كلية آشور الجامعة
Ashur University College

DEPT. OF MEDICAL DEVICES TECHNIQUES ENGINEERING **ACADEMIC YEAR: 2021-2022**

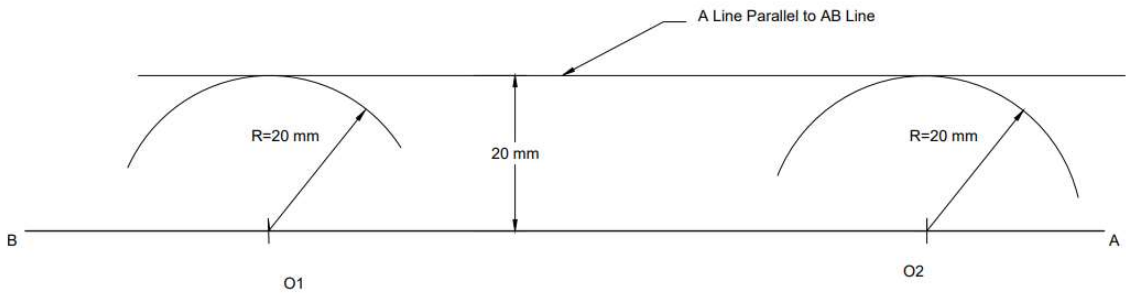
STAGE: FIRST **SUBJECT: ENGINEERING DRAWING** **INSTRUCTOR: ASSIT. PROF. SAAD ALKHFAJI**

LECTURE 3: Engineering Operations: principle of tangency of arcs and lines

1. **How to draw a line parallel to a given line at a given distance:**

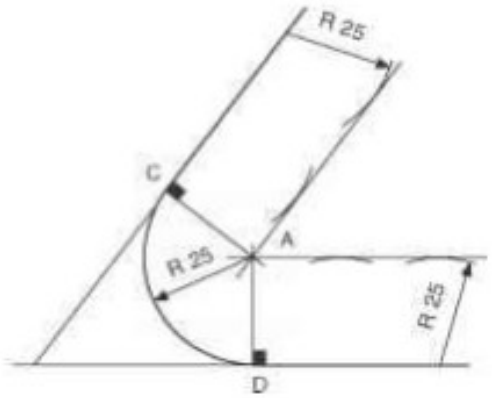
   Given: A line AB as shown in below:

   Required: Draw a line parallel to AB line at a distance of 20 mm.



2. **To draw a radius tangential to given straight lines:**

Assume that a radius of 25 mm is required to touch the lines shown in the figure below. Draw lines parallel to the given straight lines and at a perpendicular distance of 25 mm from them to intersect at point A. Note that the points of tangency are obtained by drawing perpendiculars through the point A to the straight lines.

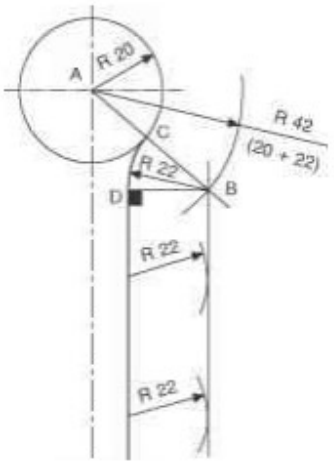


3. **To draw a radius to join a straight line and a given circle:**

Assume that the radius of the given circle is 20 mm and that the joining radius is 22 mm.

With centre A, describe an arc equal to 20 + 22 = 42 mm.

Draw a line parallel to the given straight line and at a perpendicular distance of 22 mm from it, to intersect the arc at point B. With centre B, describe the required radius of 22 mm, and note that one point of tangency lies on the line AB at C; the other lies at point D such that BD is at 90° to the straight line.



4. **To draw a curve of given radius to touch two circles when the circles are outside the radius:**

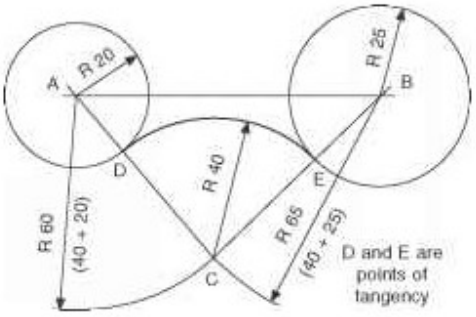
Assume that the radii of the given circles are 20 and 25 mm, spaced 85 mm apart, and that the radius to touch them is 40 mm.

With centre A. describe an arc equal to 20 + 40 = 60 mm.

With centre B, describe an arc equal to 25 + 40 = 65 mm.

The above arcs intersect at point C. With a radius of 40 mm, describe an arc from point C as shown, and note that the points of tangency between the arcs lie along the lines joining the centres AC and BC. It is

particularly important to note the position of the points of tangency before lining in engineering drawings, so that the exact length of an arc can be established.



