MACHAKOS UNIVERSITY

University Examinations for 2021/2022 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FIRST YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE (MECHANICAL ENGINEERING)

EMM 111: ENGINEERING DRAWING & DESIGN I

DATE: 2/2/2022 **TIME: 11:00 – 1:00 PM**

INSTRUCTIONS

I) This paper contains **FIVE (5)** questions.

II) Question **ONE** is **COMPULSORY** and carries 30 marks

III) Answer Question one and any other **TWO (2)** questions.

QUESTION ONE (COMPULSORY) (30 MARKS)

Figure 1 shows a machine bearing bracket. Draw in full size, the following views in **FIRST ANGLE** orthographic projection:

a) A front elevation obtained by viewing the bracket in the direction of arrow A. (8 marks)

b) An end elevation obtained by viewing the arrow in the direction of arrow B. (7 marks)

c) A plan view projected from the front and end elevation. (7 marks)

d) Insert at least 4 dimensions, a radius, a diameter, 2 location dimensions and 2 size dimensions. (3 marks)

e) Include the projection symbol according to ISO conventions a suitable title block. (5 marks)

QUESTION TWO (20 MARKS)

a) Figure 2 (a) shows orthographic views of a bearing bracket. Draw an isometric view of the bracket with corner A as the lowest point on the drawing. (10 marks)

b) Figure 2 (b) shows orthographic views of an engineering object. Draw an oblique view of the object in cavalier projection using a receding angle of 30º. (10 marks)

QUESTION THREE (20 MARKS)

Draw the profile of a disc plate cam which imparts the following vertical motion to a roller follower, Ø10 mm that is offset 20 mm to the right of the cam centerline.

- 0º to 120º Rise 60 mm with simple harmonic motion
- 120º to 180º Top dwell
- 180º to 360º Fall 60 mm with uniform acceleration and retardation
- Minimum cam diameter = 50 mm
- Direction of rotation of the cam is anticlockwise.

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. (10 marks)

b) Figure Q4b shows a four bar linkage used in a packaging machine. Crank OA rotates about a fixed axis through O while link BC oscillates about B. Obtain the locus of point D on the mechanism for one complete revolution of the crank. (12 marks)

QUESTION FIVE (20 MARKS)

a) Figure 5 (a) shows an elbow joint made from sheet metal. Draw the development of both parts considering the seam positions given. (12 marks)

b) Figure 5 (b) shows a plan and end elevation of two intersecting branch cylinders.

i. Redraw the given views,

ii. Draw the missing front view showing the line of interpenetration of the two cylinders.

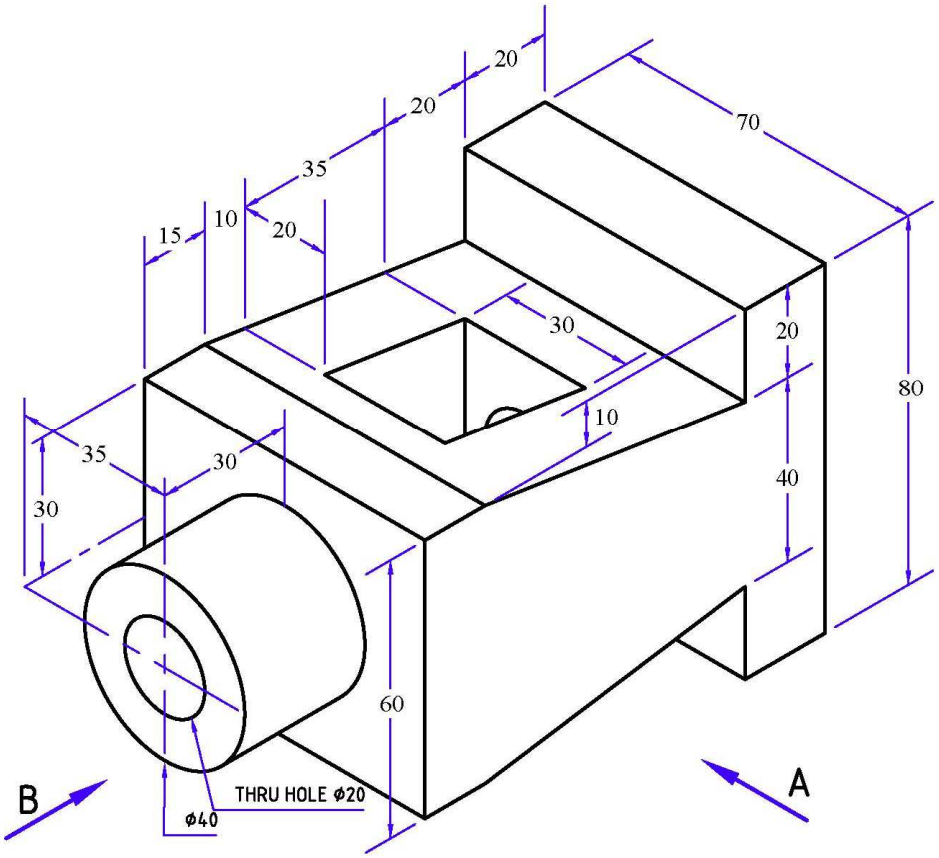


Figure Q (1)

