COURSE   : **MAJOR CORE**
PAPER   : **ANALYTICAL GEOMETRY**
TIME   : **90 MINUTES**   **MAX. MARKS: 50**

SECTION – A
Answer **ALL** questions   **3 × 2 = 6**

1. Prove that the sum of the squares of two conjugate semi diameters of an ellipse is constant.

2. Find the equation of the plane through the point P(-2, 3,-4) at right angles to OP where O is the origin.

3. Write the condition for the general equation of second degree to represent a cone.

SECTION-B
Answer any **THREE** questions   **3×8 = 24**

4. Find the nature of the conic $43x^2 + 48xy + 57y^2 + 10x + 180y + 25 = 0$. Find also the coordinates of the centre, length and position of the axes.

5. Find the equation of the hyperbola conjugate to $4x^2 + 13xy + 3y^2 + x + 3y - 25 = 0$.

6. Find the distance between the two planes $2x - 3y + 6z + 12 = 0, 2x - 3y + 6z - 2 = 0$.

7. Find the symmetrical form of the line $4x + 4y - 5z - 12 = 0 = 8x + 12y - 13z - 32 = 0$.

SECTION-C
Answer any **ONE** question   **1×20 = 20**

8. (a) Prove that the lines $\dfrac{x-3}{2} = \dfrac{y-2}{-5} = \dfrac{z-1}{3}$; $\dfrac{x-1}{-4} = \dfrac{y+2}{1} = \dfrac{z-6}{2}$ are coplanar. Find also their point of intersection and the plane through them.

   (b) Find the equation of the cone whose vertex is (1, 2, 3) and which passes through the circle $x^2 + y^2 + z^2 = 4, \ x - y + z = 7.$ **(10+10)**

9. (a) Find the equation of the plane passing through the line of intersection of the planes $2x + y + 3z - 4 = 0$ and $4x - y + 5z - 7 = 0$ and perpendicular to the plane $x + 3y - 4z + 6 = 0.$

   (b) If $x\cos\alpha + y\sin\alpha = p$ is a chord joining the ends of conjugate semi-diameters of the ellipse, $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$, show that $a^2\cos^2\alpha + b^2\sin^2\alpha = 2p^2.$ **(6+14)**

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