FACULTY OF ENGINEERING & TECHNOLOGY

and length of path of contact

$$31 = \sqrt{(R_A)^2 - R^2 \cos^2 \phi} + \sqrt{(r_A)^2 - r^2 \cos^2 \phi} - (R + r) \sin \phi$$

$$= 2\left[\sqrt{(R_A)^2 - R^2 \cos^2 \phi} - R \sin \phi\right] \quad ...(\because R = r, \text{ and } R_A = r_A)$$

$$\frac{31}{2} = \sqrt{(R_A)^2 - (120)^2 \cos^2 20°} - 120 \sin 20°$$

$$15.5 = \sqrt{(R_A)^2 - 12\,715} - 41$$

$$(15.5 + 41)^2 = (R_A)^2 - 12\,715$$

$$3192 + 12\,715 = (R_A)^2 \qquad \text{or} \qquad R_A = 126.12 \text{ mm}$$

We know that the addendum of the wheel,

$$= R_A - R = 126.12 - 120 = 6.12 \text{ mm } \textbf{Ans.}$$

Q-2 A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20° pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and the contact ratio.

Length of path of contact

We know that pitch circle radius of pinion,

$$r = m.t/2 = 12 \times 30/2 = 180 \text{ mm}$$

and pitch circle radius of gear,

$$R = m.T/2 = 12 \times 80/2 = 480 \text{ mm}$$

∴ Radius of addendum circle of pinion,

$$r_A = r + \text{ Addendum} = 180 + 10 = 190 \text{ mm}$$

and radius of addendum circle of gear,

$$R_A = R + \text{ Addendum} = 480 + 10 = 490 \text{ mm}$$

We know that length of the path of approach,

$$KP = \sqrt{(R_A)^2 - R^2 \cos^2 \phi} - R \sin \phi$$

$$= \sqrt{(490)^2 - (480)^2 \cos^2 20°} - 480 \sin 20°$$

and length of the path of recess,

$$PL = \sqrt{(r_A)^2 - r^2 \cos^2 \phi} - r \sin \phi$$

$$= \sqrt{(190)^2 - (180)^2 \cos^2 20°} - 180 \sin 20° =$$

We know that length of path of contact,

$$KL = KP + PL = 27.3 + 25 = 52.3 \text{ mm} \textbf{ Ans.}$$

and length of path of contact

$$31 = \sqrt{(R_A)^2 - R^2 \cos^2 \phi} + \sqrt{(r_A)^2 - r^2 \cos^2 \phi} - (R + r) \sin \phi$$

$$= 2\left[\sqrt{(R_A)^2 - R^2 \cos^2 \phi} - R \sin \phi\right] \quad ...(\because R = r, \text{ and } R_A = r_A)$$

$$\frac{31}{2} = \sqrt{(R_A)^2 - (120)^2 \cos^2 20°} - 120 \sin 20°$$

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$$(15.5 + 41)^2 = (R_A)^2 - 12\,715$$

$$3192 + 12\,715 = (R_A)^2 \qquad \text{or} \qquad R_A = 126.12 \text{ mm}$$

We know that the addendum of the wheel,

$$= R_A - R = 126.12 - 120 = 6.12 \text{ mm} \textbf{ Ans.}$$

Interference in Involute Gears

Fig. shows a pinion with centre O1, in mesh with wheel or gear with centre O2 MN is the common tangent to the base

circles and KL is the path of contact between the two mating teeth.