

The tangent to the circle $x^2 + y^2 = 5$ at the point $(1, -2)$ also touches the circle $x^2 + y^2 - 8x + 6y + 20 = 0$ at

(A) $(-2, 1)$

(B) $(-3, 0)$

(C) $(-1, -1)$

(D*) $(3, -1)$

Correct Option:- (D)

Soln:-

equation of tangent to the circle $x^2 + y^2 = 5$ at (x_1, y_1) will be $xx_1 + yy_1 = 5$

$$x \times 1 + y(-2) = 5$$
$$x - 2y = 5 \text{ or } x = (2y + 5)$$

now this is tangent at circle $x^2 + y^2 - 8x + 6y + 20 = 0$

$$\text{or } (2y + 5)^2 + y^2 - 8(2y + 5) + 6y + 20 = 0$$
$$\text{or } 4y^2 + 20y + 25 + y^2 - 16y - 40 + 6y + 20 = 0$$
$$\text{or } 5y^2 + 10y + 5 = 0$$
$$\text{or } y^2 + 2y + 1 = 0$$
$$(y + 1)^2 = 0$$
$$y = -1$$
$$\therefore x = 2(-1) + 5 = 3$$

\therefore point at which tangent is $(3, -1)$