



**DEDAN KIMATHI UNIVERSITY OF TECHNOLOGY**

**University Examinations 2021/2022**

**SECOND YEAR FIRST SEMESTER EXAMINATION FOR THE DEGREE OF  
BACHELOR OF SCIENCE IN ELECTRICAL ENGINEERING, BACHELOR OF  
SCIENCE IN TELECOMMUNICATION AND INFORMATION ENGINEERING,  
BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING, BACHELOR OF  
SCIENCE IN CHEMICAL ENGINEERING, BACHELOR OF EDUCATION  
TECHNOLOGY IN MECHANICAL ENGINEERING and BACHELOR OF  
EDUCATION TECHNOLOGY IN ELECTRICAL AND ELECTRONICS  
ENGINEERING**

**EMG 1102/EME 1201 ENGINEERING DRAWING AND DESIGN**

**DATE: DECEMBER 2021**

**TIME: 3 HOURS**

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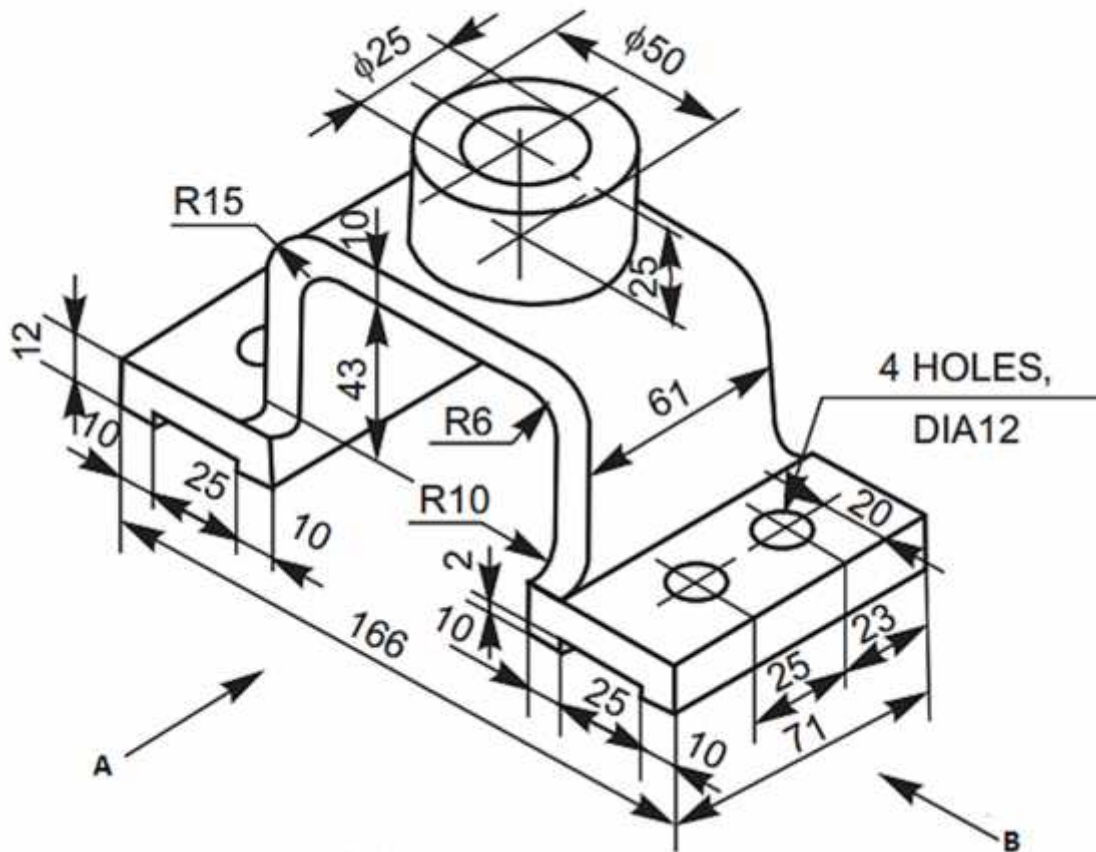
**INSTRUCTIONS**

- (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 an isometric view of a bracket. Draw to full size the following views in First Angle Orthographic projection showing all hidden details. All dimensions are in **mm**.

