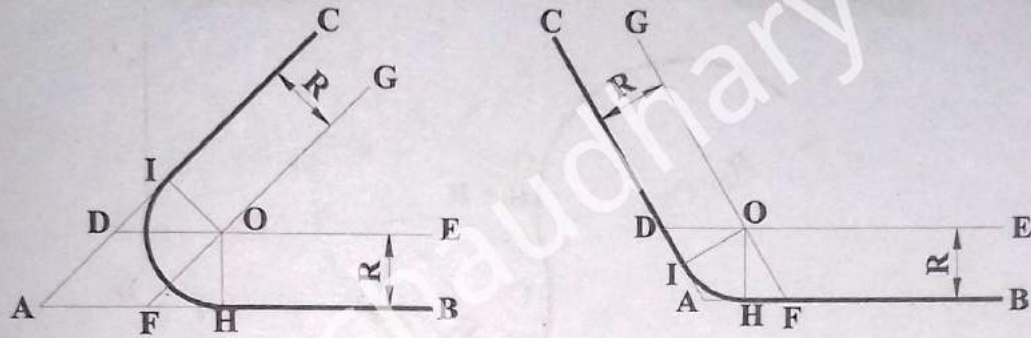Figure 2.29(c)

Figure 2.29(d)

2.3.5 To Draw an Arc of Radius R and Tangent to a Given Straight Line and a Given Circle (or a Circular Arc)

(a) Outside to the Given Circle

- Draw given straight line AB. Mark a point O_1 at a given distance from the given line and draw a given circle with O_1 as center and R_1 as radius. *(Figure 2.30(a))*
- Draw a straight line CD parallel to the line AB and at a distance of R from it. *(Figure 2.30(b))*
- With O_1 as center and $R + R_1$ as radius draw an arc intersecting the line CD at point O, which is the center of the required arc. *(Figure 2.30(c))*
- Join O and O_1 to get point of tangency E on the given circle and drop perpendicular from O to line AB to get the point of tangency F on the given line. *(Figure 2.30(d))*
- With O as center and OE (= OF = R) as radius, draw the required arc. *(Figure 2.30(e))*
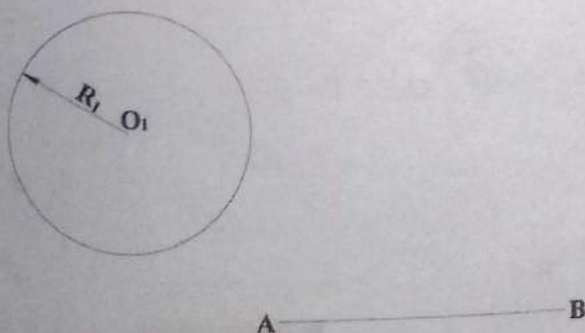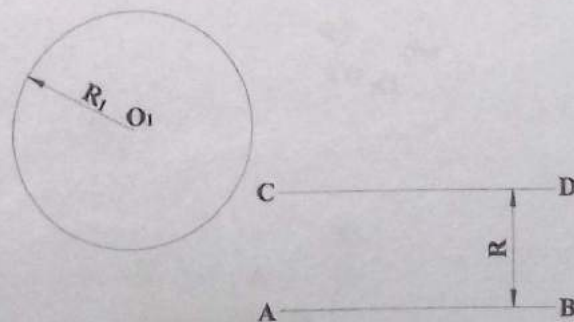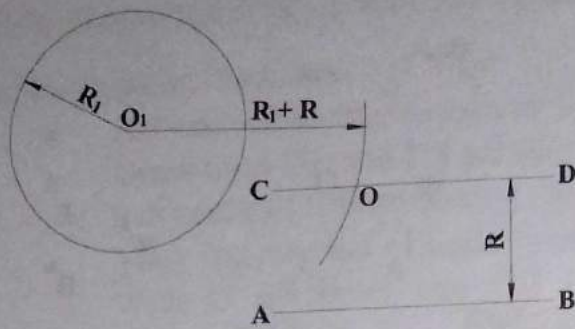

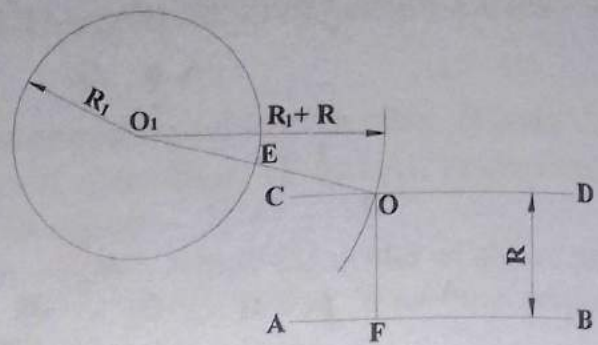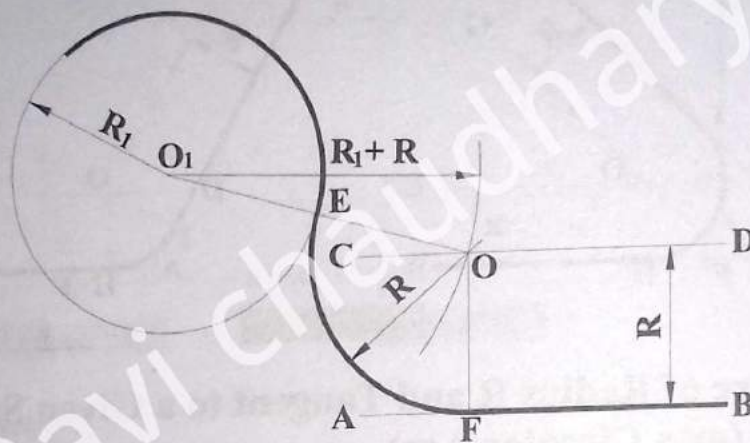Figure 2.30(a)

