DEDAN KIMATHI UNIVERSITY OF TECHNOLOGY

University Examinations 2021/2022

BACHELOR OF SCIENCE IN ELECTRICAL AND ELECTRONICS ENGINEERING

BACHELOR OF SCIENCE IN

TELECOMUNICATION AND INFORMATION ENGINEERING AND BACHELOR OF EDUCATION TECHNOLOGY IN ELECTRICAL AND ELECTRONICS ENGINEERING

EME 1201 ENGINEERING DRAWING AND DESIGN

DATE: 21st JANUARY 2022 3 HOURS TIME: 8.30AM

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)

(a) **Fig. Q 1 (a)** is an isometric/pictorial representation of a machine mounting. The key dimensions of the various features of the part are indicated on the figure. Draw (to scale) in the first angle orthographic projection the following views of the part including the key dimensions.

(i) Front elevation **(6 Marks)**
(ii) Plan **(5 Marks)**
(iii) End/Side view **(4 Marks)**
(iv) Standard first angle projection symbol **(2 Marks)**
(v) A title block **(3 Marks)**

Include at least the 10 key dimensions.

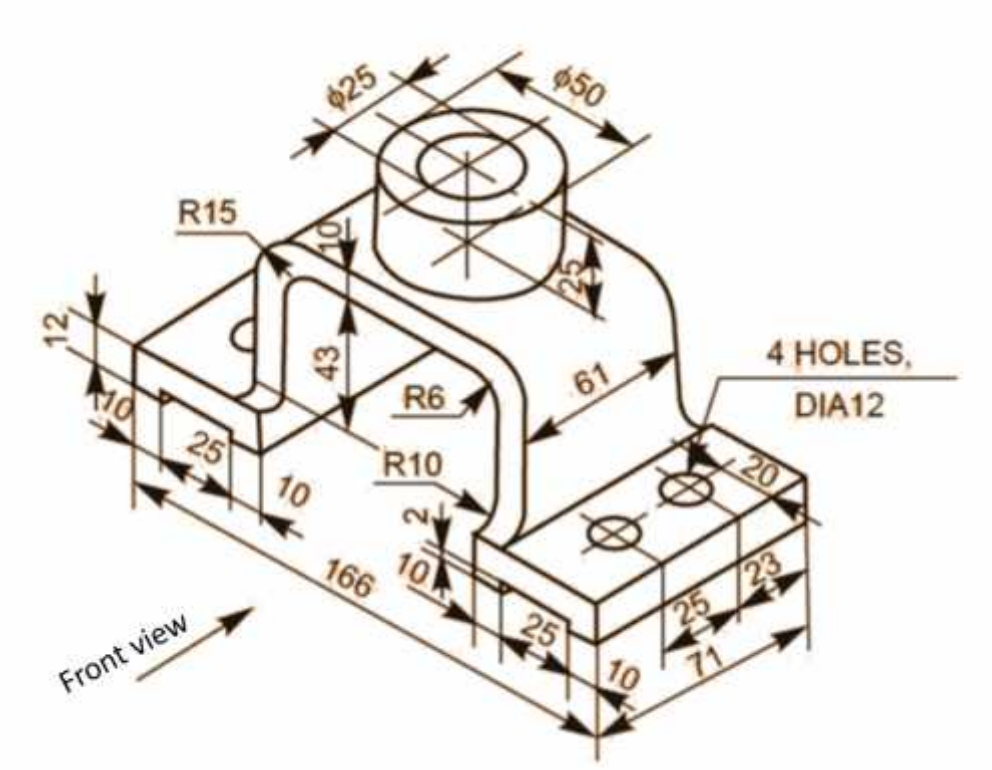

Fig. Q 1 (a)

(b) The views shown in **Fig. Q 1 (b)** are represented in 3rd angle orthographic projection. Draw (to scale) the isometric projection of the views. **(10 Marks)**