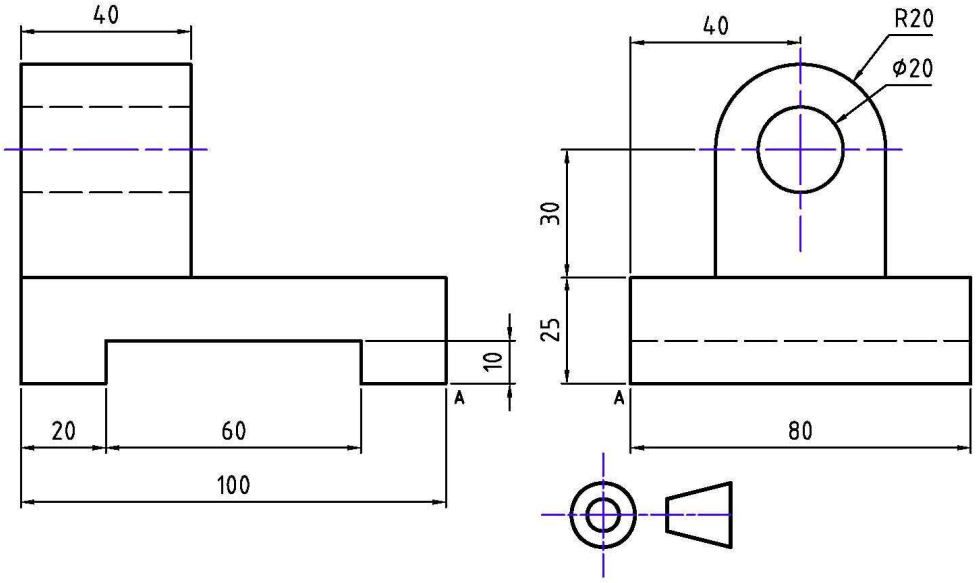


Figure Q2 (a)

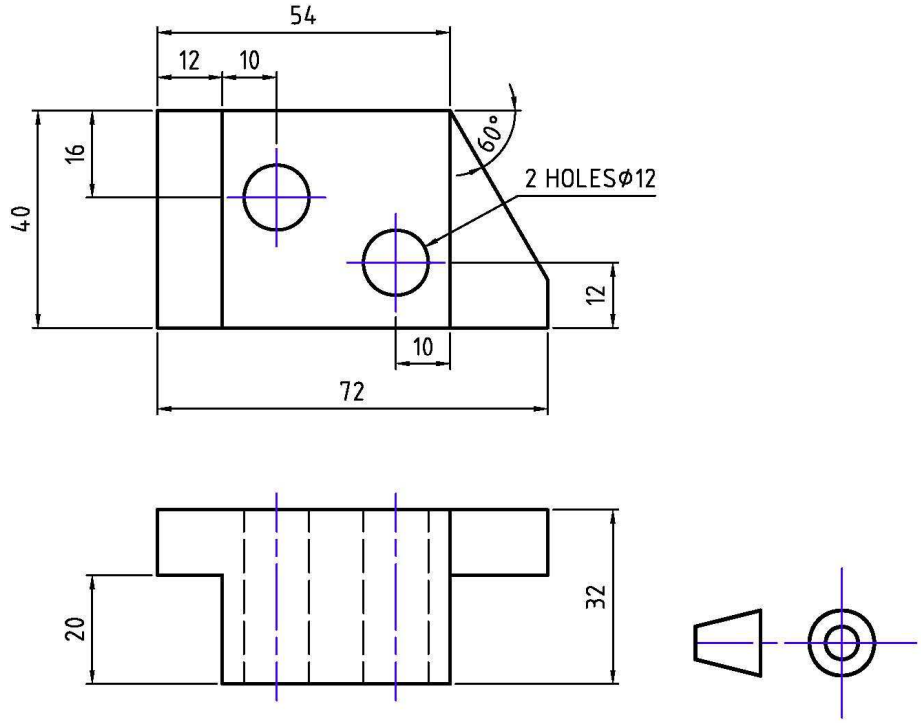


Figure Q2 (b)

