(6, 0, 0)**.
- (7) A point **R** with x-coordinate **4** lies on the line segment joining the points **P(2, -3, 4)** and **Q(8, 0, 10)**. Find the coordinates of the point **R**.
- (8) If **A(3, 2, 0), B(5, 3, 2), C(-9, 6, -3)** are the vertices of a triangle Find the length **AD**, if **AD** bisects the angle  $\angle BAC$ .
- (9) Show that the points **A(1, 2, 3), B(-1, -2, -1), C(2, 3, 2)** and **D(4, 7, 6)** are the vertices of a parallelogram **ABCD**, but it is not a rectangle.
- (10) Find the coordinates of the centroid of the triangle whose vertices are  $(x_1, y_1, z_1), (x_2, y_2, z_2)$  and  $(x_3, y_3, z_3)$ .
- (11) Find  $\lim_{x \rightarrow 0} f(x)$ , where the function is  $f(x) = \begin{cases} |x| & ; x \neq 0 \\ 0 & ; x = 0 \end{cases}$
- (12) If  $\lim_{x \rightarrow 1} f(x) = f(1)$ , where the function  $f(x) = \begin{cases} a + bx & ; x < 1 \\ 4 & ; x = 1 \\ b - ax & ; x > 1 \end{cases}$ , Find the value of **a** and **b**.
- (13) Find :  $\lim_{x \rightarrow 3} \left\{ \frac{x^4 - 81}{2x^2 - 5x - 3} \right\}$
- (14) Find :  $\lim_{x \rightarrow 1} \left\{ \frac{x-2}{x^2-x} - \frac{1}{x^3-3x^2+2x} \right\}$
- (15) Find the derivative of the following functions: (i)  $\frac{x^5 - \cos x}{\sin x}$  (ii)  $\frac{x}{\sin^n x}$
- (16) Find the derivative of the following functions: (i)  $\frac{\sin x + \cos x}{\sin x - \cos x}$  (ii)  $\frac{x \cos x}{x - \tan x}$

6 – Marks

- (17) Find the equation of the hyperbola having foci on  $(0, \pm \sqrt{10})$  and which passes through  $(2, 3)$ .
- (18) Find the equation of conic – section such that,  $e = 3/4$ , foci on  $y$  – axis, centre at origin and passing through the point  $(6, 4)$ .
- (19) Find the centre, the lengths of axes, eccentricity, foci of the hyperbola:  $x^2 - 2y^2 + 2x + 8y - 1 = 0$ .
- (20) Find the equation of the ellipse, such that major axis is  $x$  – axis, centre is at origin and the ellipse passes through  $(4, 3)$  and  $(6, 2)$ .
- (21) Find the derivative of the function  $f(x) = x^2 \sin x$ , using first principle.
- (22) Find the derivative of the function  $f(x) = \sqrt[3]{\cot x}$ , using first principle.

\*\*\*\*\*