

2.5 Construction of Standard Curves

2.5.1 Construction of Involute

The curve traced by a fixed point on a stretched cord when it is unwound from a circle or a polygon is called an involute. Involute of a circle is used as the profile of gear teeth. Cams are often designed to the involute shape to ensure the rolling contact between the roller and the follower at constant speed.

(a) Involute of a Square

- Draw the given square ABCD. (Figure 2.54(a))
- Extend sides of the square as shown. (Figure 2.54(b))
- With A as center and AB as radius draw an arc intersecting the extended DA at point A'. With D as center and DA' as radius, draw an arc which intersects the extended CD at point D'. With C as center and CD' as radius, draw an arc which intersects the extended BC at point C'. With B as center and BC' as radius, draw an arc which intersects the extended AB at point B'. (Figure 2.54(c))

When one turn of the cord is taken out from the square, the length of the cord (BB') will be equal to perimeter of the square.

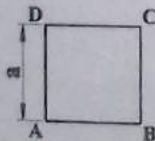


Figure 2.54(a)

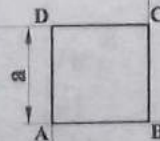


Figure 2.54(b)



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Figure 2.55(a)

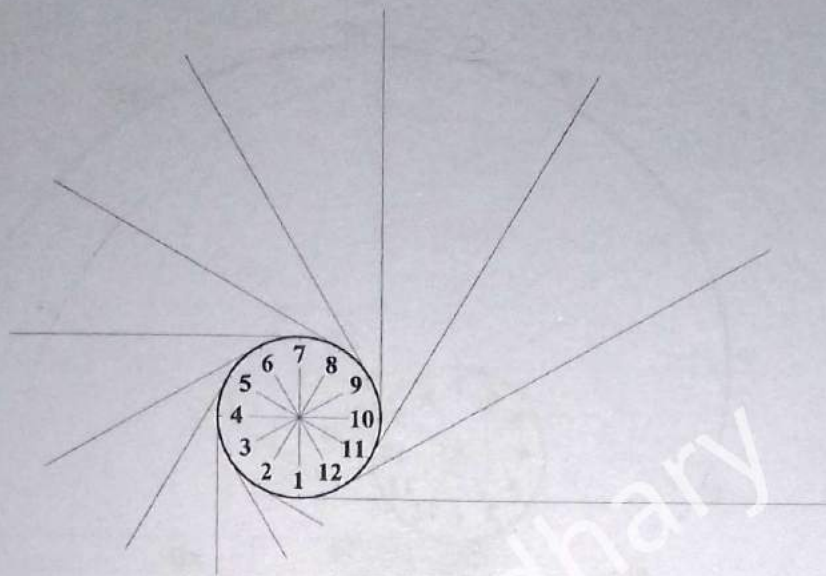


Figure 2.55(l)

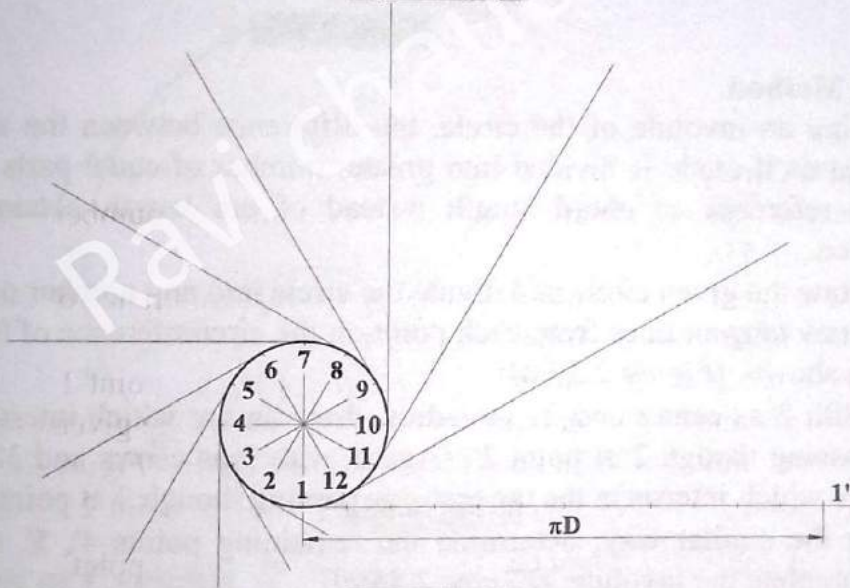


Figure 2.55(c)

