



MACHAKOS UNIVERSITY

University Examinations 2023/2024 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

**FIRST YEAR FIRST SEMESTER EXAMINATION FOR
BACHELOR OF SCIENCE MECHANICAL ENGINEERING**

EMM 111: ENGINEERING DRAWING & DESIGN I

DATE: _____

TIME: _____

INSTRUCTIONS

- (a) This paper contains **FIVE** (5) questions.
- (b) You are required to answer **THREE** (3) questions only.
- (c) Question **ONE** is compulsory.
- (d) Attempt any other **TWO** questions.
- (e) Construction lines should be faint and should not be erased.
- (f) All dimensions are in millimeters unless otherwise stated.
- (g) Accuracy, neatness and good line-work are essential.
- (h) Missing and mismatching dimensions, if any, may be suitably assumed

QUESTION ONE (COMPULSORY) (30 MARKS)

Fig Q1 shows a pictorial view of a bracket. Draw to full size the following views in First Angle Orthographic projection with all hidden details

- a) A front elevation obtained by viewing the bracket in the direction of arrow A **(8 Marks)**
- b) An end view obtained by viewing the bracket in the direction of arrow B **(6 Marks)**
- c) A plan view projected from the front elevation and end elevation **(6 Marks)**
- d) At least 5 dimensions (a diameter, a radius, a short length and a long length) **(3 Marks)**
- e) A projection symbol according to standard drawing conventions **(2 Marks)**
- f) A suitable title block **(5 Marks)**

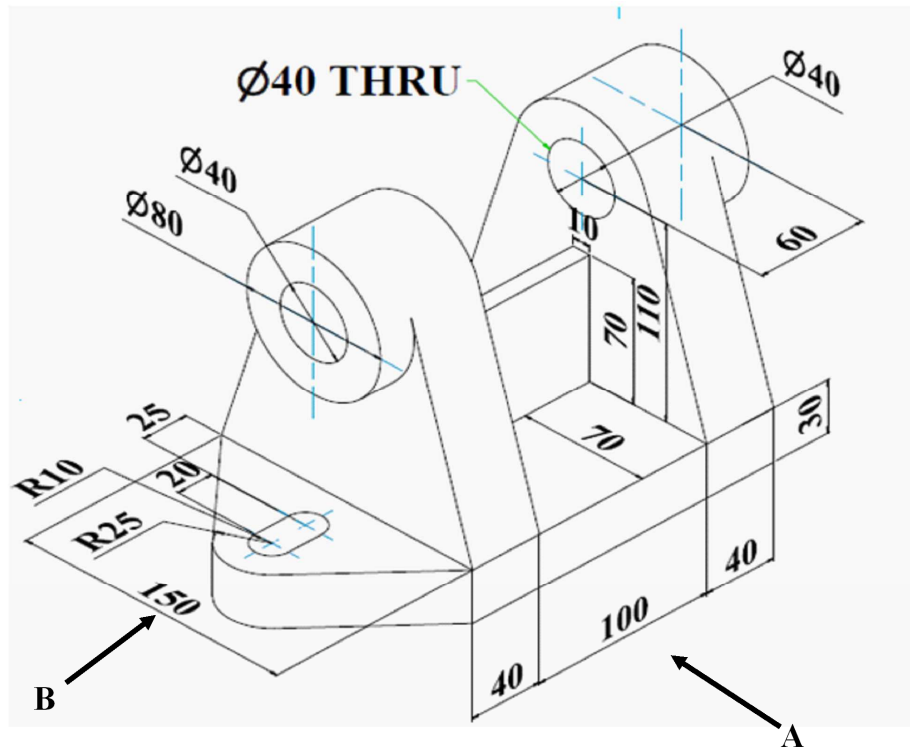


Fig Q1

QUESTION TWO (20 MARKS)

Fig Q2 shows two views of a block drawn in First Angle Projection. Draw and fully dimension the block in Isometric, taking 'P' as the lowest point

