DEDAN KIMATHI UNIVERSITY OF TECHNOLOGY

University Examinations 2019/2020

SPECIAL/SUPPLEMENTARY EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN MECHATRONIC ENGINEERING

EMT 1101: ENGINEERING DRAWING AND DESIGN I

DATE: *OCTOBER 2021* **TIME:** 3 *HOURS*

INSTRUCTIONS

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

II. Question One carries **30 marks** and all the other questions carries **20 marks** each

III. Answer question **ONE** (**COMPULSORY**) and any other **TWO** questions

IV. All dimensions are in millimeters unless otherwise stated

QUESTION ONE (30 MARKS)

FIG Q1 shows a connecting bracket. Draw in full size the following views in **first angle orthographic projection**:

a. A front elevation looking from the direction of arrow X
b. The left hand side view of the object
c. A top view projected from the front and end elevation
d. The drawing should have
    i. A projection symbol
    ii. All necessary dimensions
    iii. A title block including proper lettering

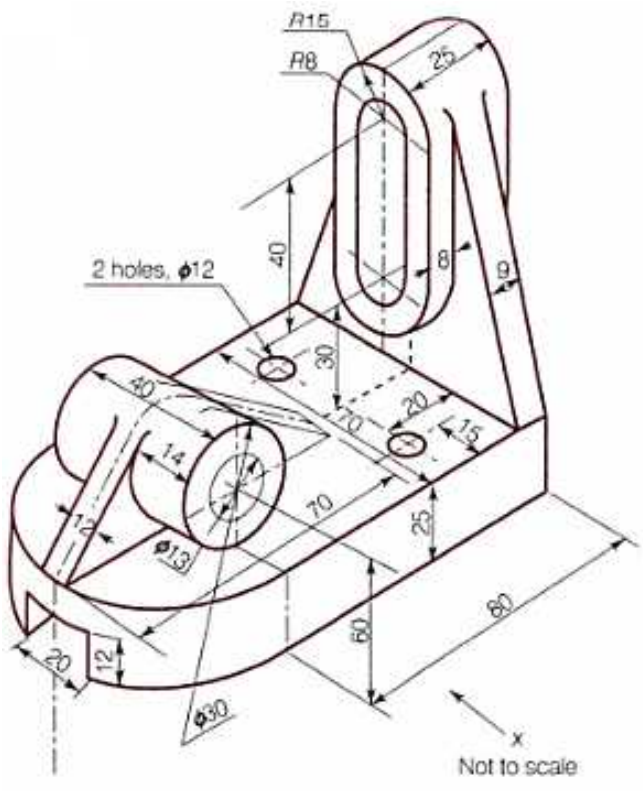

FIG Q1

QUESTION TWO (20 Marks)

Draw the profile of a disc cam plate rotating in a clockwise direction which imparts the following vertical motion to a knife edge follower.

- Cam specification: disc cam, minimum radius 40 mm; shaft diameter 20 mm; Displacement and motion:
- 0-90 degrees, rise of 30 mm with uniform acceleration
- 90-180 degrees, rise of 30 mm with uniform retardation
- 180-240 degrees, dwell
- 240-360 degrees, fall with uniform velocity

QUESTION THREE (20 Marks)

Fig Q3 shows orthographic views of a support bracket in FIRST ANGLE orthographic projection. Draw an isometric drawing of the bracket with the corner A as the lowest point on the drawing.