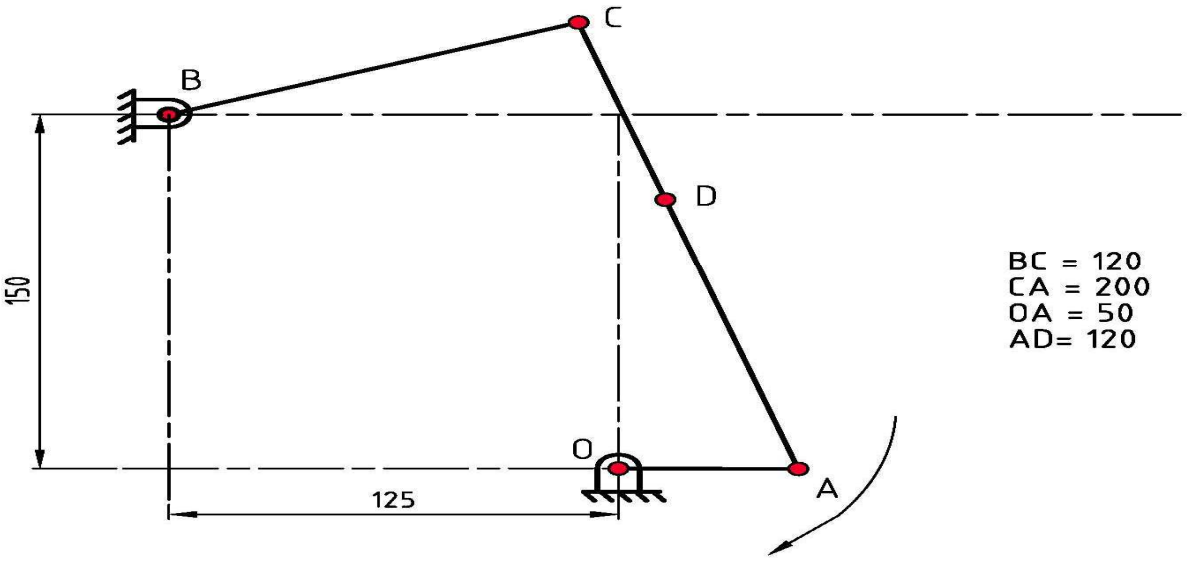
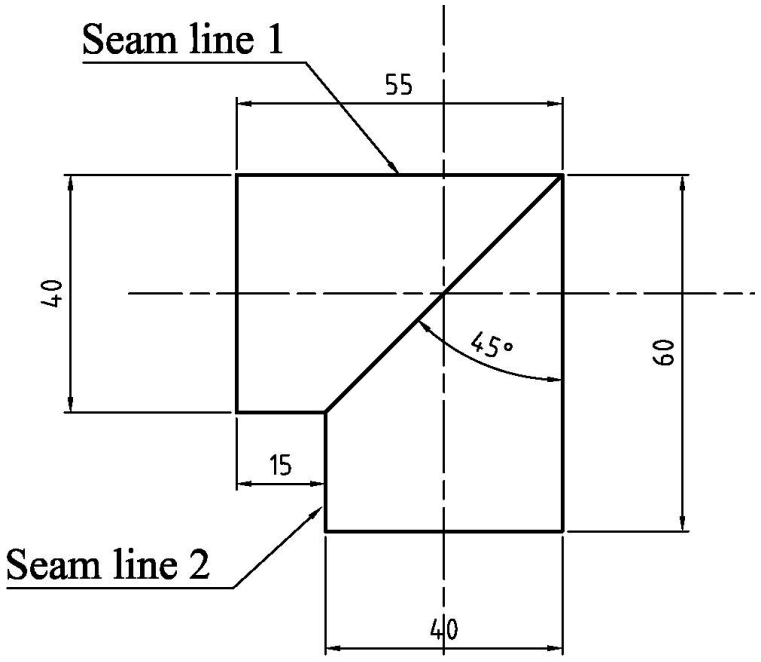


Figure Q (4a)



Dimensions in mm

Figure 5 (a)

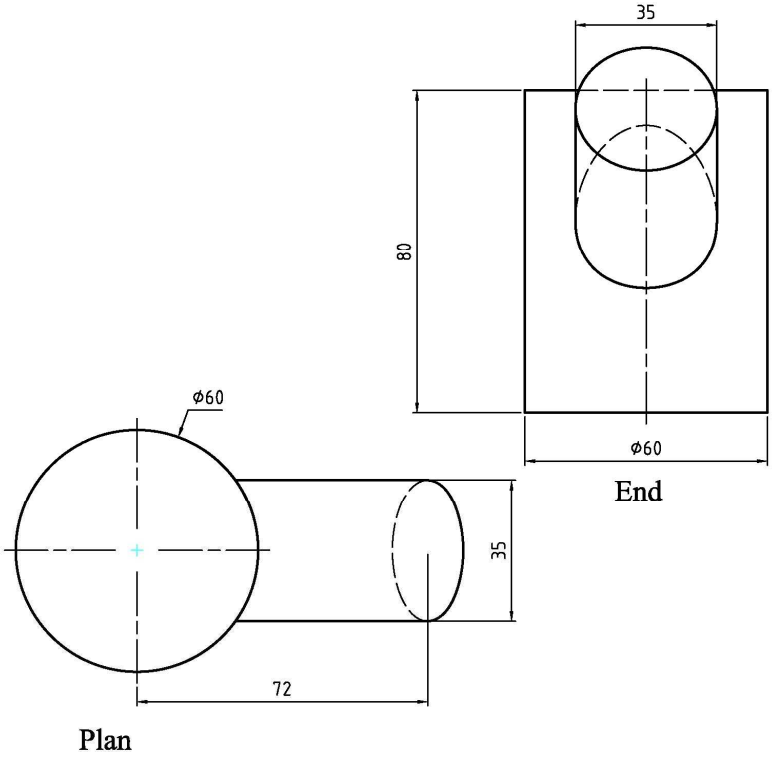


Figure 5 (b)