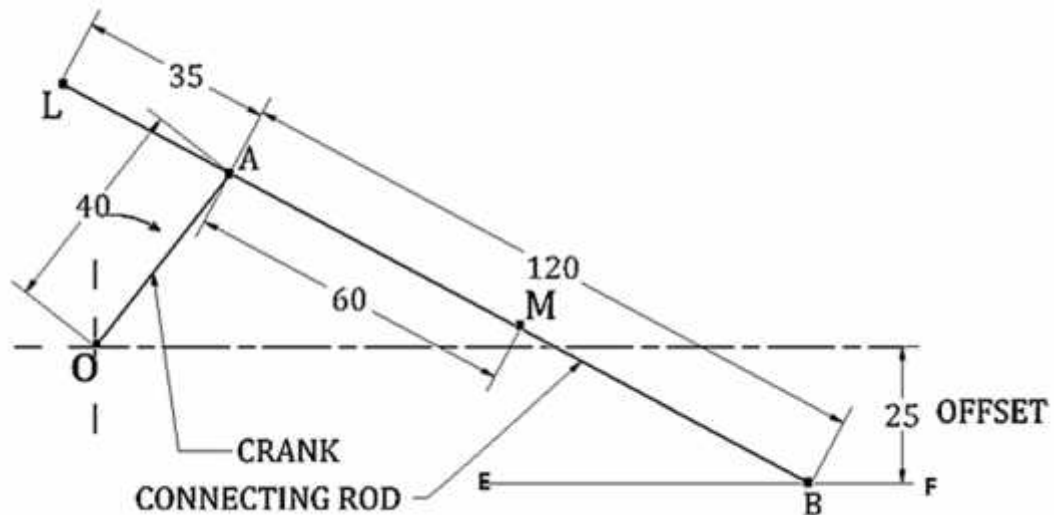
- (i) A front elevation obtained by viewing the bracket in the direction of arrow A **(8 Marks)**
- (ii) An end view obtained by viewing the bracket in the direction of arrow B **(7 Marks)**
- (iii) A plan view projected from the front elevation and end elevation **(6 Marks)**
- (iv) At least 5 dimensions (include a short length and a long length) **(3 Marks)**
- (v) A projection symbol according to standard drawing conventions **(2 Marks)**
- (vi) A suitable title block **(4 Marks)**



