



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FIRST YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (MECHANICAL ENGINEERING)

EMM 100: ENGINEERING DRAWING & DESIGN I

DATE: 26/3/2021

TIME: 8.30-10.30 AM

INSTRUCTIONS

- I) This paper contains **FIVE (5)** questions.
- II) Question **ONE** is **COMPULSORY** and carries 30 marks
- III) Answer any other **TWO (2)** questions.

SECTION ONE (COMPULSORY)

QUESTION ONE (30 MARKS)

Figure Q1 shows a pillar block bearing. Draw in full size, the following views in **THIRD ANGLE** orthographic projection:

- a) A front elevation obtained by viewing the bracket in the direction of arrow A; (5 marks)
- b) An end view obtained by viewing the bracket in the direction of arrow B; (4 marks)
- c) A plan view projected from the front and end elevation (5 marks)
- d) Indicate the leading dimensions (2 marks)
- e) Indicate the type of projection using a projection symbol according to ISO conventions. (2 marks)
- f) Obtain the true length of line AB (2 marks)

SECTION TWO (ANSWER ANY TWO) (20 MARKS EACH)

QUESTION TWO (20 MARKS)

- a) **Figure Q2 (a)** shows orthographic views of a milling machine bracket. Draw an isometric view of the bracket with corner A as the lowest point on the drawing (10 marks)
- b) **Figure Q2 (b)** shows the orthographic views of a belt tensioning bracket. Draw an oblique view of the object in cavalier projection using a receding angle of 30° . (10 marks)

QUESTION THREE (20 MARKS)

Draw the profile of a disc plate cam which imparts the following vertical motion to a roller follower, $\phi 12$ mm, that is offset 25 mm to the left of the cam centerline.

- a) 0° to 180° Rise 66 mm with uniform acceleration and retardation
- b) 180° to 210° Top dwell
- c) 210° to 360° Fall 66 mm with simple harmonic motion
- d) Minimum cam diameter = 60 mm
- e) Direction of rotation of the cam is clockwise.

QUESTION FOUR (20 MARKS)

- a) Draw the locus of a point P which moves so that it is equidistant from a point and a line which are 40 mm apart. Use a maximum rise of 60 mm. In block letters, name the locus and state one application of this curve. (8 marks)
- b) In the mechanism given in **figure Q4 (b)** crank OA and BQ revolve in opposite directions at the same speed and are joined by the rods AC and BCD. Crank OA revolves in the clockwise direction. Plot the locus of D for one revolution of the cranks. (12 marks)

QUESTION FIVE (20 MARKS)

- a) **Figure Q5 (a)** shows an elbow joint made from sheet metal. Draw the development of both parts considering the seam positions given. (12 marks)
- b) **Figure Q5 (b)** shows a plan and end elevation of two intersecting branch cylinders.
 - i. Redraw the given views, (4 marks)
 - ii. Draw the missing front view showing the line of interpenetration of the two cylinders. (4 marks)