Figure 2.30(b)

Figure 2.30(c)

Figure 2.30(d)

Figure 2.30(e)

(b) Including the Given Circle

- Draw given straight line AB. Mark a point O_1 at a given distance from the given line and draw a given circle with O_1 as center and R_1 as radius. *(Figure 2.31(a))*
- Draw a straight line CD parallel to the line AB and at a distance of R from it. *(Figure 2.31(b))*
- With O_1 as center and $R - R_1$ as radius draw an arc intersecting the line CD at point O, which is the center of the required arc. *(Figure 2.31(c))*
- Join O and O_1 and extend to get point of tangency E on the given circle and drop perpendicular from O to line AB to get the point of tangency F on the given line. *(Figure 2.31(d))*
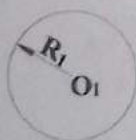- With O as center and OE (= OF = R) as radius, draw the required arc. *(Figure 2.31(e))*
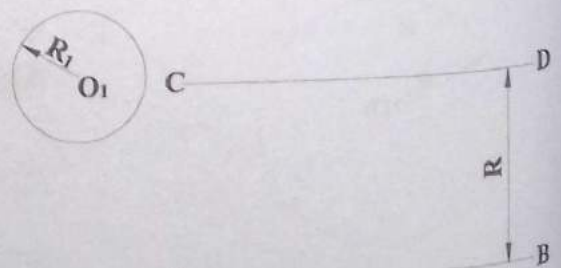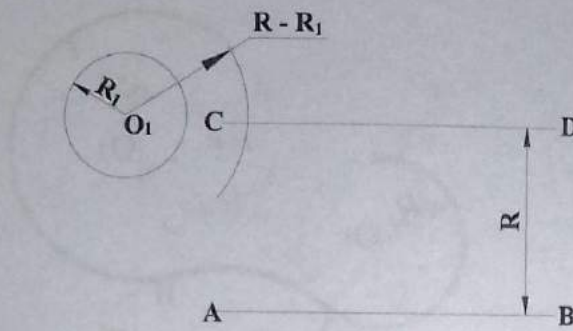

Figure 2.31(a)
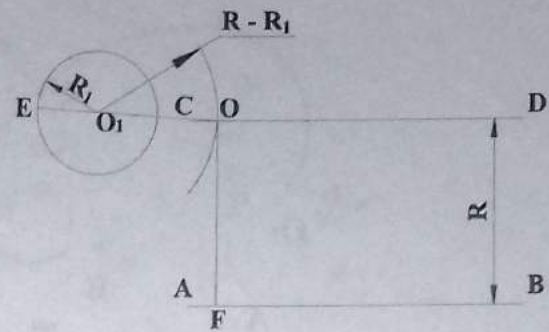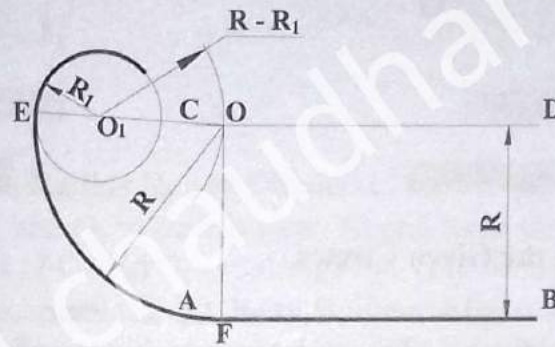

Figure 2.31(b)

Figure 2.31(c)

Figure 2.31(d)

Figure 2.31(e)

2.3.6 To Draw an Arc of Radius R and Tangent to Given Two Circles (or Circular Arcs)

(a) Outside to the Given Circles

- 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 2.32(a))*
- Draw arcs with O_1 as center and $R + R_1$ as radius and O_2 as center and $R + R_2$ as radius respectively. Intersection of these arcs gives the center O of the required arc. *(Figure 2.32(b))*
- Join O and O_1 and O and O_2 to get the point of tangencies A and B respectively. *(Figure 2.32(c))*
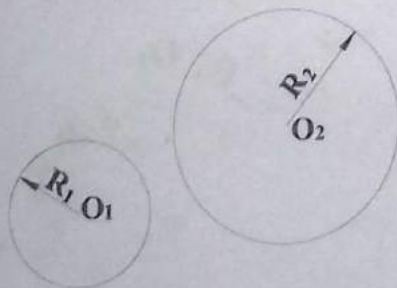- Draw the required arc with O as center and OA $(= OB = R)$ as radius. *(Figure 2.32(d))*
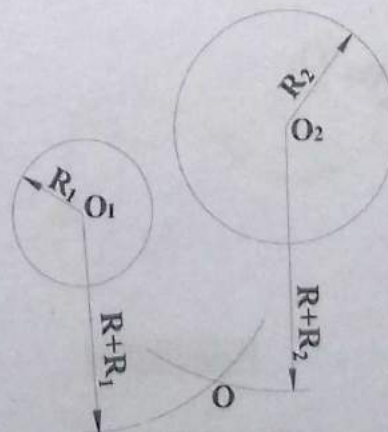

Figure 2.32(a)

Figure 2.32(b)