

# Question-7-7.2-8

EE24BTECH11033 - KOLLURU SURAJ

## Question:

The centre of circle is  $\left( \frac{2a}{a-7} \right)$ . Find the values of  $a$  if the circle passes through the point  $\mathbf{A} \begin{pmatrix} 11 \\ -9 \end{pmatrix}$  and has diameter  $10\sqrt{2}$  units

## Solution:

Description	Given value
Centre	$\left( \frac{2a}{a-7} \right)$
Diameter	$10\sqrt{2}$
point <b>A</b>	$\begin{pmatrix} 11 \\ -9 \end{pmatrix}$

TABLE 0: variables used

The radius of circle is  $\frac{\text{diameter}}{2}$

$$\implies \text{radius} = 5\sqrt{2} \quad (0.1)$$

The equation of a circle is given by

$$\|\mathbf{x}\|^2 + 2\mathbf{u}^\top \mathbf{x} + f = 0 \quad (0.2)$$

for

$$\mathbf{u} = -\mathbf{c}, f = \|\mathbf{c}\|^2 - r^2 \quad (0.3)$$

Now,

$$\mathbf{u} = -\left( \frac{2a}{a-7} \right), f = 5a^2 - 14a - 1 \quad (0.4)$$

On substituting  $x = \begin{pmatrix} 11 \\ -9 \end{pmatrix}$

$$202 - 26a - 126 + 5a^2 - 14a - 1 = 0 \quad (0.5)$$

$$5a^2 - 40a + 75 = 0 \quad (0.6)$$

$$a^2 - 8a + 15 = 0 \quad (0.7)$$

$$a = 3, a = 5 \quad (0.8)$$