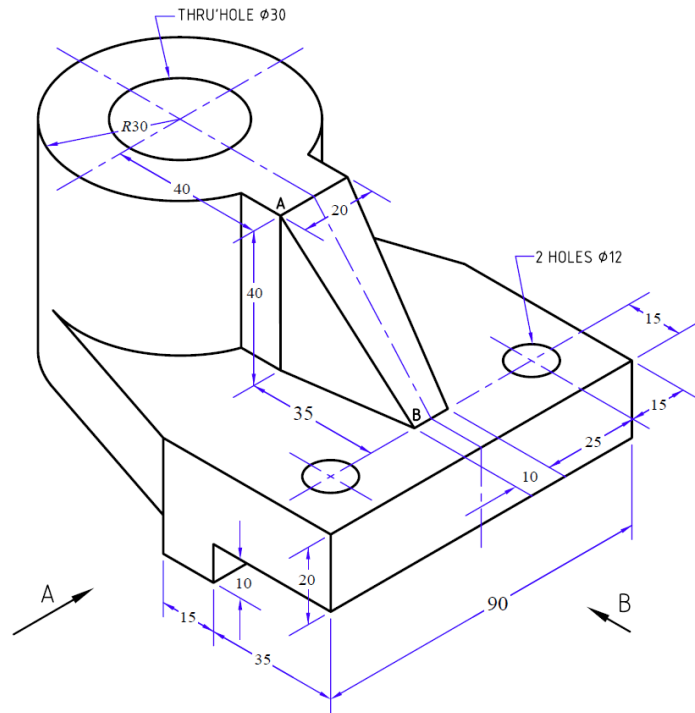


Figure Q1

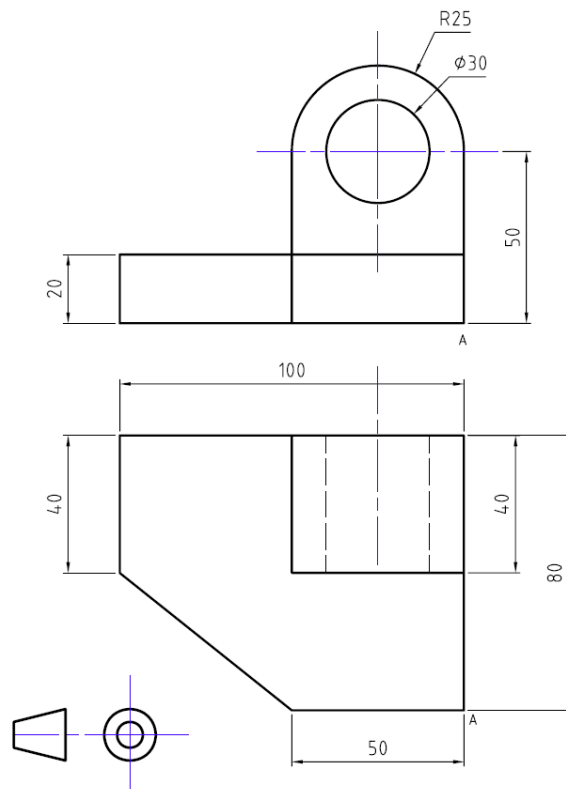


Figure Q2 (a)

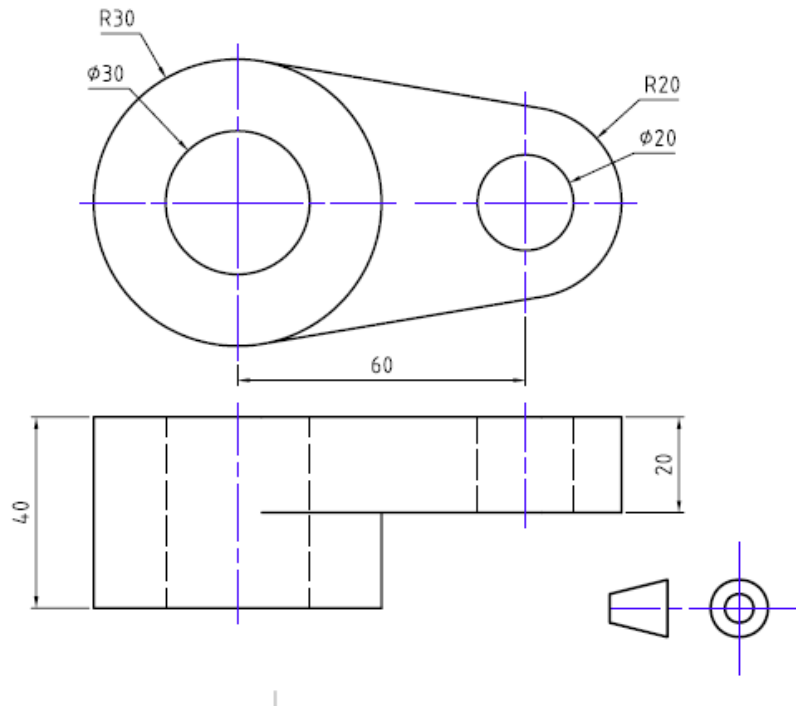


Figure Q2 (b)

