Q6. The centre of a circle passing through the points $(0, 0)$, $(1, 0)$ and touching the circle $x^2 + y^2 = 9$ is

(a) $\left(\dfrac{3}{2}, \dfrac{1}{2}\right)$ (b) $\left(\dfrac{1}{2}, \dfrac{3}{2}\right)$ (c) $\left(\dfrac{1}{2}, \dfrac{1}{2}\right)$ (d) $\left(\dfrac{1}{2}, -2^{\frac{1}{2}}\right)$
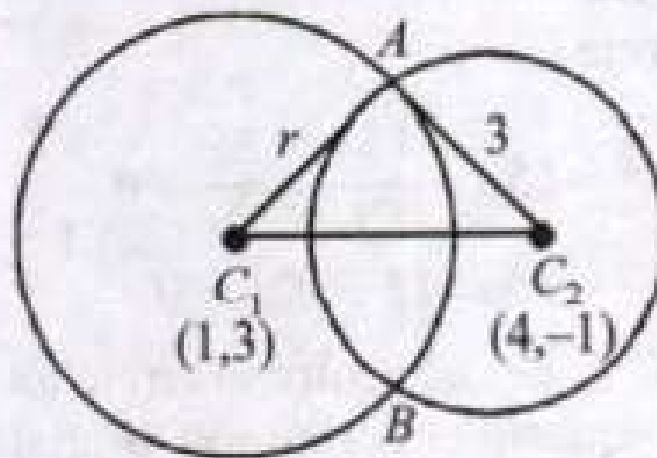
6. **(a)** Given : Two circles $(x-1)^2 + (y-3)^2 = r^2$

Centre $(1, 3)$, radius $= r$

and $x^2 + y^2 - 8x + 2y + 8 = 0$

Centre $(4, -1)$, radius $= \sqrt{16+1-8} = 3$

As the two circles intersect each other in two distinct points we should have

$$C_1 C_2 < r_1 + r_2 \qquad \text{and } C_1 C_2 > |r_1 - r_2|$$
$$\Rightarrow C_1 C_2 < r + 3 \qquad \text{and } C_1 C_2 > |r_1 - r_2|$$
$$\Rightarrow \sqrt{9+16} < r + 3 \qquad \text{and } 5 > |r - 3|$$
$$\Rightarrow 5 < r + 3 \qquad \text{and} \qquad |r - 3| < 5$$
$$\Rightarrow r > 2 \qquad \text{and} \qquad -5 < r - 3 < 5$$