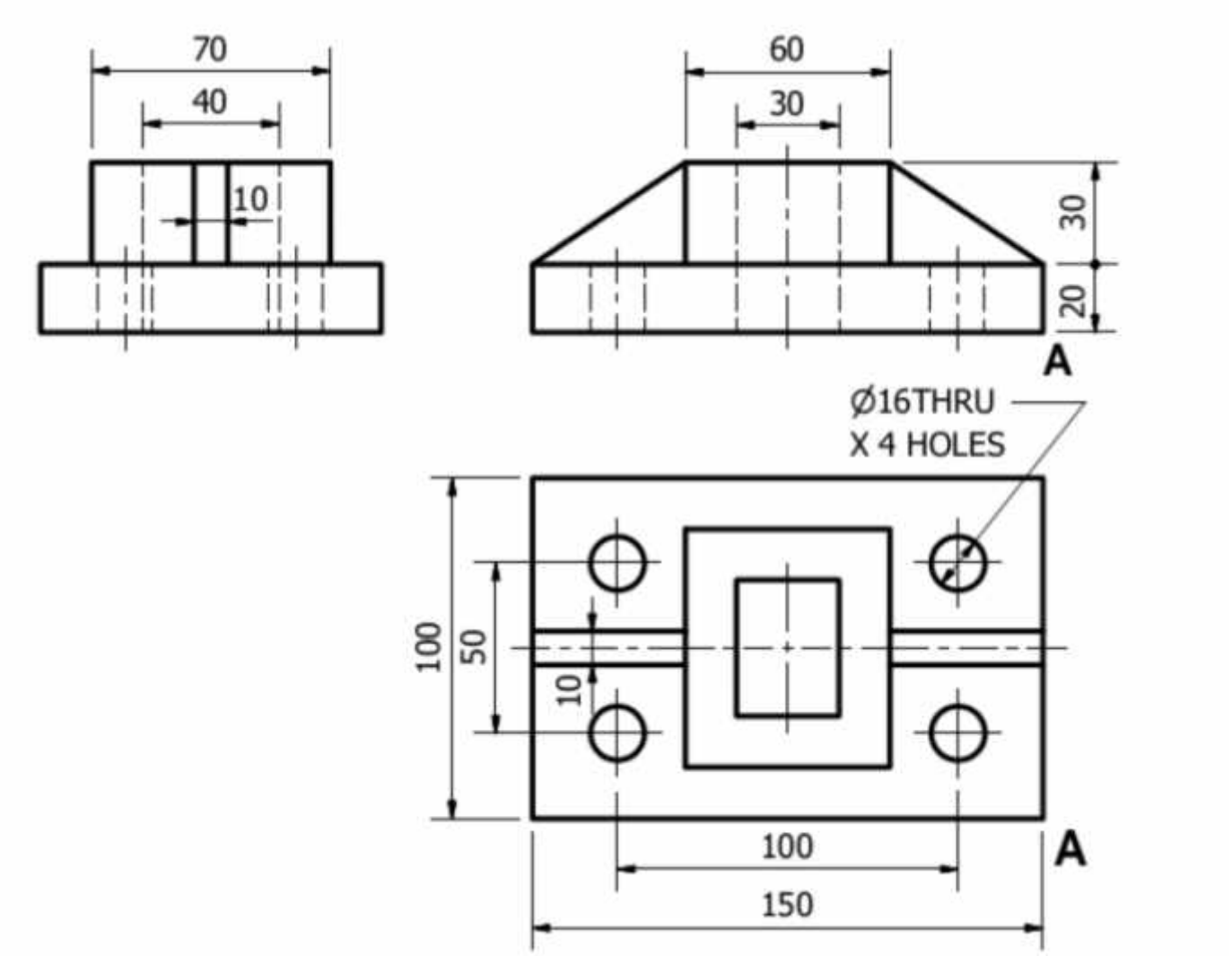

FIG. Q3

QUESTION FOUR (20 Marks)

a. **Fig. Q4 (a)** shows a four bar chain mechanism consisting of two cranks OA and BC joined by a link AB. The fourth link is between the two fixed pivots O and C. Plot the locus of a point P located at mid-point of link AB. Lengths OA, AB and BC are 40 mm, 120 mm and 75 mm respectively. (12 marks)

b. **Figure Q4 (b)** shows a circular wheel 40 mm in diameter with a point P attached to its periphery. The wheel rolls without slipping along a perfectly straight track whilst remaining in the same plane. Plot the path of point P for one revolution of the wheel on the track. (8 marks)

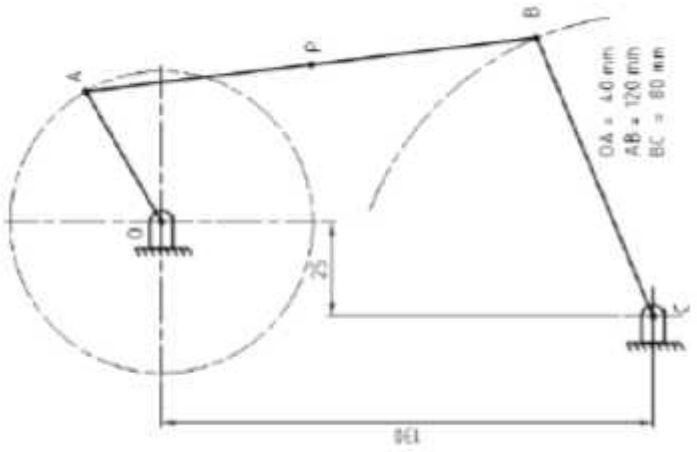

FIG Q4 (A)

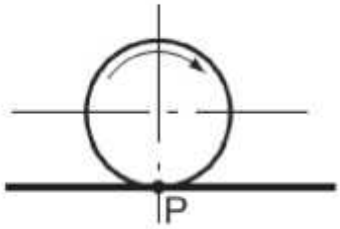

FIG Q4 (B)

QUESTION FIVE (20 Marks)

Fig. Q5 shows the incomplete orthographic projections of an object. Re-draw the orthographic projections and include the missing view. Also sketch an isometric representation of the block.

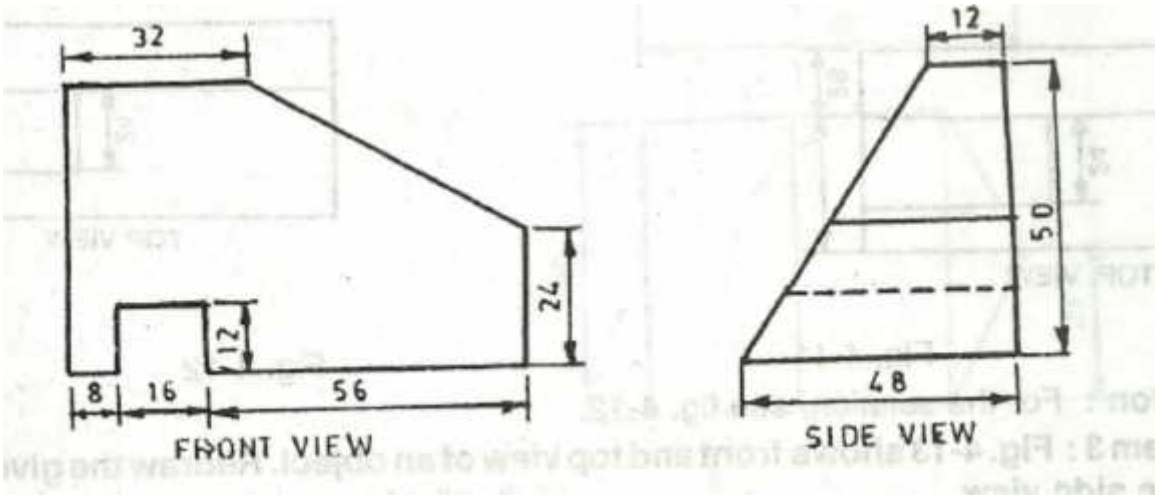

FIG Q5