

INSTITUTE FOR IAS/IFoS/CSIR/GATE EXAMINATIONS
MATHEMATICS by K. Venkanna

The required sphere is the sphere through the point circle (or a circle of zero radius) of intersection of the sphere and the plane and also passing through the point $(0, 0, 0)$.

The equation of any sphere through the circle of intersection (point circle) is $(x^2 + y^2 + z^2 - x + 3y + 2z - 3) + \lambda(x + 5y - 6) = 0$ — (3)

If it passes through $(0, 0, 0)$ then,

$$-3 - 6\lambda = 0$$

$$\Rightarrow \lambda = -1/2$$

Substituting this value of λ in (3), the required equation is

$$(x^2 + y^2 + z^2 - x + 3y + 2z - 3) + (-1/2)(x + 5y - 6) = 0$$

$$\Rightarrow 2(x^2 + y^2 + z^2 - x + 3y + 2z - 3) - (x + 5y - 6) = 0$$

$$\Rightarrow \underline{\underline{2(x^2 + y^2 + z^2) - 3x + y + 4z = 0}}$$

(ii)

Let $\frac{x}{l} = \frac{y}{m} = \frac{z}{n}$ be one of the lines in

which the plane $ux + vy + wz = 0$ meets the cone $ax^2 + by^2 + cz^2 = 0$, then we have,