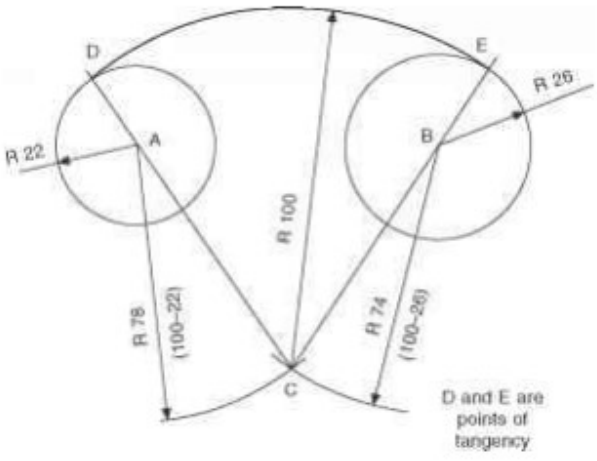
5. To draw a curve of given radius to touch two circles when the circles are inside the radius:

Assume that the radii of the given circles are 22 and 26 mm, spaced 86 mm apart, and that the radius to touch them is 100 mm.

With centre A, describe an arc equal to 100 - 22 = 78 mm.

With centre B, describe an arc equal to 100 - 26 = 74 mm.

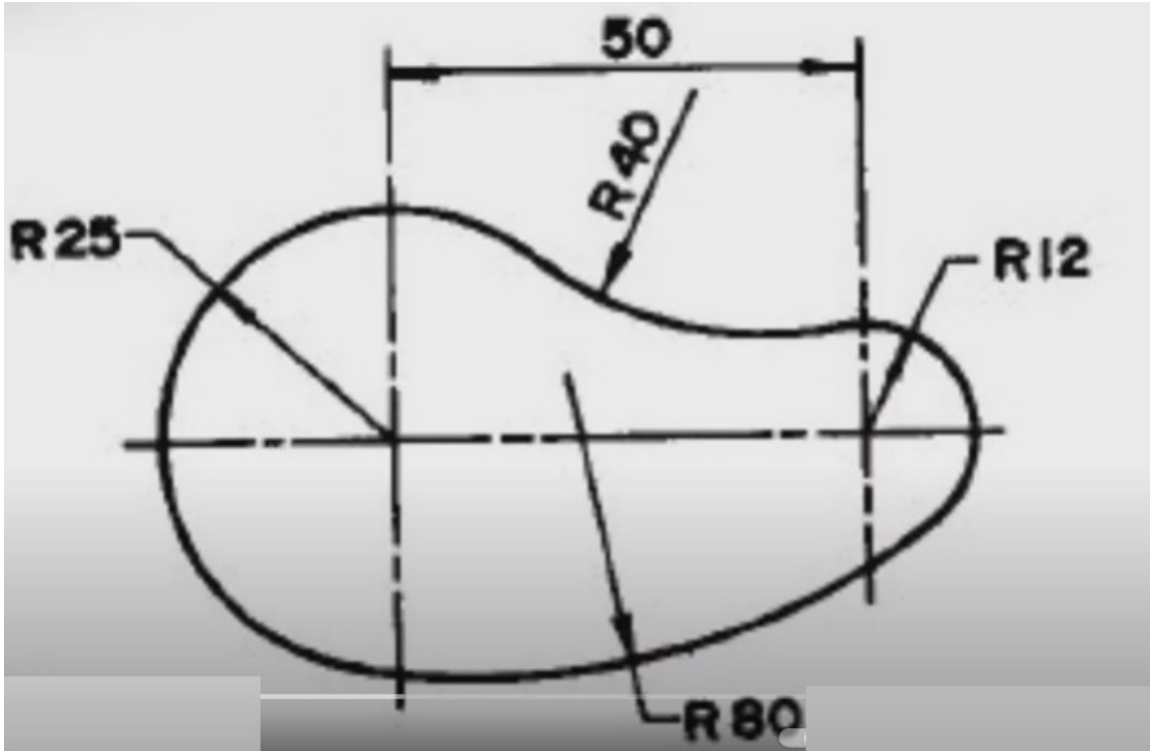
The above arcs intersect at point C. With a radius of 100 mm, describe an arc from point C, and note that in this case the points of tangency lie along line CA extended to D and along line CB extended to E.



C.W.

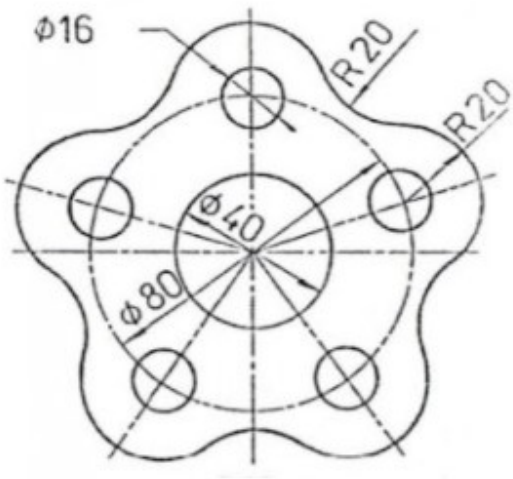
Draw, scale 1:1, the following drawing showing clearly the centers of the arcs.

