MACHAKOS UNIVERSITY

University Examinations 2020/2021

FIRST YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE MECHANICAL ENGINEERING

EMM 100: ENGINEERING DRAWING & DESIGN I

DATE: AUGUST 2021 **TIME: 3 HOURS**

INSTRUCTIONS

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

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

III) Answer any other **TWO (2)** questions.

IV) All dimensions are in millimeters.

SECTION ONE (COMPULSORY) [30 MARKS]

QUESTION ONE

Figure Q1 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]

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

QUESTION TWO

a) Figure Q2 (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 Q2 (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

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. [20 Marks]

QUESTION FOUR

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) Figure Q4 (b) 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

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]

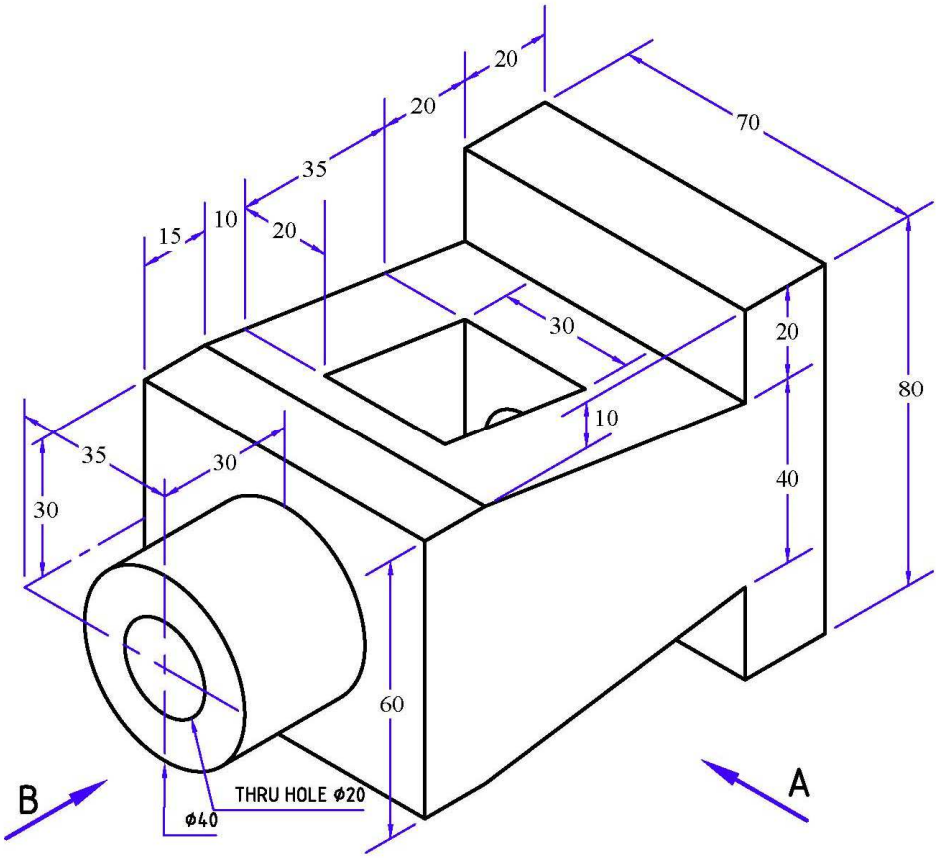


Figure Q1

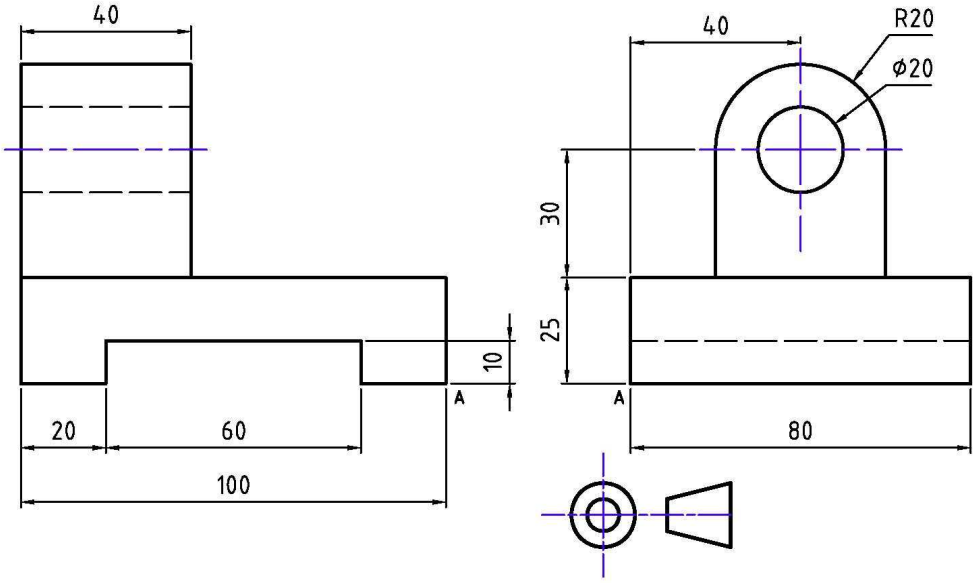


Figure Q2 (a)

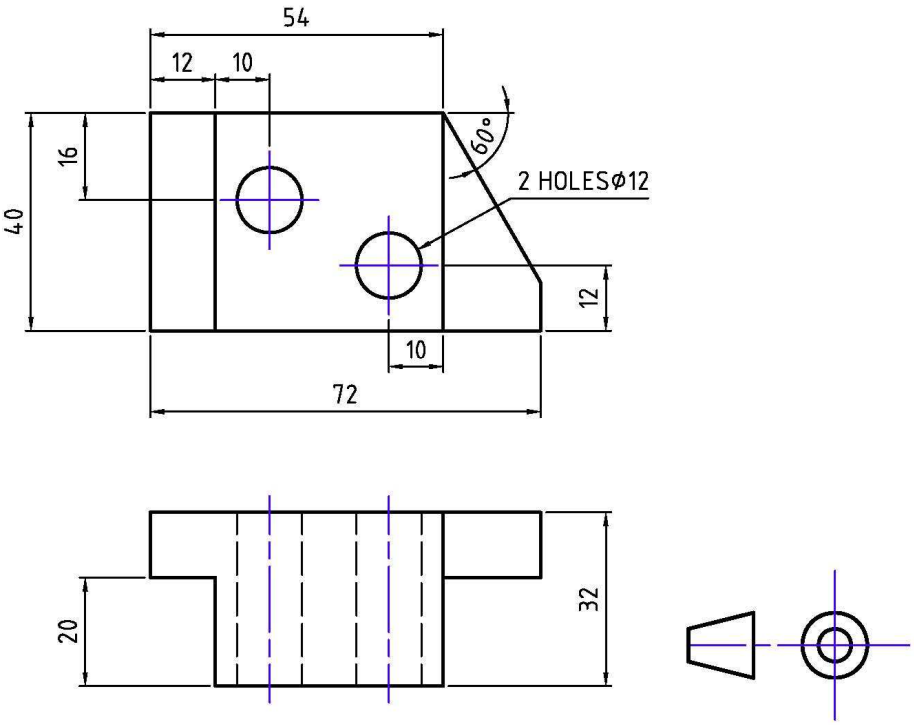


Figure Q2 (b)

