2.3.7 To Draw Common Line Tangents to Given Two Circles

(a) Open Belt Tangent

- Draw circles with O_1 and O_2 as their centers, R_1 and R_2 as their radii respectively. The relative positions of O_1 and O_2 are also given. *(Figure 2.36(a))*
- Draw a circle with O_2 as center and $R_2 - R_1$ as radius. *(Figure 2.36(b))*
- Join O_1 and O_2 and draw it perpendicular to locate its midpoint A. *(Figure 2.36(c))*
- With A as center and O_1A (= O_2A) as radius draw a circle which intersects the circle with radius $R_2 - R_1$ at point B. *(Figure 2.36(d))*
- Join O_2 and B and extend it to get point of tangency T_2 on the circle with radius R_2. *(Figure 2.36(e))*

- Draw a straight line passing through O_1 and parallel to O_2T_2 intersecting the circle with radius R_1 at point T_1, which is the other required point of tangency. *(Figure 2.36(f))*
- Joint T_1 and T_2 to get the required tangent *(Figure 2.36(g))*
- Repeat the same procedure to get the tangent on the bottom side. *(Figure 2.36(h))*

Figure 2.36(a)

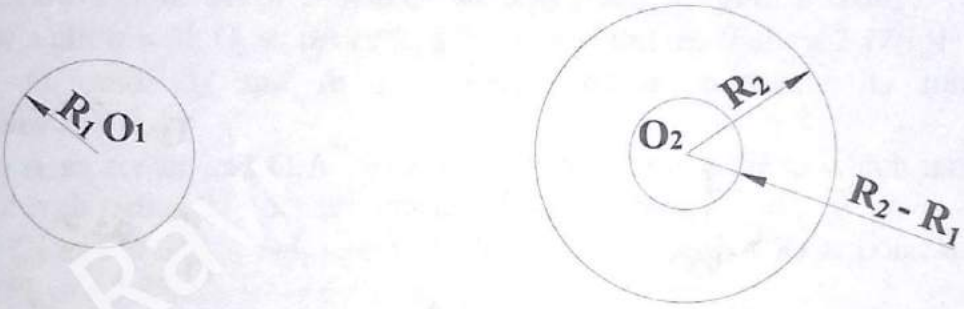

Figure 2.36(b)

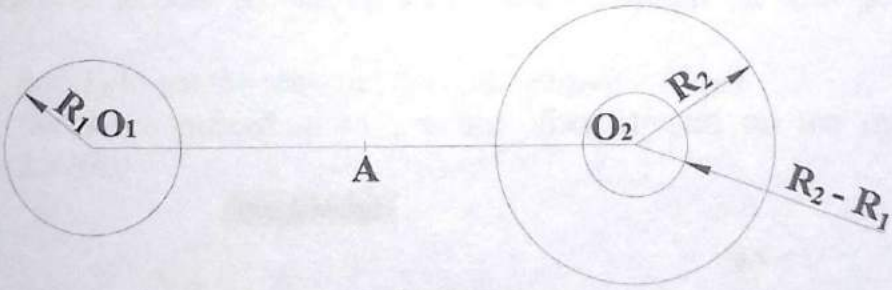

Figure 2.36(c)

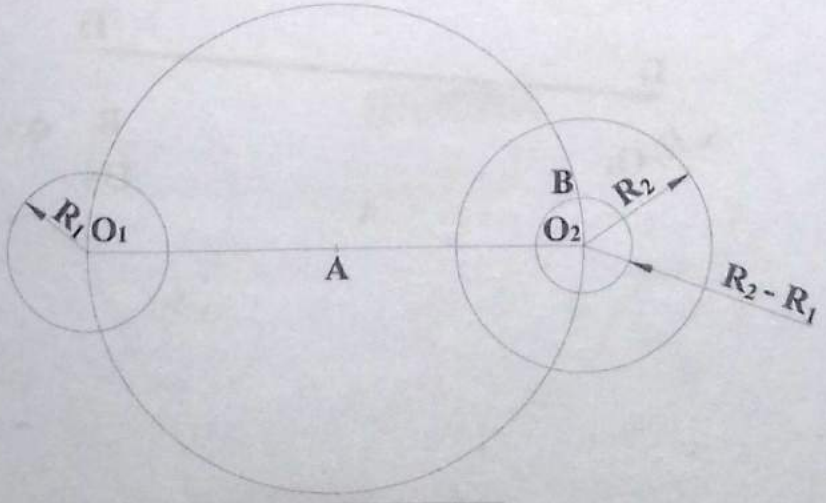

Figure 2.36(d)

