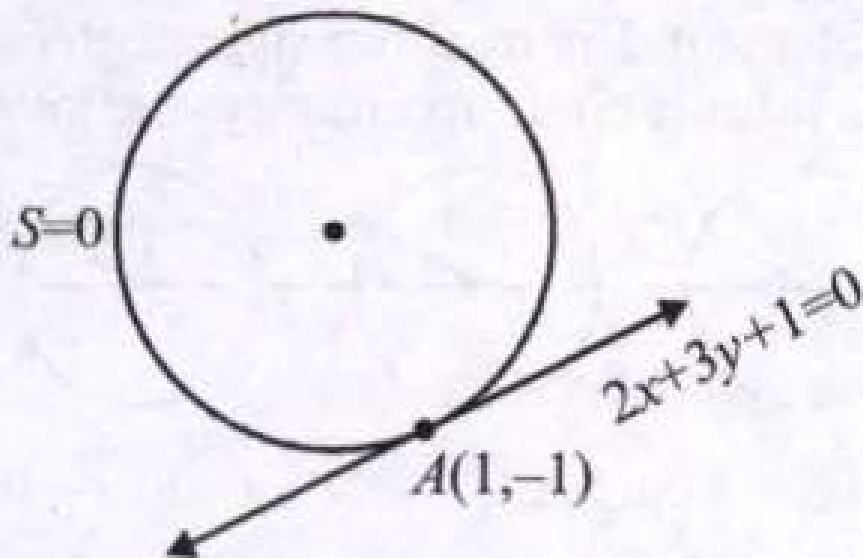


Q2. Find the equation of circle touching the line  $2x + 3y + 1 = 0$  at  $(1, -1)$  and cutting orthogonally the circle having line segment joining  $(0, 3)$  and  $(-2, -1)$  as diameter.

**[2004 - 4 Marks]**

Sol 2.

Given : A line  $2x + 3y + 1 = 0$  touches a circle  $S = 0$  at  $(1, -1)$ .



$\therefore$  Equation of the circle can be

$$(x-1)^2 + (y+1)^2 + \lambda(2x+3y+1) = 0.$$

$$\Rightarrow x^2 + y^2 + 2x(\lambda-1) + y(3\lambda+2) + (\lambda+2) = 0 \dots (i)$$

But given that this circle is orthogonal to the circle, the extremities of whose diameter are  $(0, 3)$  and  $(-2, -1)$  i.e.

$$x(x+2) + (y-3)(y+1) = 0$$

$$\Rightarrow x^2 + y^2 + 2x - 2y - 3 = 0 \dots (ii)$$

On applying the condition of orthogonality for circles (i)

$$\text{and (ii), } 2(\lambda-1) \cdot 1 + 2 \left( \frac{3\lambda+2}{2} \right) \cdot (-1) = \lambda+2 + (-3)$$

$$(\because 2g_1g_2 + 2f_1f_2 = c_1 + c_2)$$

$$\Rightarrow 2\lambda - 2 - 3\lambda - 2 = \lambda - 1$$