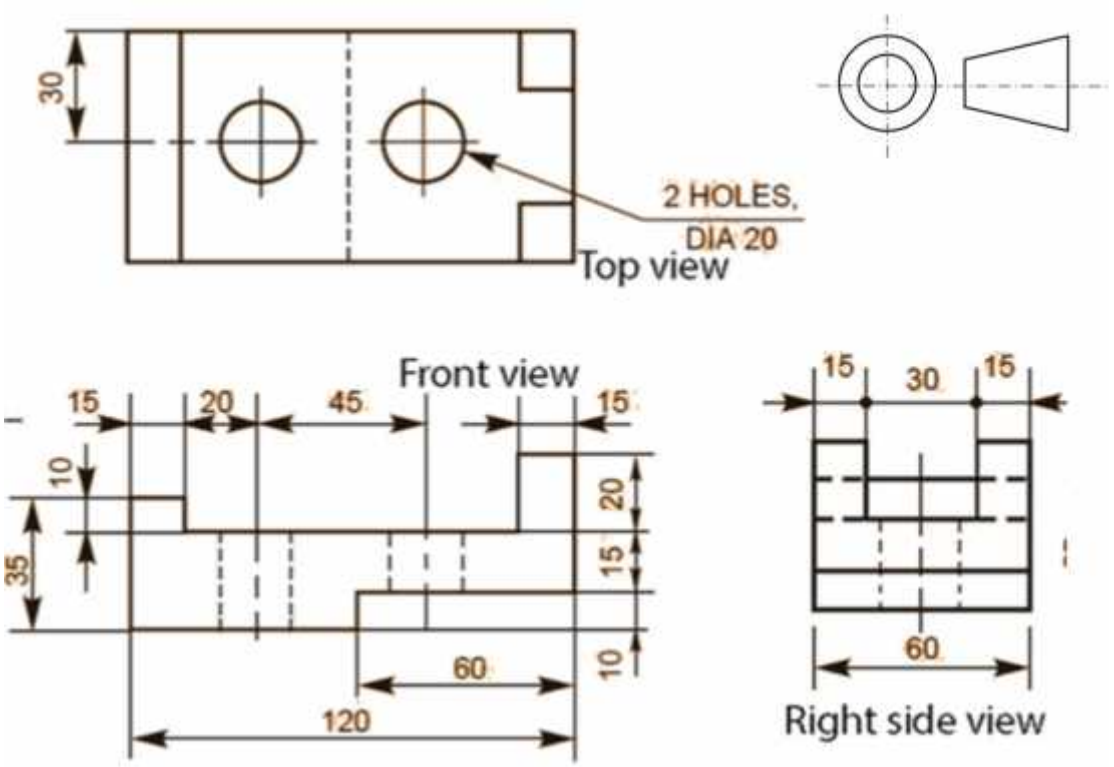

Fig. Q 1 (b)

QUESTION TWO (20 MARKS)

a) Draw locus of a point on the periphery of a circle which rolls on a curved path. Take diameter of rolling circle 50 mm and radius of directing circle i.e., curved path, 75 mm. Identify the locus constructed. **(8 Marks)**

b) The four-bar mechanism given in **Fig Q 2** consists of crank OA which rotates about centre O, link BC which oscillates about centre C and the coupler, AB. Plot the locus traced by the mid-point P of the coupler for one complete revolution of crank OA. **(12 Marks)**

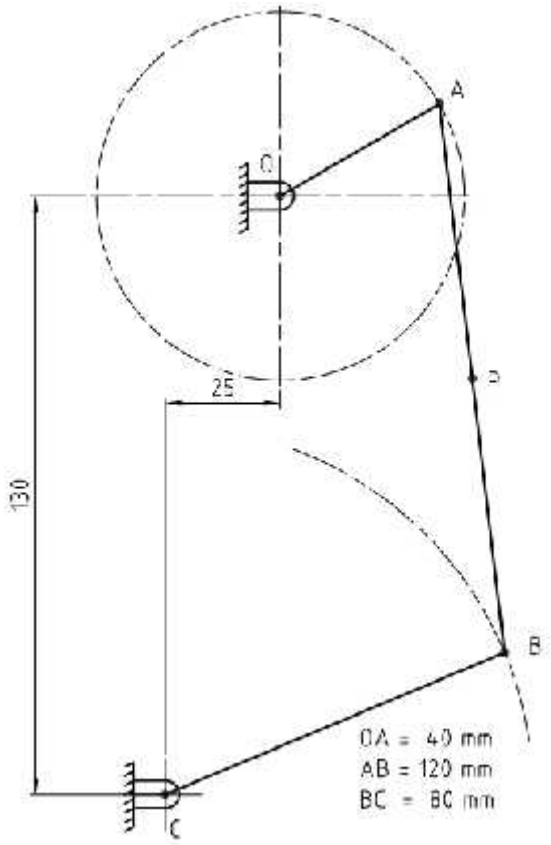

Fig Q 2

QUESTION THREE (20 MARKS)

A cam, with a minimum diameter of 50 mm, rotating clockwise at a uniform speed, is required to give a roller follower the motions as described below:

a) To move outwards through 40 mm during 120° rotation of the cam;
b) To dwell for next 45°;
c) To fall during next 150°, and
d) To dwell for the rest period of a revolution.

