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MECHANICAL ENGINEERING

19/ENG06/016 SERIAL NO.: 111

MAT 102 ASSIGNMENT (Mrs. Emeka)

1. Find the equation of the tangent at the point (1,0) on the circle $x^2 + y^2 - 5x - y + 4 = 0$

Solution

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

dy/dx; $\quad 2x + 2y\,dy/dx - 5 - dy/dx = 0$

$$2x - 5 = -2y\,dy/dx + dy/dx$$

$$2x - 5 = dy/dx\,(-2y + 1)$$

$$\frac{2x-5}{-2y+1} = \frac{dy}{dx}$$

At $x = 1$, $y = 0$;

$$\frac{dy}{dx} = \frac{2(1) - 5}{-2(0) + 1}$$

$$dy/dx = -3 = m$$

Also,

$$y = mx + c$$

$$0 = -3(1) + c$$

$$c = 3$$

∴ Equation of the tangent; $y = -3x + 3$

2. Find the equation of the tangent at the point (1,0) on the circle $x^2+y^2-12x-12y+47=0$

Solution

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

dy/dx; $\quad 2x+2y\,dy/dx-12-12\,dy/dx=0$

$$2x-12=12\,dy/dx-2y\,dy/dx$$

$$2x-12=dy/dx\,(12-2y)$$

$$\frac{dy}{dx}=\frac{2x-12}{12-2y}$$

At $x=1$, $y=0$,

$$\frac{dy}{dx}=\frac{2(1)-12}{12-2(0)}$$

$$dy/dx=-5/6=m$$

Also,

$$y=mx+c$$

$$0=\frac{-5}{6}(1)+c$$

$$c=5/6$$

∴ Equation of the tangent; $y=\frac{-5}{6}x+\frac{5}{6}$

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

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3. Find the equation of the tangent at the point (1,0) on the tangent at the point (1,0) on the circle $x^2 + y^2 - 8x + 14y + 40 = 0$

Solution

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

$\frac{dy}{dx}$; $2x + 2y\, dy/dx - 8 + 14\, dy/dx = 0$

$$2y\, dy/dx + 14\, dy/dx = 8 - 2x$$

$$dy/dx\,(2y + 14) = 8 - 2x$$

$$dy/dx = \frac{8 - 2x}{2y + 14}$$

At $x = 1$, $y = 0$,

$$\frac{dy}{dx} = \frac{8 - 2(1)}{2(0) + 14}$$

$$dy/dx = 3/7 = m$$

Also,

$$y = mx + c$$

$$0 = 3/7(1) + c$$

$$c = -3/7$$

∴ Equation of the tangent ; $y = 3/7x - 3/7$

$$7y = 3x - 3$$