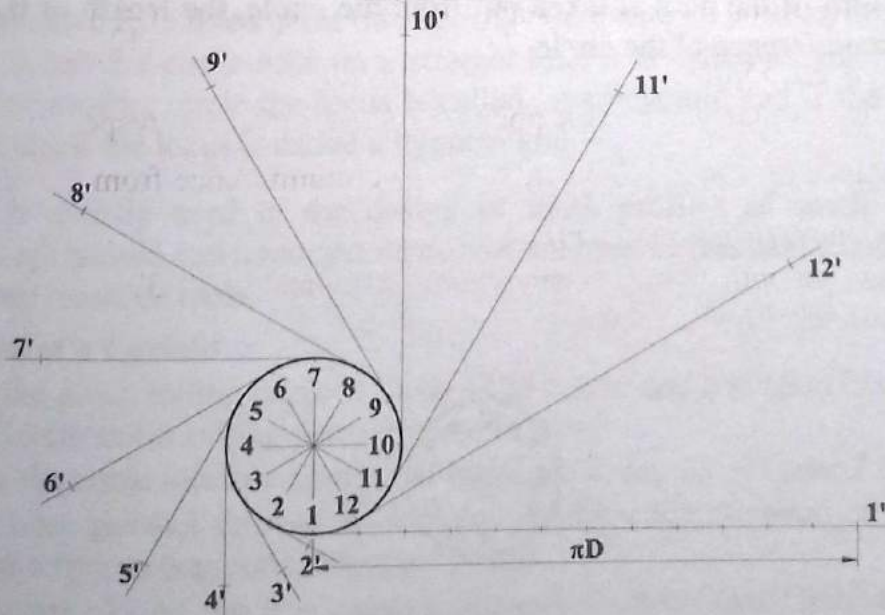


Figure 2.55(d)

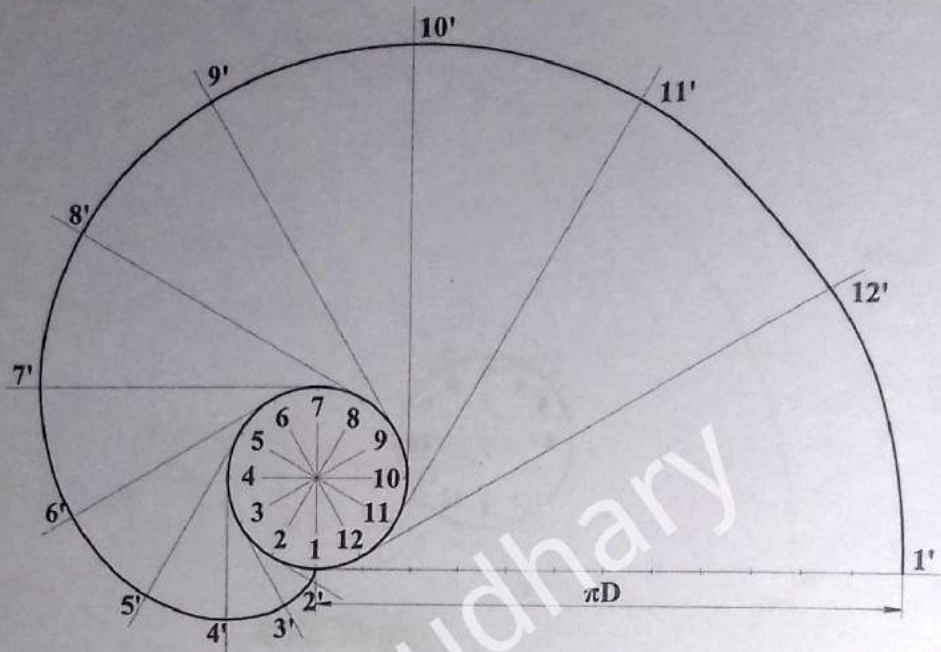


Figure 2.55(e)

Alternative Method

While drawing an involute of the circle, the difference between the arc length and chord length decreases if circle is divided into greater number of equal parts and involute can be drawn with reference to chord length instead of arc length obtained by dividing the circumference.

- Draw the given circle and divide the circle into any number of equal parts, say 12. Draw tangent lines from each point on the circumference of the circle in direction as shown. (Figure 2.56(a))
- With 2 as center and 21 as radius, draw an arc which intersects the tangent line passing through 2 at point 2'. (Again, with 3 as center and 32' as radius, draw an arc which intersects the tangent line passing through 3 at point 3'. (Figure 2.56(b))
- In the similar way, determine the remaining points 4', 5', 6',, 12' to complete the involute. (Figure 2.56(c))

When one turn of the cord is taken out from the circle, the length of the cord (11') will be equal to circumference of the circle.