The displacement of the follower is to take place with simple harmonic motion during the rise and with uniform acceleration and uniform retardation during the return motion. The diameter of the cam shaft and the roller is 40 mm and 25 mm respectively. The line of stroke of the follower is off-set 12.5 mm from the center of the cam. Construct the displacement diagram of the follower and profile of a cam based on the information stated. **(20 marks)**

QUESTION FOUR (20 MARKS)

Fig Q 4 shows the primary views of the components of a castor. The complete list of parts is as follows:

ITEM	DESCRIPTION	QUANTITY
1	Top plate	1
2	Frame	2
3	Wheel	1
4	Axle	1
5	Bush	2
6	M10 hexagonal head bolt	4

i. Draw as an assembly drawing, to scale 1:1, a full-sectional front view of the castor. **(18 marks)**

ii. Insert a suitable title and scale centrally below the drawing. **(2 marks)**

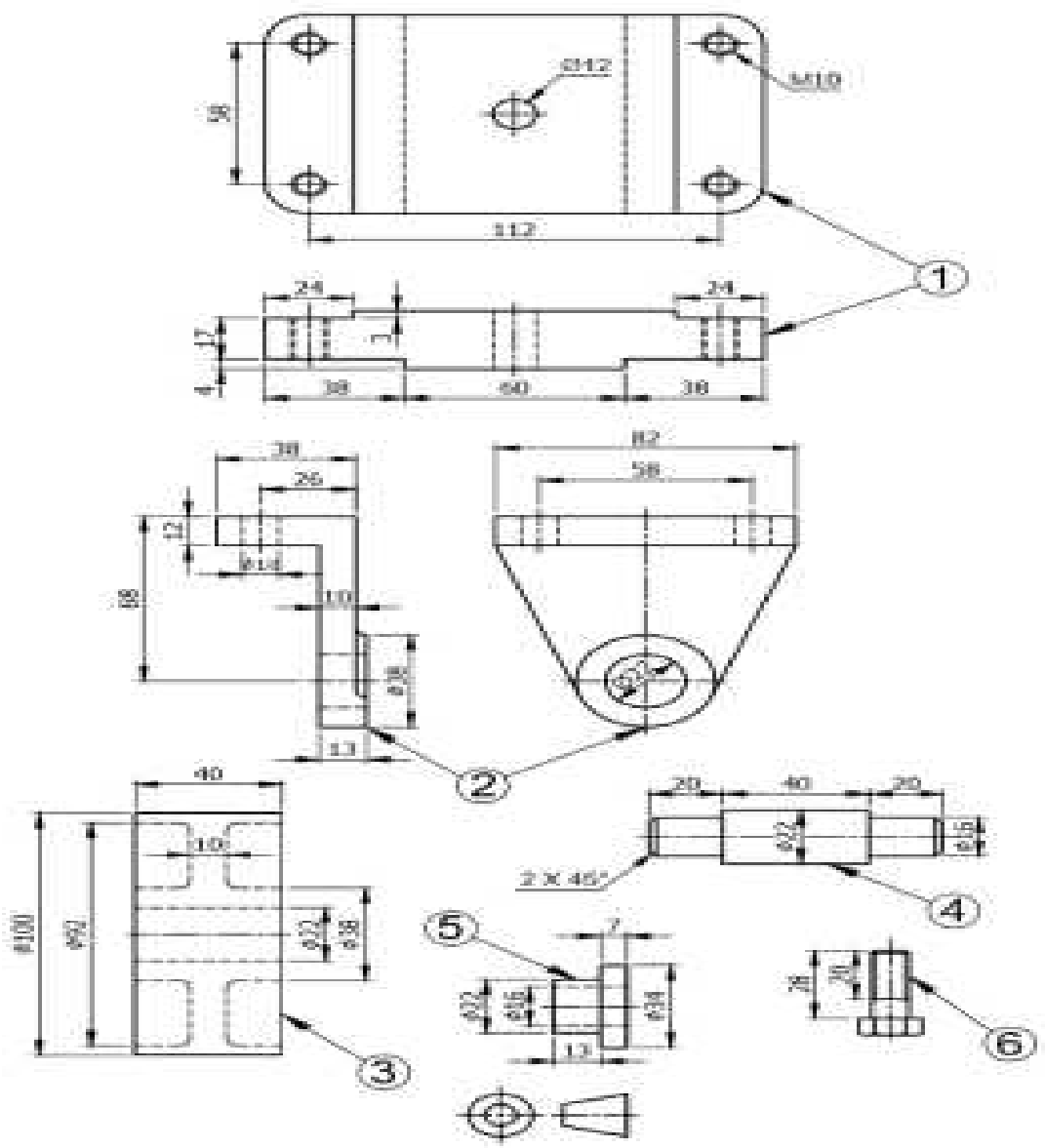

Fig Q 4

QUESTION FIVE (20 MARKS)

a) The orthographic views in Fig. Q 5 (a) are given in the first angle projection. Sketch (***not to scale but in approximate dimensional proportions***) the isometric/pictorial projection of these views. **(7 Marks)**