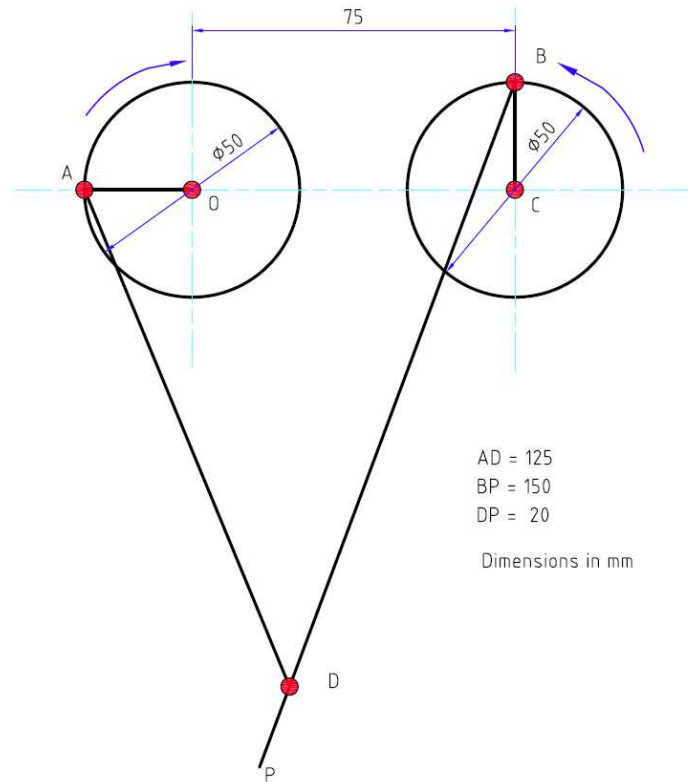
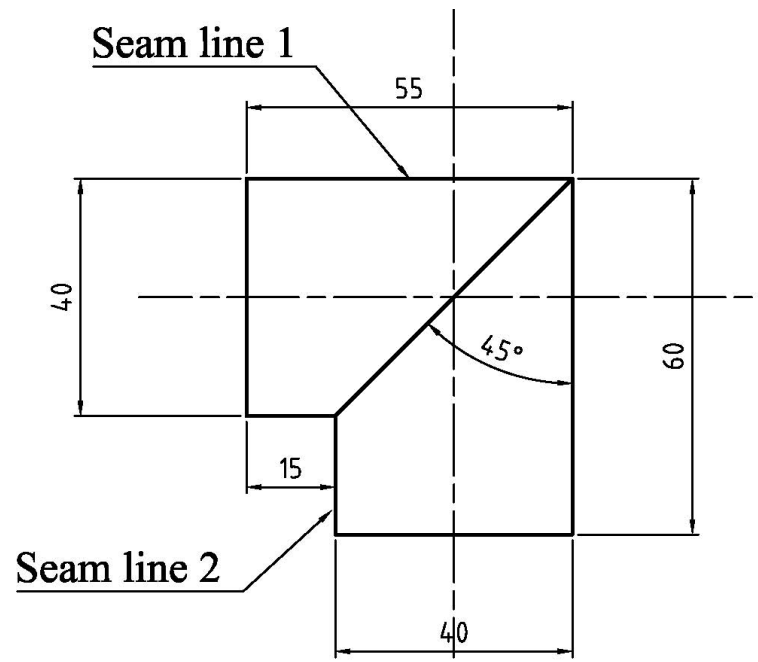


Figure Q4 (b)



Dimensions in mm

Figure Q5 (a)

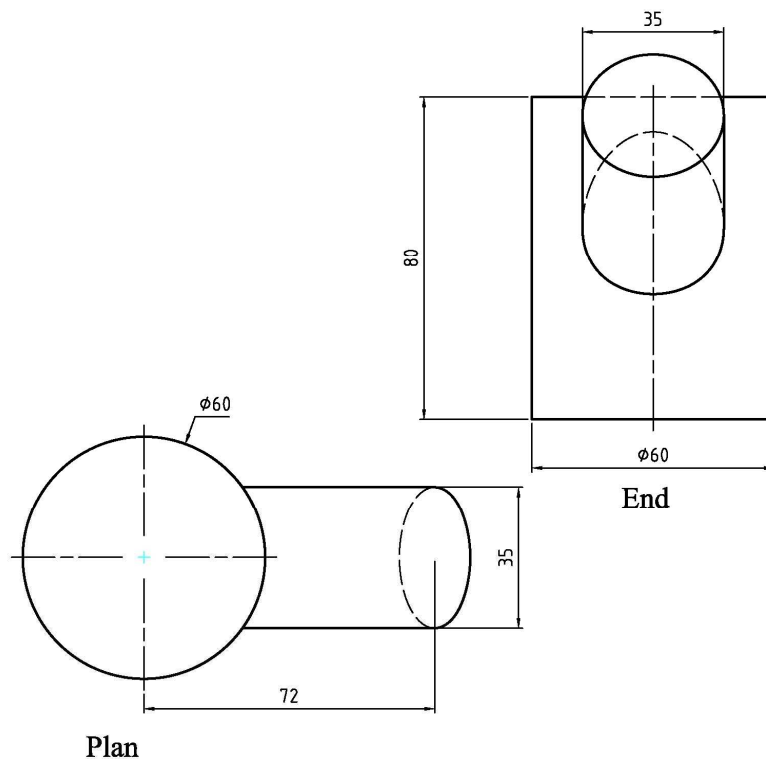


Figure Q5 (b)