1. Find the equation of the circle which touches the both axes in first quadrant and whose radius is a.

So, the equation of required circle is:

$$(x-a)^2+(y-a)^2=a^2$$

$$\Rightarrow \quad x^2-2ax+a^2+y^2-2ay+a^2=a^2$$

$$\Rightarrow \quad x^2+y^2-2ax-2ay+a^2=0$$

4. Find the equation of the circle which touches x-axis and whose centre is (1, 2)

Sol: Given that, circle with centre (1,2) touches x-axis.

Radius of the circle is, r = 2

So, the equation of the required circle is:

$(x-1)^2+(y-2)^2=2^2$

$\Rightarrow x^2-2x+1+y^2-4y+4=4$

$\Rightarrow x^2+y^2-2x-4y+1=0$

6. Find the equation of a circle which touches both the axes and the line $3x-4y+8=0$ and lies in the third quadrant. [Hint: Let a be the radius of the circle, then $(-a,-a)$ will be centre and perpendicular distance from the centre to the given line gives the radius of the circle.]

$$\therefore \quad \frac{a+8}{5}=\pm a$$

$$\Rightarrow \quad a+8=5a \text{ or } a+8=-5a$$

$$\Rightarrow \quad a=2 \text{ or } a=-4/3$$

$$\therefore \quad a=2$$

So, the equation of the required circle is:

$$(x+2)^2+(y+2)^2=2^2$$

$$\Rightarrow \quad x^2+y^2+4x+4y+4=0$$

48. Equation of a circle which passes through (3, 6) and touches the axes is

(a) $x^2 + y^2 + 6x + 6y + 3 = 0$ (b) $x^2 + y^2 - 6x - 6y - 9 = 0$

(c) $x^2 + y^2 - 6x - 6y + 9 = 0$ (d) none of these

Sol. **(c)** Given that the circle touches both axes.

Therefore, equation of the circle is: $(x - a)^2 + (y - a)^2 = a^2$

Circle passes through the point (3, 6).

$\therefore \quad (3 - a)^2 + (6 - a)^2 = a^2$

$\Rightarrow \quad a^2 - 18a + 45 = 0 \quad \Rightarrow \quad (a - 3)(a - 15) = 0$

$\therefore \quad a = 3, a = 15$

For $a = 3$, the equation of circle is:

$(x - 3)^2 + (y - 3)^2 = 9$

$\Rightarrow \quad x^2 + y^2 - 6x - 6y + 9 = 0$