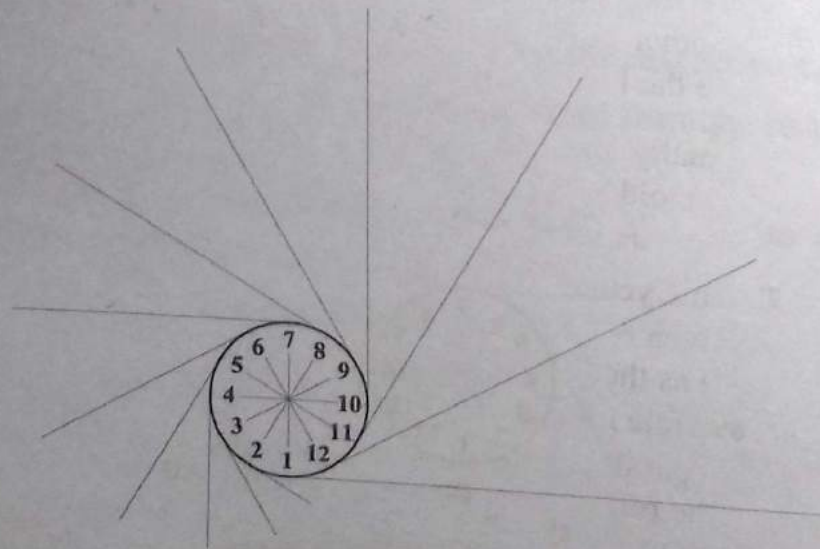


Figure 2.56(a)

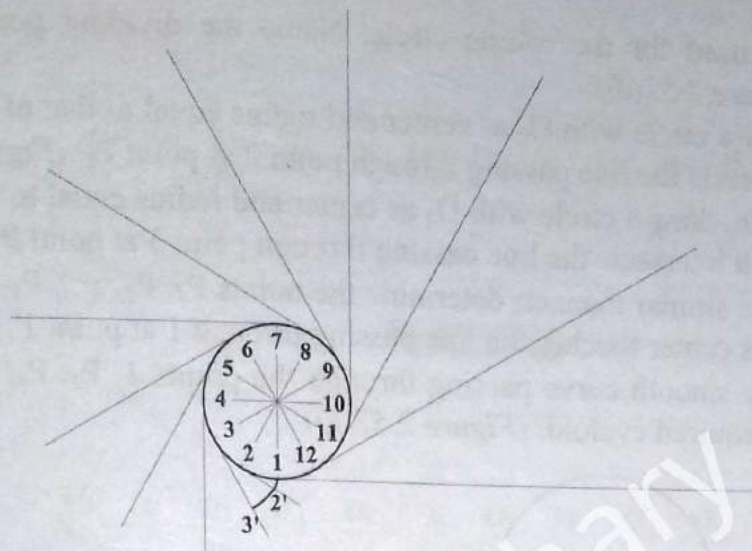


Figure 2.56(b)

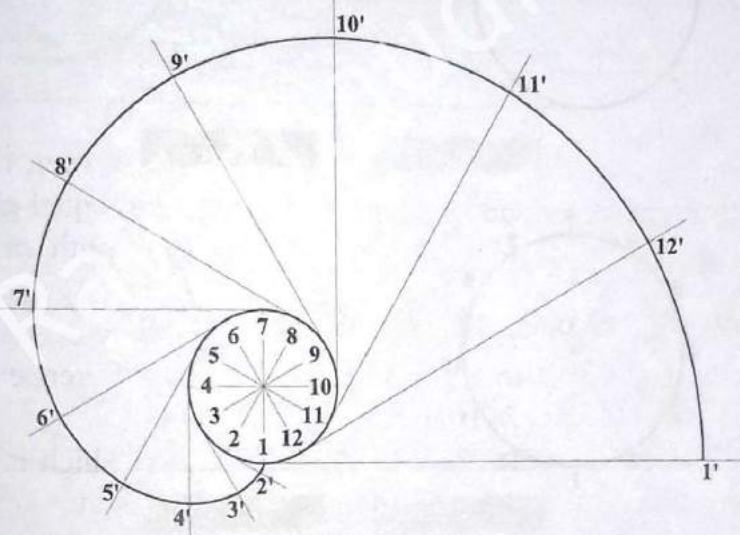


Figure 2.56(c)