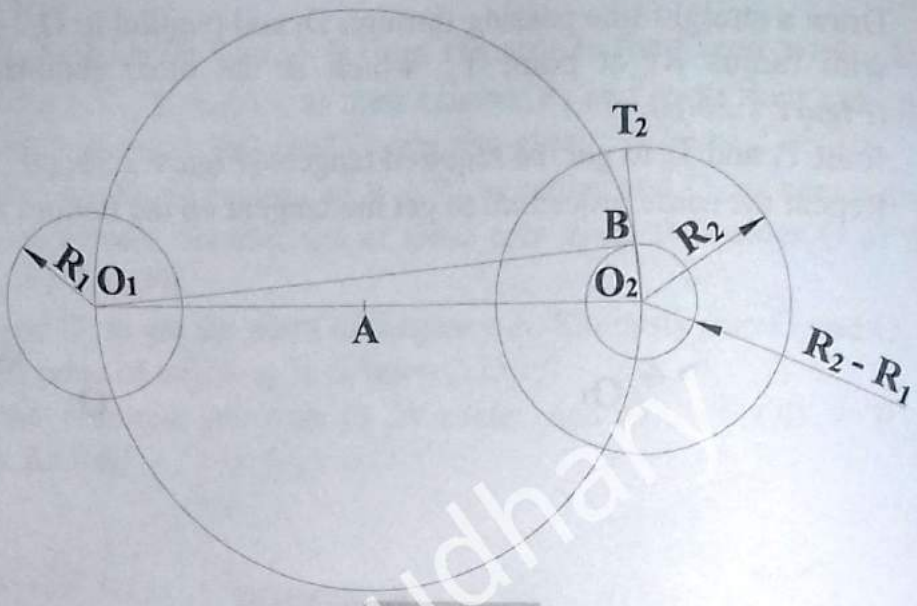

Figure 2.36(e)

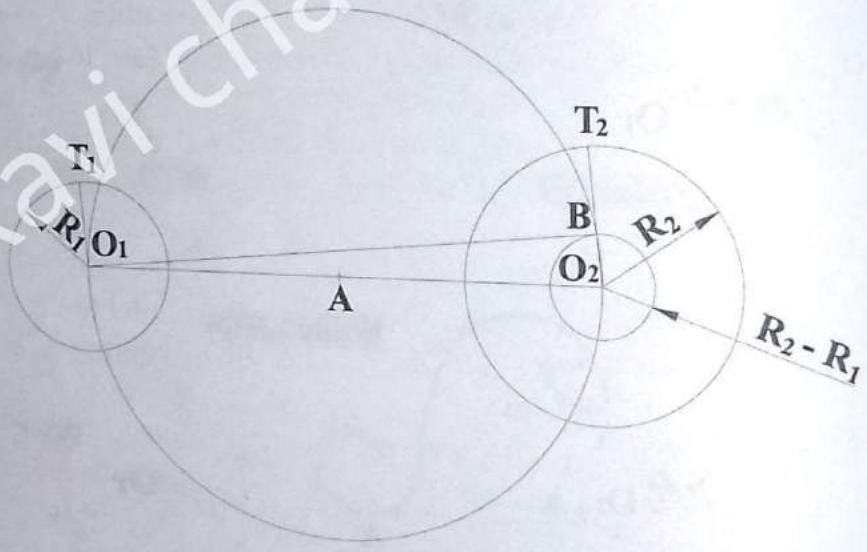

Figure 2.36(f)

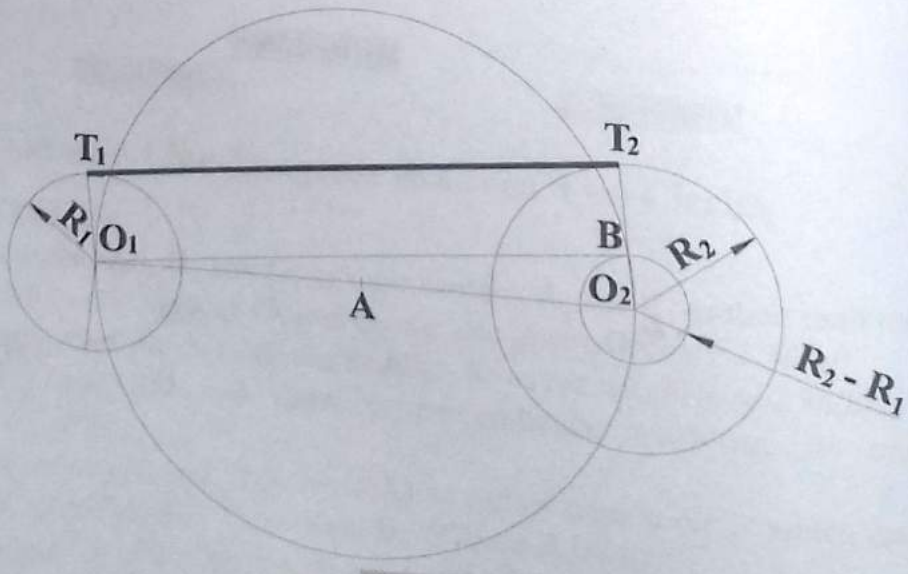

Figure 2.36(g)

