

### Question 2nd

the equation of the circle through the intersection of the circles  $x^2 + y^2 - 8x - 2y + 7 = 0$  and  $x^2 + y^2 - 4x + 10y + 8 = 0$  and passing through the point  $(-1, -2)$ .

(a)  $9x^2 + 9y^2 - 40x + 78y + 71 = 0$

(b)  $9x^2 - 9y^2 - 40x + 78y + 78 = 0$

(c)  $4x^2 + 2y^2 - 40x + 78y + 71 = 0$

(d)  $9x^2 + y^2 - 40x - 78y + 78 = 0$

#### Solution:

The equation of family of circles passing through the point of intersection of two circles  $S_1 = 0$  and  $S_2 = 0$  is given by  $S_1 + \lambda S_2 = 0$

so  $S_1 = x^2 + y^2 - 8x - 2y + 7 = 0$

$S_2 = x^2 + y^2 - 4x + 10y + 8 = 0$

$\Rightarrow x^2 + y^2 - 8x - 2y + 7 + \lambda(x^2 + y^2 - 4x + 10y + 8) = 0$

As it pass through  $(-1, -2)$ ,so it gives,

$\Rightarrow 1 + 4 + 8 + 4 + 7 + \lambda(1 + 4 + 4 - 20 + 8) = 0$

$\Rightarrow 24 - 3\lambda = 0$

$\Rightarrow \lambda = 24/3 = 8$

So we get ,  $x^2 + y^2 - 8x - 2y + 7 + 8(x^2 + y^2 - 4x + 10y + 8) = 0$

$\Rightarrow 9x^2 + 9y^2 - 40x + 78y + 71 = 0$

so, the answer is (a).