**Fig. Q1**

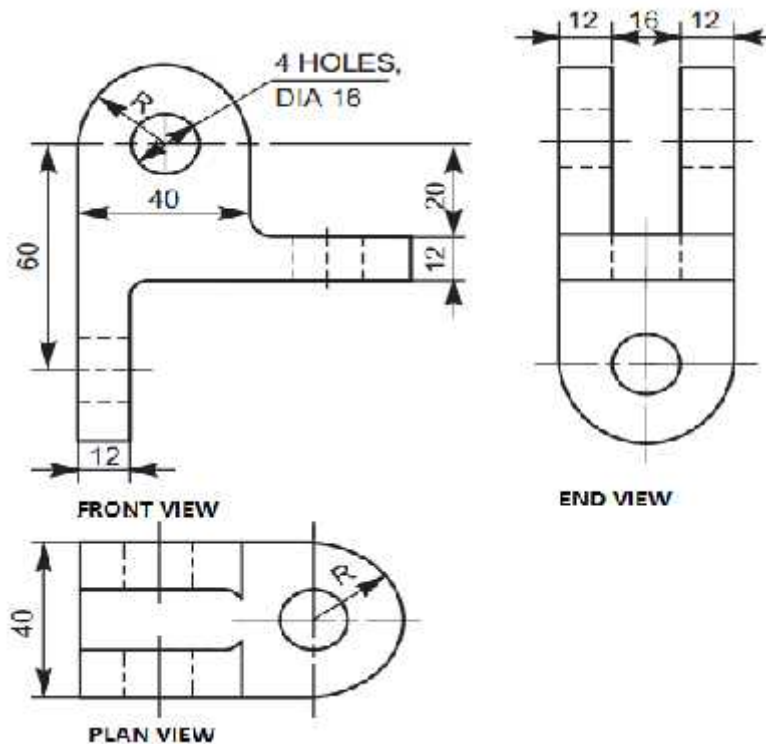
**QUESTION TWO (20 MARKS)**

- 2(a).** Fig. Q2 (a) shows an offset slider crank chain mechanism. The crank OA 40 mm long rotates in clockwise direction about the center O. The connecting rod AB 120 mm long is attached with the crank at the point A and the other end B is fixed in a slider EF 25 mm below the horizontal line passing through the point O, & the connecting rod AB is extended in the direction BA at the point L 35 mm from the point A as shown in the figure. Draw the loci points L & M (which is midpoint of the connecting rod AB) for one complete revolution of the crank. **(12 Marks)**



**Fig. Q2 (a)**

- 2(b).** Fig. Q2 (b) shows first angle orthographic views of an engineering component. Make freehand isometric sketch of the component. **(8 Marks)**



**Fig. Q2 (b)**

**QUESTION THREE (20 MARKS)**

Draw the displacement diagram and cam profile of a disc plate cam which imparts the following vertical motion to a roller follower,  $\text{Ø } 12\text{mm}$ , base circle  $\text{Ø } 60\text{mm}$ , cam shaft  $\text{Ø } 20\text{mm}$ .

- $0^\circ - 60^\circ$  follower rises 12 mm with uniform velocity
- $60^\circ - 90^\circ$  Dwell
- $90^\circ - 180^\circ$  Rise of 24mm with harmonic motion
- $180^\circ - 210^\circ$  dwell
- At  $210^\circ$  sudden fall of 12mm
- $210^\circ - 240^\circ$  Dwell
- $240^\circ - 360^\circ$  Fall of 24mm with uniform acceleration

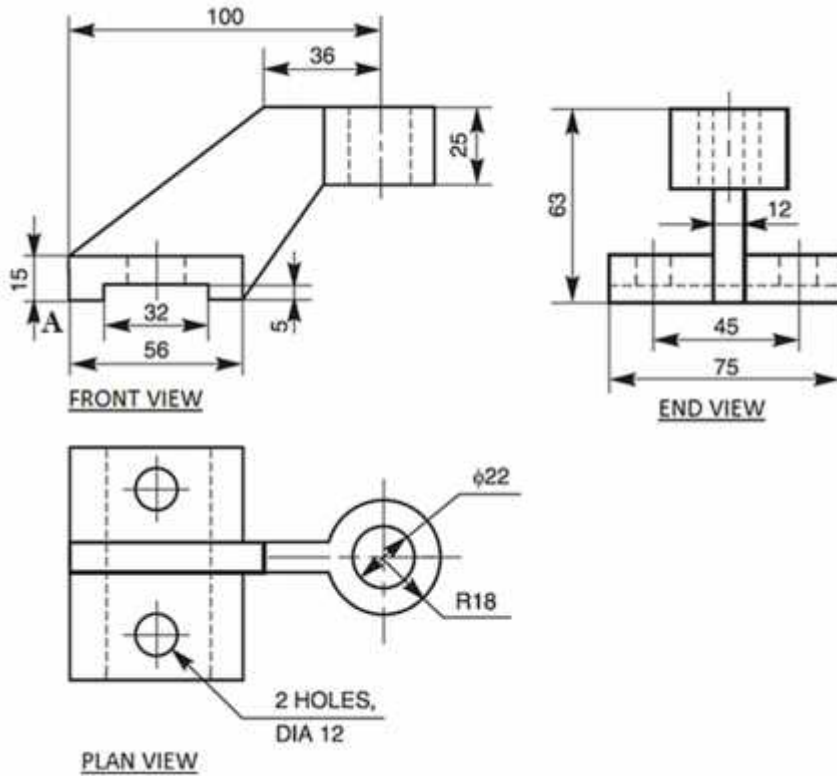
The cam is rotating counterclockwise (CCW) direction.

**(20 Marks)**

**QUESTION FOUR (20 MARKS)**

The fig. **Q4** shows orthographic views of a support bracket in **FIRST ANGLE** orthographic projection. Make an isometric drawing of the bracket with the corner A as the lowest point on the drawing.