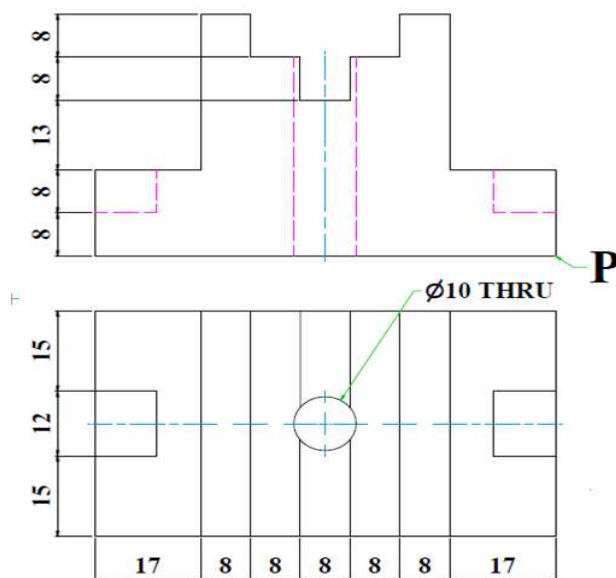
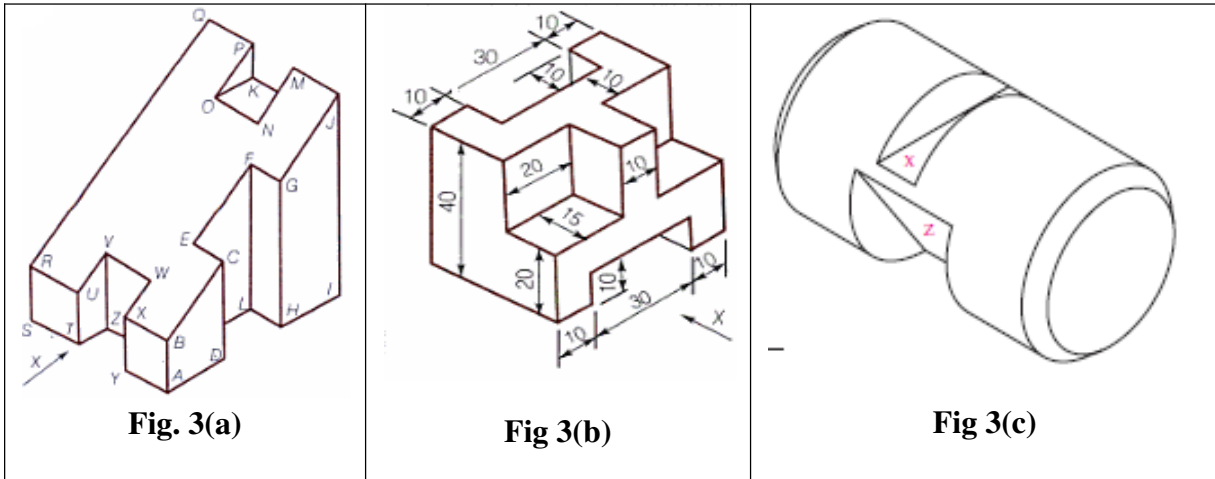


Fig Q2

QUESTION THREE (20 MARKS)

- a) Fig. 3(a), 3(b) and 3(c) shows the pictorial views of 3 engineering components. Sketch in free hand and in good proportions, suitable front view, end view and plan views of each component using third angle orthographic projection. **(12 marks)**



- b) Fig Q3 (d) shows the orthographic views of an engineering object. Draw an oblique view of the object in cavalier projection using a receding angle of 45° . **(8 Marks)**

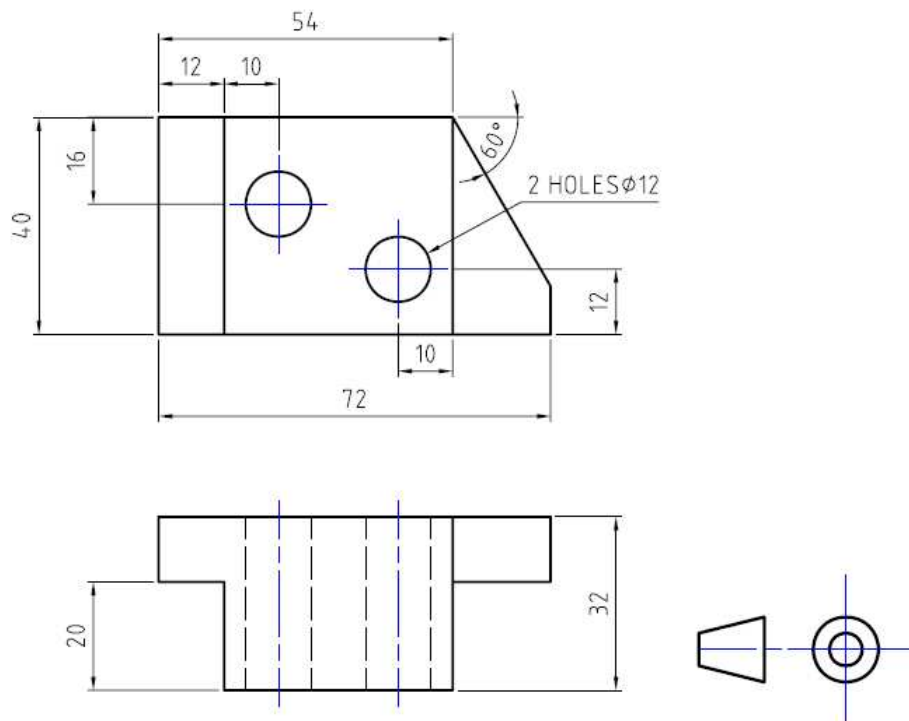


Fig Q3 (d)

QUESTION FOUR (20 MARKS)

- a) Construct an ellipse using concentric circle method when its major axis is 90 mm and minor axis is 55 mm **(10 Marks)**
- b) A piece of string equal to the circumference of a cylinder, diameter 42 mm, is attached to a point on the circumference of the cylinder. Draw the path of the free end of a string as it is wound round the cylinder in a plane perpendicular to the axis of the cylinder. Name the curve and state one practical application. **(10 marks)**

QUESTION FIVE (20 MARKS)

Draw the profile of a disc plate cam which imparts the following vertical motion to a roller follower, Ø6 mm.

0°-60°	Rise of 12 mm with uniform velocity
60°-90°	Dwell
90°-180°	Rise of 24 mm with harmonic motion
180°-210°	Dwell
at 210°	Sudden fall of 12 mm
210°-240°	Dwell
240°-360°	Fall of 24 mm with uniform acceleration

Minimum cam diameter = 40 mm. Direction of rotation of the cam is counterclockwise.