

1. Exercise : 2 WEEK - 2

2. Date: 13/10/2020

3. Title : Conic and special curves.

4. Aim : To understand and draw conic curves, and special curves like cycloid, involute, and Archimedean spiral.

5. Software used: AutoCAD - 2020

6. Introduction:

i. About Conic curves:

When a cone is cut by a plane, the curve formed along the section is known as a conic. A cone may be cut by different section planes to obtain different conic sections. For example, when a cone is cut by section plane 1-1, passing through axis, then the section obtained is triangle; and when cut by section plane 3-3 at angle α , $90^\circ > \alpha > 0$ ($\frac{1}{2}$ apex angle), the curve of section is an ellipse.

ii. About special curves:

A curve is an object similar to a line, but that doesn't have to be straight. It may be thought as the trace left by a moving point. Some special curves are :-

- ① A cycloid - A special curve that is traced by a point on a circle as it rolls along a straight line without slipping.
- ② An involute of a regular pentagon - It is a special curve that is generated by unwrapping an inflexible chord from around the pentagon i.e. by extending its sides with centres.
- ③ An Archimedean Spiral - A plane curve generated by a point moving away from or towards a fixed point at constant rate

7. Procedure (for solving question #):

7.1 Question outline

Draw an involute of a regular pentagon of side 30mm for one complete turn.

7.2 Object

7.3 Conditions (if any)

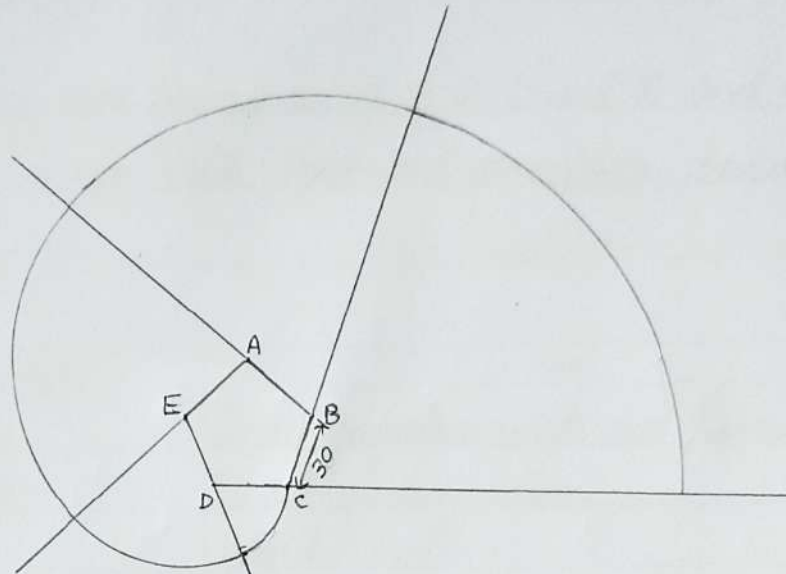


Fig. Free hand sketch of the solution to question #

7.4 Drawing Procedure:

Step 1.

First we have to set units, limits, text and style.
 Units:- in millimeter, precision is '0', limits: Upper Right corners <0,0>, Lower Right Corners <297, 410>. Text size height '7' and width factor '0.7'.

step 2: Use polygon command to enter edge numbers = 5 in order to draw a pentagon with edge measuring 30 mm.

Step 3: Draw slant straight line from each corner with length greater than the length of each edge.

step 4: Measure the length of edge and draw circle of that radius. Use trim command to erase unnecessary parts and get the first part of curve.

Step 5: Measure distance of third point of pentagon from the point of intersection of curve and line and draw

a circle with that as the radius.

Step 6: Repeat the above process with each corner of pentagon as centres of circles to get the involute of a regular pentagon

Step 7: Mark each corners as A, B, C, D and E and edge length as 30 mm with text and annotator commands.

8. Commands used:

S.N.	Command	Use
1.	Units	To set reference units and precision.
2.	Limits	To set working area.
3.	text	To type text.
4.	polygon.	To enter no. of edges and draw a pentagon.
5.	lines	To draw straight lines.
6.	circle	To draw circles from each edge.
7.	trim	To trim unnecessary parts of circle.
8.	pllye	To define the points clearly.
9.	pedit	To separate object lines, dimension lines.
10.	Annotation	To measure the lengths of radius and edge length of pentagon.

9. Result:

The special curve of involute of a regular pentagon is drawn successfully using AutoCAD-2020 with specified commands.

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