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DEPARTMENT: MECHANICAL

MATRIC NO: 191ENG051001

Solution

1. find the equation of the tangent at the point $(1, 0)$ on circle

$$x^2 + y^2 - 5x - y + 4 = 0$$

2. find the equation of the tangent of the point $(4, 0)$ on circle

$$x^2 + y^2 - 12x - 12y + 47 = 0$$

3. find the equation of the tangent at the point $(1, 0)$ on circle

$$x^2 + y^2 - 8x + 14y + 40 = 0$$

Solution

1. $x^2 + y^2 - 5x - y + 4 = 0$.

Comparing the given equation to $x^2 + y^2 + 2gx + 2fy + c = 0$

$$2gx = -5x$$

$$2fy = -y$$

$$2g = -5$$

$$2f = -1$$

$$g = -\frac{5}{2}$$

$$f = -\frac{1}{2}$$

Equation of the tangent at $(1, 0)$

$$xx_1 + yy_1 + g(x+x_1) + f(y+y_1) + c = 0$$

$$x(1) + y(0) + g(x+1) + f(y+0) + c = 0$$

$$1x_1 + 1y_1 - \frac{5}{2}(x+x_1) - \frac{1}{2}(y+y_1) + c = 0$$

$$1x(1) + 1y(0) - \frac{5}{2}(x+1) - \frac{1}{2}(y+0) + c = 0$$

$$1x(1) + 0 - \frac{5x}{2} - \frac{5}{2} - \frac{1}{2}y + c = 0$$

$$\frac{x}{1} - \frac{5x}{2} - \frac{5}{2} - \frac{1}{2}y + c = 0$$

$$\frac{x}{1} - \frac{5x}{2} - \frac{5}{2} - \frac{1}{2}y + \frac{4}{1} = 0$$

$$\frac{2x - 5x - 5 - y + 8}{2} = 0$$

$$-3x - y + 3 = 0$$

$$= 3x + y - 3 = 0$$

$$x^2 + y^2 - 12x - 12y + 47 = 0.$$

Comparing the given equation to $x^2 + y^2 + 2gx + 2fy + c = 0$

$$2gx = -12x$$

$$2fy = -12y$$

$$2g = -12$$

$$2f = -12$$

$$g = \frac{-12}{2} = -6$$

$$f = \frac{-12}{2}$$

$$g = -6$$

$$f = -6$$

Equation of the tangent at $(1, 0)$

$$xx_1 + yy_1 + g(x+x_1) + f(y+y_1) + c = 0.$$

$$x[1] + y[0] + g[x+1] + f[y+0] + c = 0$$

$$1x + 0 + 1y - 6(x+1) - 6(y+0) + 47 = 0$$

$$1x[1] + 1y[0] - 6(x+1) - 6(y+0) + 47 = 0$$

$$x + 0 - 6x - 6 - 6y = 0 + 47 = 0.$$

$$x + 0 - 6x - 6y + 47 = 0.$$

$$x - 6x - 6y + 47 - 6 = 0$$

$$-5x - 6y + 41 = 0.$$

$$= 5x + 6y - 41 = 0$$

$$5x + 6y - 4 = 0$$

3. $x^2 + y^2 - 8x + 14y + 40 = 0$.

comparing the given equation to $x^2 + y^2 + 2gx + 2fy + c = 0$.

$$2g = -8$$

$$g = -4$$

$$2f = 14$$

$$f = 7$$

Equation of the tangent at (1, 0)

$$xx_1 + yy_1 + g(x+x_1) + f(y+y_1) + c = 0$$

$$x[1] + y[0] + g(x+1) + f(y+0) + c = 0$$

$$1x + 0y - 4(x+1) + 7(y+0) + 40 = 0$$

$$x[1] + y[0] - 4(x+1) + 7(y+0) + 40 = 0$$

$$x + 0 - 4x - 4 + 7y + 0 + 40 = 0$$

$$x - 4x - 4 + 7y + 0 + 40 = 0$$

$$x - 4x + 7y + 36 = 0$$

$$-3x + 7y + 36 = 0$$

$$3x - 7y - 36 = 0$$