AI1103 Assignment-1

AI21BTECH11026
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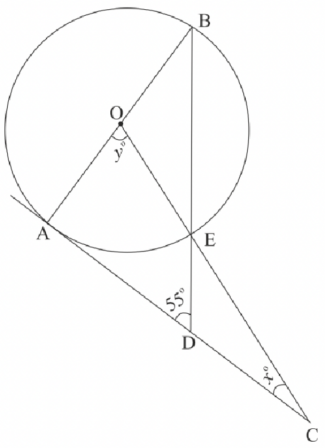
CONTENTS

0.1. Question 7a.
In the given figure AC is a tangent to the circle with centre O. If ∠ADB=55°, find x and y. Give reasons for your answers.



Solution: Given,
∠BDA=55°, ∠OCA=x°, ∠AOC=y°

As AC is a tangent to the given circle,
∠OAC=∠BAD=90°

Angle Sum Property for ΔOAC,
∠OAC+∠OCA+∠AOC=180°
90°+x°+y°=180°
x°+y°=90°

Angle Sum Property for ΔABD,
∠ABD+∠BAD+∠BDA=180°
∠ABD+90°+55°=180°
∠ABD=35°

∠BOE+y°=180°
∠BOE=180-y

Let the radius of the circle be 'r'.
then,
OB=OE=r
Then the length of the chord BE becomes 2rcos 35°.
Applying 'cosine' rule in ΔBOE,

$(BE)^2=(OB)^2+(OE)^2-2.(OB).(OE).\cos(\angle BOE)$
$(2r\cos 35°)^2 = r^2+r^2 - 2.r.r.\cos(180-y)$
$4r^2\cos^2 35° = 2r^2 - 2r^2\cos(180-y)$
$2\cos^2 35° = 1 - \cos(180-y)$
$\cos(180-y) = -\cos 70°$ ($\because 1-\cos^2\theta = \cos 2\theta$)
$\cos(180-y) = \cos(180-70)$
$\therefore y = 70°$
$\therefore x = 20°$ ($\because x=90-y$)