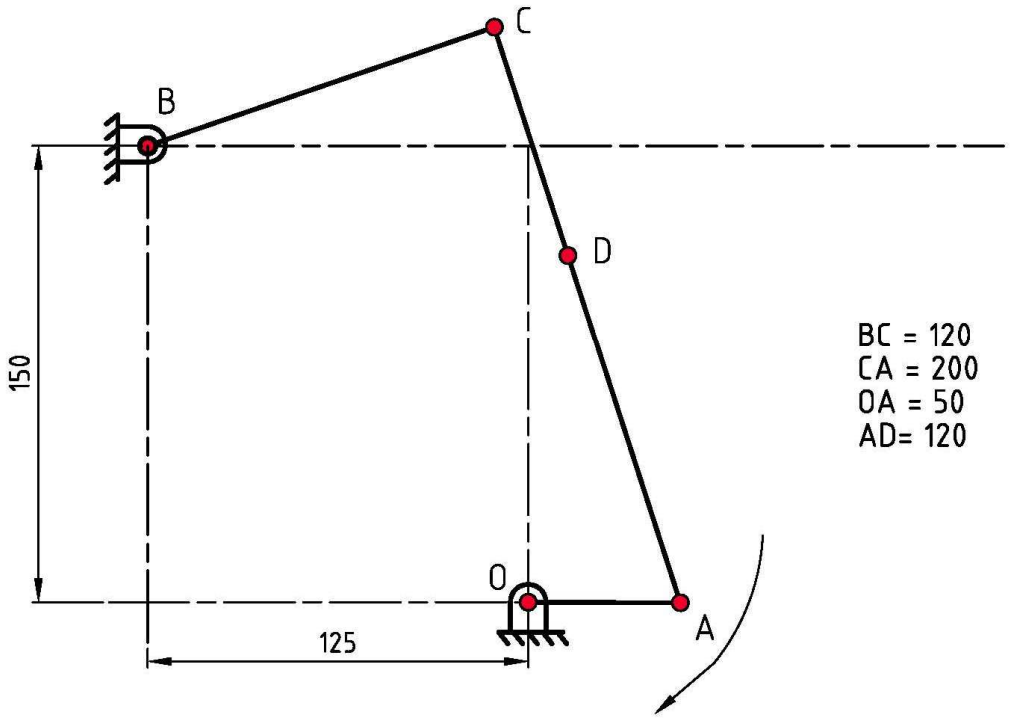
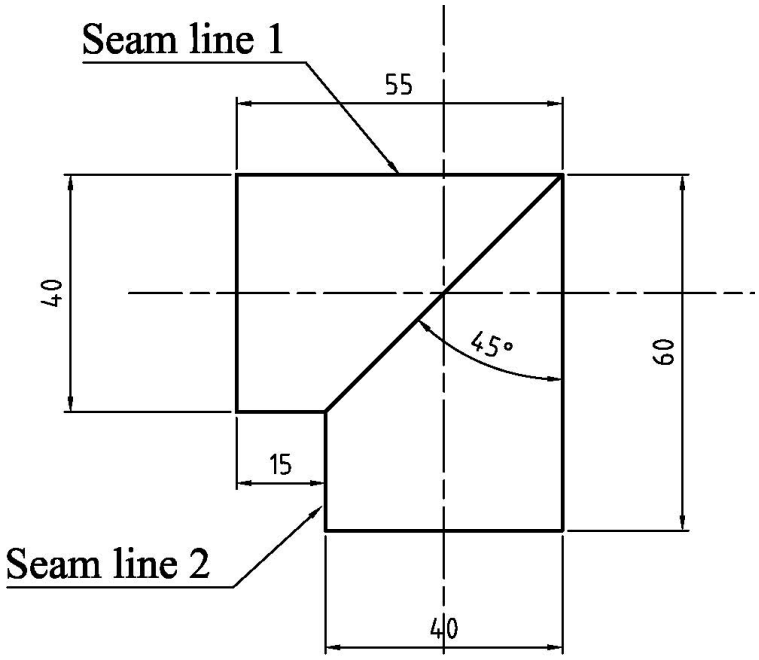


Figure Q4 (b)



Dimensions in mm

Figure Q5 (a)

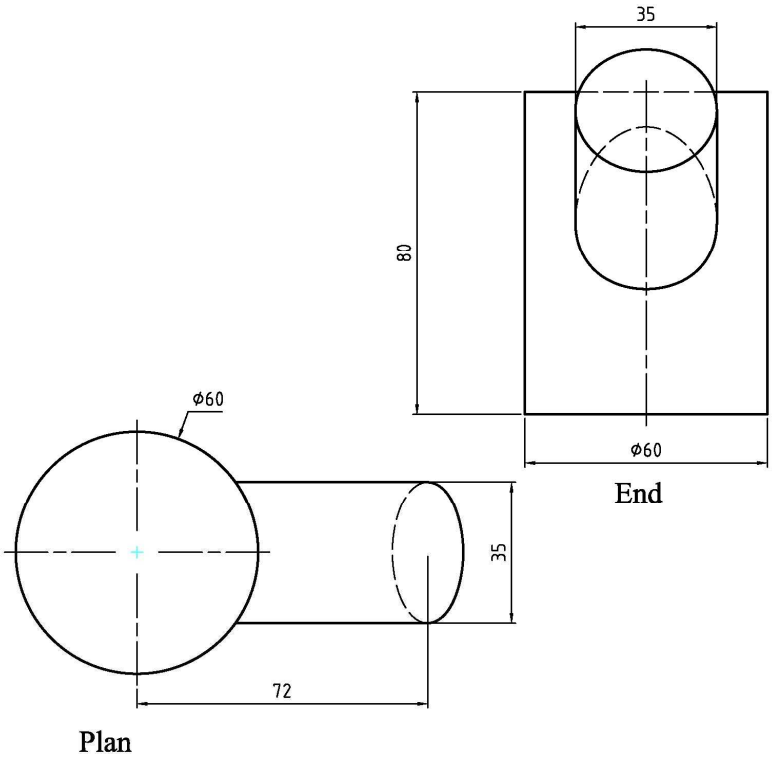


Figure Q5 (b)