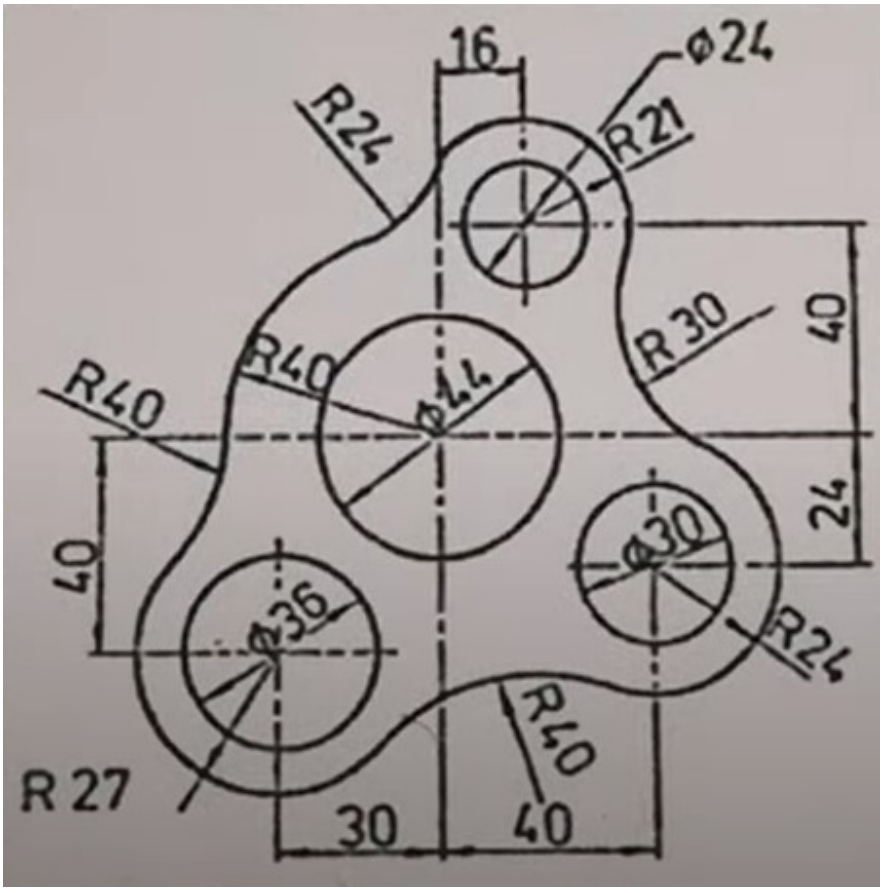
Dimensions are given in mm.

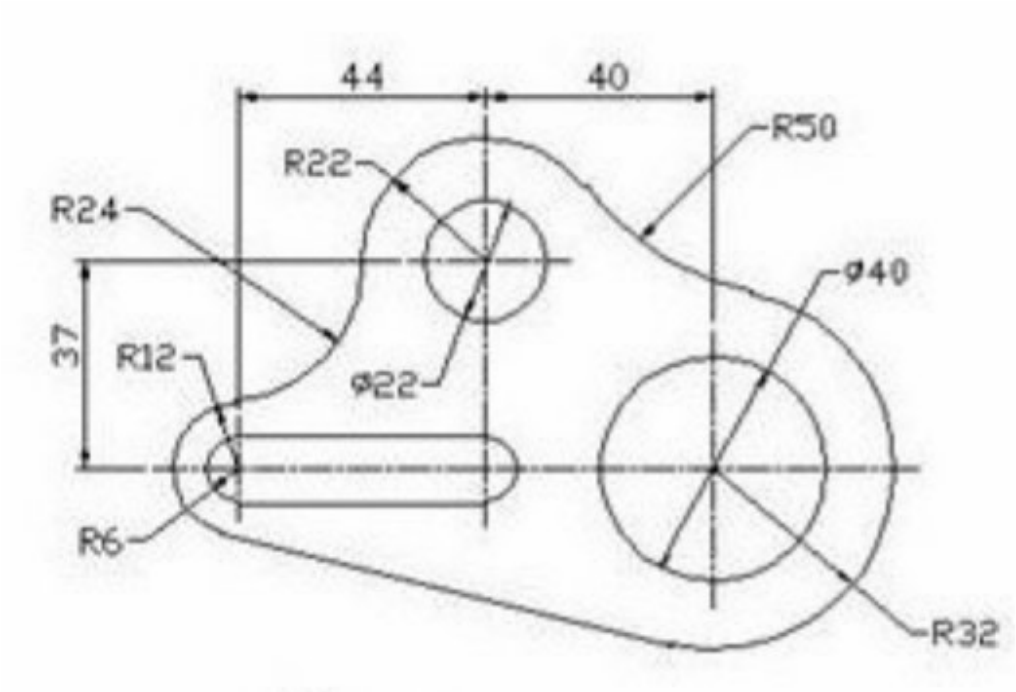


H.W.:Draw, scale 1:1, **ONE** of the following drawings, dimensions are in mm, showing clearly the:

(i) centres of the arcs (ii) points of tangency.






44
40
R50
R22
R24
ø40
37
R12
ø22
R6
R32