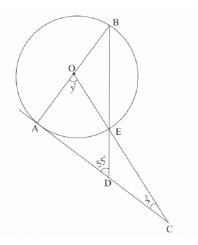
## 1

## AI1103 Assignment-1

## AI21BTECH11026 SAANVI AMRUTHA

## 1 QUESTION-7A

1.1. In the given figure AC is a tangent to the circle with centre O. If  $\angle ADB = 55^{\circ}$ , find x and y. Give reasons for your answers.



Solution: Given,

$$\angle BDA = 55^{\circ}, \angle OCA = x^{\circ}, \angle AOC = y^{\circ}$$

As AC is a tangent to the given circle,  $\angle OAC = \angle BAD = 90^{\circ}$ 

Angle Sum Property for  $\triangle OAC$ ,  $\angle OAC + \angle OCA + \angle AOC = 180^{\circ}$   $90^{\circ} + x^{\circ} + y^{\circ} = 180^{\circ}$   $x^{\circ} + y^{\circ} = 90^{\circ}$ 

Angle Sum Property for  $\triangle ABD$ ,  $\angle ABD + \angle BAD + \angle BDA = 180^{\circ}$   $\angle ABD + 90^{\circ} + 55^{\circ} = 180^{\circ}$   $\angle ABD = 35^{\circ}$ 

$$\angle BOE + y^{\circ} = 180^{\circ}$$
  
 $\angle BOE = 180 - y$ 

Let the radius of the circle be r. then,

$$\overrightarrow{OB} = OE = r$$

Then the length of the chord BE becomes  $2rcos35^{\circ}$ .

Applying 'cosine' rule in  $\Delta BOE$ ,

$$(BE)^{2} = (OB)^{2} + (OE)^{2} - 2.(OB).(OE).cos(\angle BOE)$$

$$(2rcos35^{\circ})^{2} = r^{2} + r^{2} - 2.r.r.cos(180 - y)$$

$$4r^{2}cos^{2}35^{\circ} = 2r^{2} - 2r^{2}cos(180 - y)$$

$$2cos^{2}35^{\circ} = 1 - cos(180 - y)$$

$$cos(180 - y) = -cos70^{\circ} (\because 1 - cos^{2}\theta = cos2\theta)$$

$$cos(180 - y) = cos(180 - 70)$$

$$\therefore y = 70^{\circ}$$

$$\therefore x = 20^{\circ} (\because x = 90 - y)$$