

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

$$\Rightarrow (2-\lambda)[- (7+\lambda)(2-\lambda)-25] + 5[-5(2-\lambda)-20] \\ -4[25-4(7+\lambda)] = 0$$

$$\Rightarrow \lambda^3 + 2\lambda^2 - 90\lambda + 216 = 0$$

$$\Rightarrow (\lambda-3)(\lambda^2 + 6\lambda - 72) = 0$$

$$\Rightarrow (\lambda-3)(\lambda-6)(\lambda+12) = 0$$

$$\Rightarrow \lambda = 3, 6, -12.$$

$$\therefore \text{Let } \lambda_1 = 3, \lambda_2 = 6, \lambda_3 = -12$$

$\therefore$  By rotation of axes the given equation transforms to

$$\lambda_1 x'' + \lambda_2 y'' + \lambda_3 z'' + d = 0$$

substituting the values of  $\lambda_1, \lambda_2, \lambda_3, d$

$$\Rightarrow 3x'' + 6y'' - 12z'' + 0 = 0$$

$$\Rightarrow x'' + 2y'' - 4z'' = 0$$

which is the required standard form and represents a cone.  
 Also the vertex of the cone is

$$\left( \frac{1}{2}, -\frac{1}{3}, \frac{4}{3} \right).$$