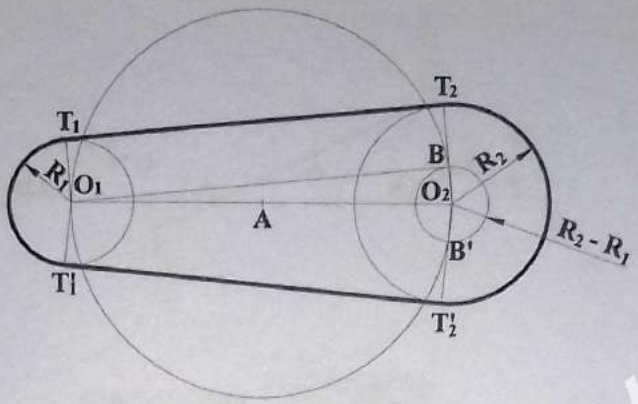

Figure 2.36(h)

(b) Cross Belt Tangent

- Draw circles with O_1 and O_2 as their centers, R_1 and R_2 as their radii respectively. The relative positions of O_1 and O_2 are also given. *(Figure 2.37(a))*
- Draw a circle with O_2 as center and $R_1 + R_2$ as radius. *(Figure 2.37(b))*
- Join O_1 and O_2 and draw it perpendicular to locate its midpoint A. *(Figure 2.37(c))*
- With A as center and O_1A (= O_2A) as radius draw a circle which intersects the circle with radius $R_1 + R_2$ at point B. *(Figure 2.36(d))*
- Join O_2 and B and which intersect the circle with radius R_2 at point of tangency T_2. *(Figure 2.37(e))*
- Draw a straight line passing through O_1 and parallel to O_2T_2 intersecting the circle with radius R_1 at point T_1, which is the other required point of tangency. *(Figure 2.37(f))*
- Joint T_1 and T_2 to get the required tangent. *(Figure 2.37(g))*
- Repeat the same procedure to get the other tangent on the opposite side. *(Figure 2.37(h))*

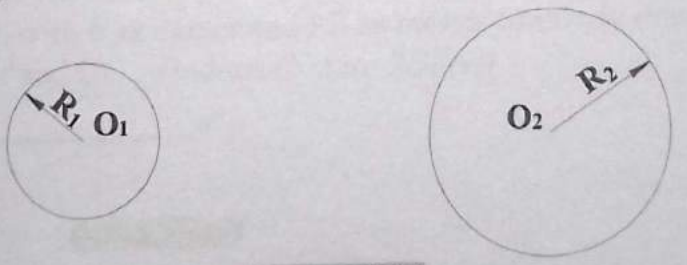

Figure 2.37(a)

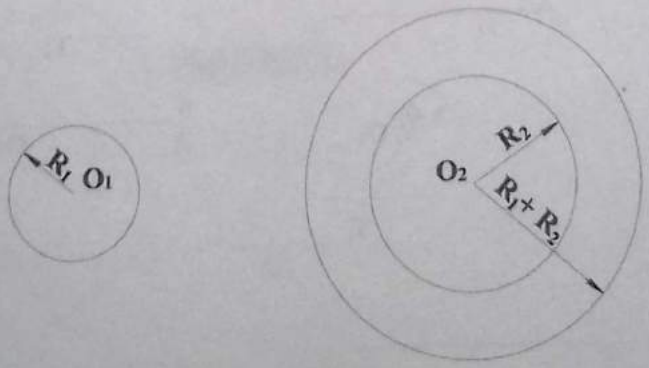

Figure 2.37(b)

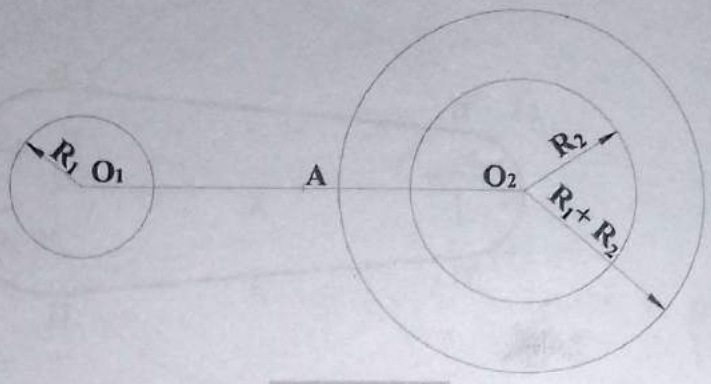

Figure 2.37(c)