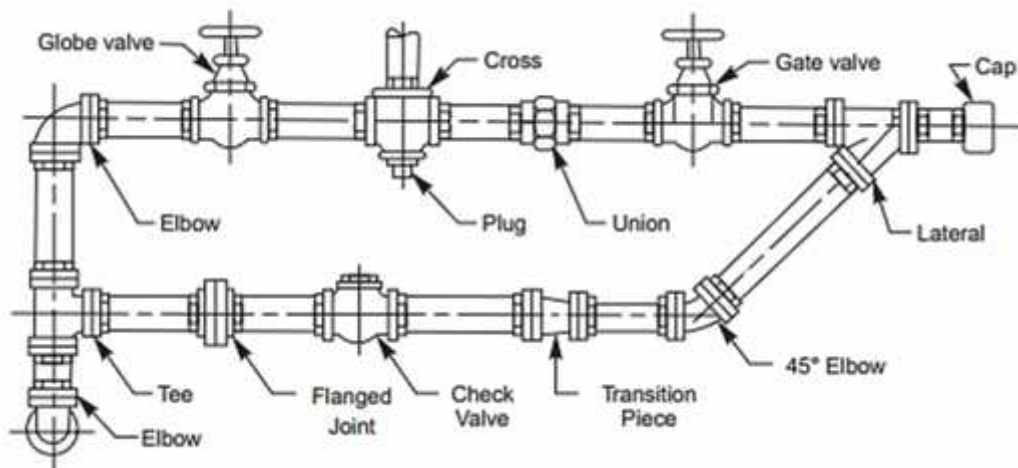
**(20 Marks)**



**Fig Q4**

**QUESTION FIVE (20 MARKS)**

**5(a).** Fig Q5 (a) shows a scale layout of a piping system. Make a schematic drawing of the piping system in symbol using a suitable scale. Details which are not standard symbols should be made in outline and noted. **(6 Marks)**

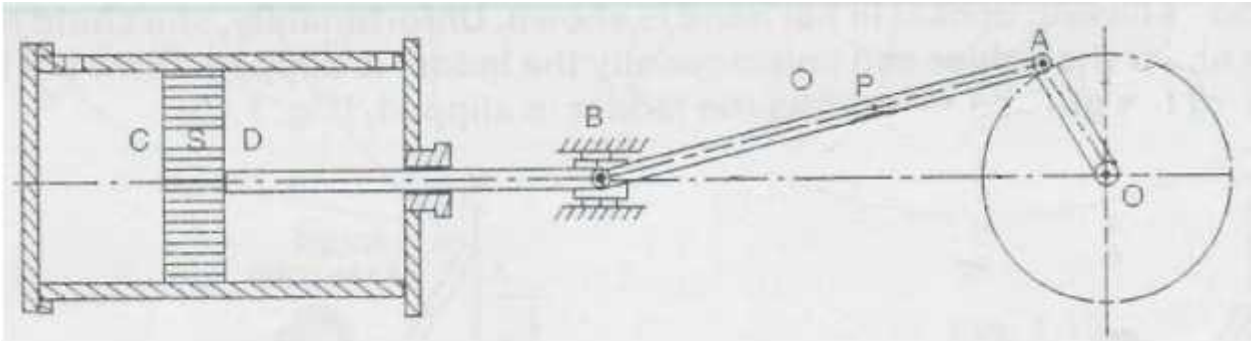


**Fig. Q5(a)**

**5(b).** Draw symbols of the following electrical and electronic items according to BS 5070 and BS 3939 and state their uses;

- i. Potentiometer **(0.5 Mark)**
- ii. Reversing Switch **(0.5 Mark)**
- iii. LED **(0.5 Mark)**
- iv. Transistor NPN **(0.5 Mark)**

**5(c).** Fig. Q5 (c) The slider crank mechanism of a reciprocating engine has a crank length 38mm and a connecting rod of length 225 mm. Draw the locus of a point P located on the connecting rod at a distance of 70 mm from the big end. **(12 marks)**



**Fig. Q5 (c)**