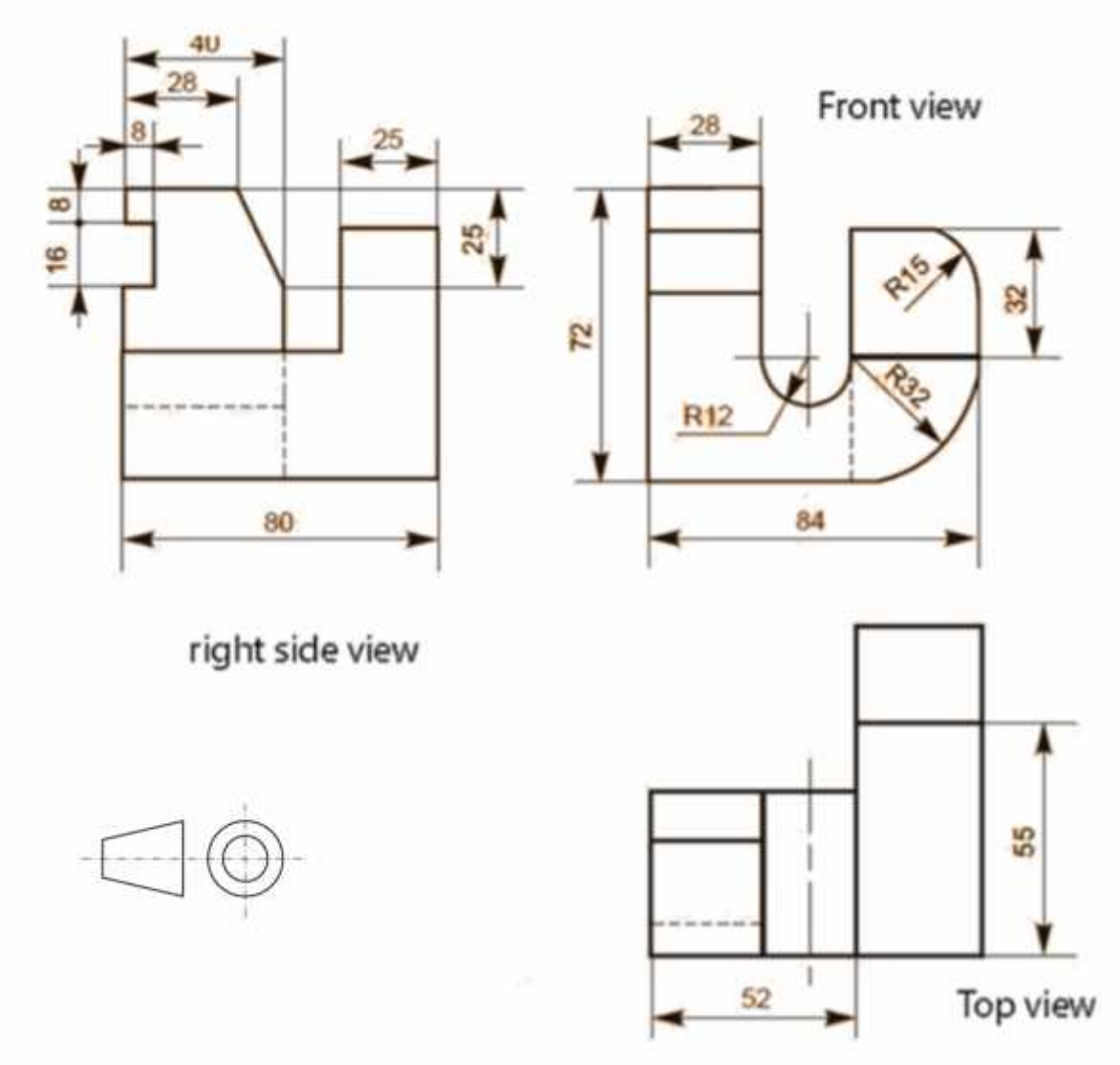

Fig. Q 5 (a)

b) A cylinder of 70mm diameter and 100 mm axis is completely penetrated by a cone of 80 mm diameter and 120 mm long axis horizontally. Both axes intersect & bisect each other. Draw projections showing curves of intersections. **(10 Marks)**

c) Draw symbols of the following electrical and electronic items according to BS 5070 and BS 3939 and state their uses;

(i) Potentiometer **(1 Mark)**

(ii) Reversing Switch **(1 Mark)**

(iii)LED **(1 Mark)**