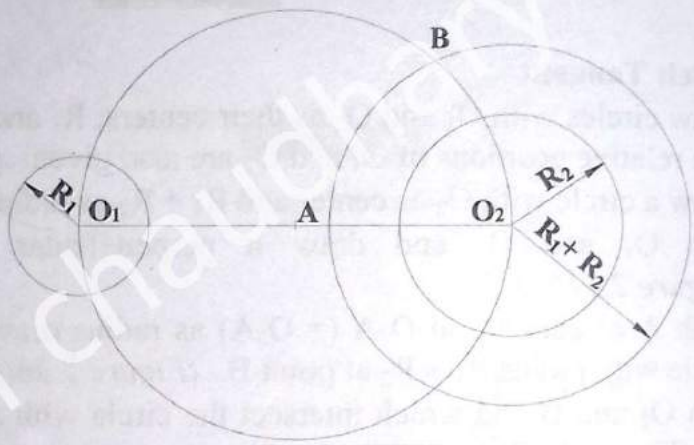

Figure 2.37(d)

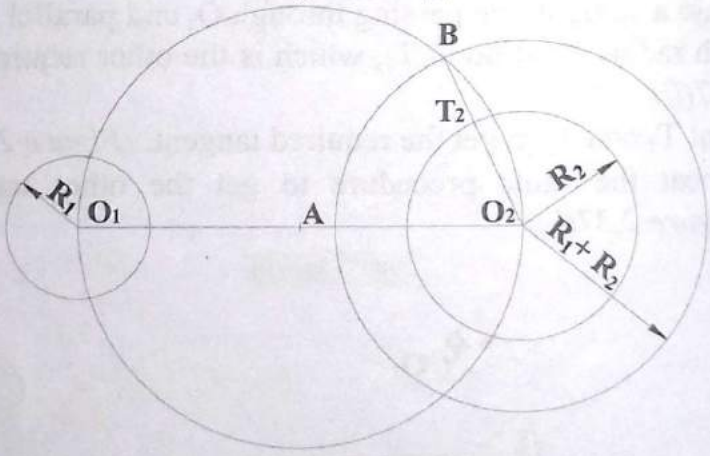

Figure 2.37(e)

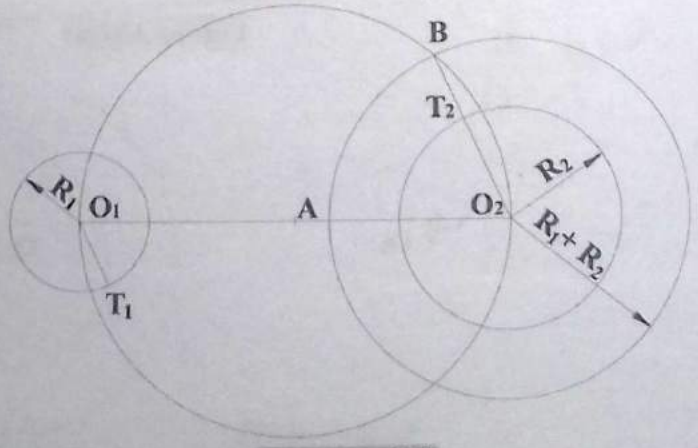

Figure 2.37(f)

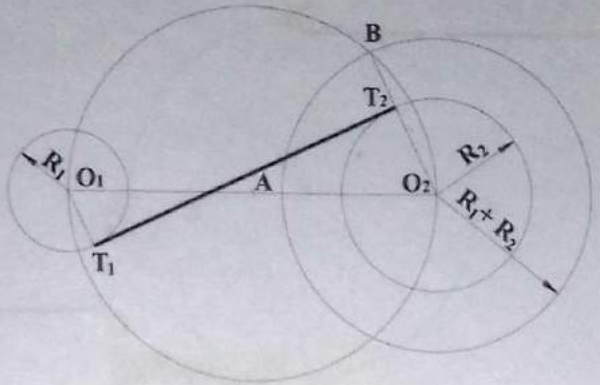

Figure 2.37(g)

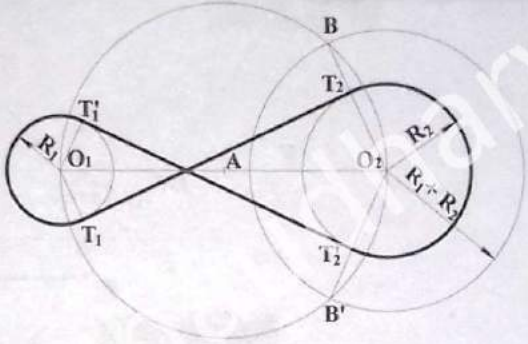

Figure 2.37(h)