



MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

**SECOND YEAR SECOND SEMESTER EXAMINATION FOR BACHELOR OF
SCIENCE IN MECHANICAL ENGINEERING**

EMM 101: ENGINEERING DRAWING AND DESIGN II

DATE: 20/6/2017

TIME: 8:30 – 10:30 AM

INSTRUCTIONS

1. This paper contains **FIVE (5)** questions.
2. You are required to attempt **THREE (3)** questions only
3. Attempt question **ONE (COMPULSORY)** and any other two questions
4. Question one carries **30 marks** and the others carry **20 marks** each.
5. Construction lines should be faint and should not be erased.
6. All dimensions are in **millimeters** unless otherwise stated.
7. BS4500A sheet is provided.

QUESTION ONE (30 MARKS) (COMPULSORY)

Fig. Q1 shows 4 components of a lever. Draw the following in FIRST ANGLE orthographic projection for the fully assembled lever:

- a) Sectional front view through plane A-A. (14 marks)
- b) Plan view. (7 marks)
- c) Parts List and title block. (5 marks)
- d) A projection symbol according to ISO conventions. (2 marks)
- e) Include **Four** main dimensions (2 marks)

QUESTION TWO (20 MARKS)

Fig. Q2 shows an isometric view of a shaft support. Draw the following views in First Angle Projection;

- a) A full section of the front view. The arrow indicates the direction from which to obtain the front view. (9 marks)
- b) Plan view (6 marks)
- c) Include **six** principle dimensions (3 marks)
- d) Appropriate projection symbol (2 marks)

QUESTION THREE (20 MARKS)

- a) With the aid of diagrams, illustrate each of the following:
 - i. Clearance fit (2 marks)
 - ii. Transition fit (2 marks)
 - iii. Interference fit (2 marks)
- b) Using the data sheet 4500A (selected ISO Fits- Hole Basis) extracted from BS 4500 provided for the shaft and hole nominal sizes of 10 H9 e9 calculate:
 - i. Maximum diameters (2 marks)
 - ii. Minimum diameters (2 marks)
 - iii. Tolerances (2 marks)
- c) Draw the roughness symbol and indicate how various surface roughness specifications are placed relative to the symbol. (3 marks)

- d) Fig. Q3 shows two drawings. Sketch each of the two drawings and fill the tolerance frame indicating the appropriate correct geometrical tolerances to satisfy the following conditions. (5 marks)

Characteristic	Tolerance
Angularity	0.3
Concentricity	0.1

QUESTION FOUR (20 MARKS)

- a) Draw symbols of the following electrical and electronic items according to BS 5070 and BS 3939:
- i. Capacitor (1 mark)
 - ii. Resistor (1 mark)
 - iii. Potentiometer (1 mark)
 - iv. PNP Transistor (1 mark)
 - v. NPN Transistor (1 mark)
 - vi. Diode (1 mark)
- b) Draw a simple circuit diagram having a switch, a battery and two resistors in parallel using the correct electronic symbols. (4 marks)
- c) Fig. Q4b shows a double-line drawing for a system of pipes and pipe fittings. Redraw the figure as a single- line drawing and label all the fittings. (10 marks)

QUESTION FIVE (20 MARKS)

- a) Using neat sketches illustrate the following types of sectional views:
- i. Offset section (2 marks)
 - ii. Broken section (2 marks)
 - iii. Revolved section (2 marks)
 - iv. Half section (2 marks)

- b) Using a well labeled diagram of and external thread show the following; (6 marks)
- i. Thread angle
 - ii. Crest and Root
 - iii. Major and minor diameter
 - iv. Thread depth and flank
- c) Using well labeled diagrams illustrate types of thread forms. (6 marks)
- i. Square thread
 - ii. ACME thread
 - iii. Metric thread

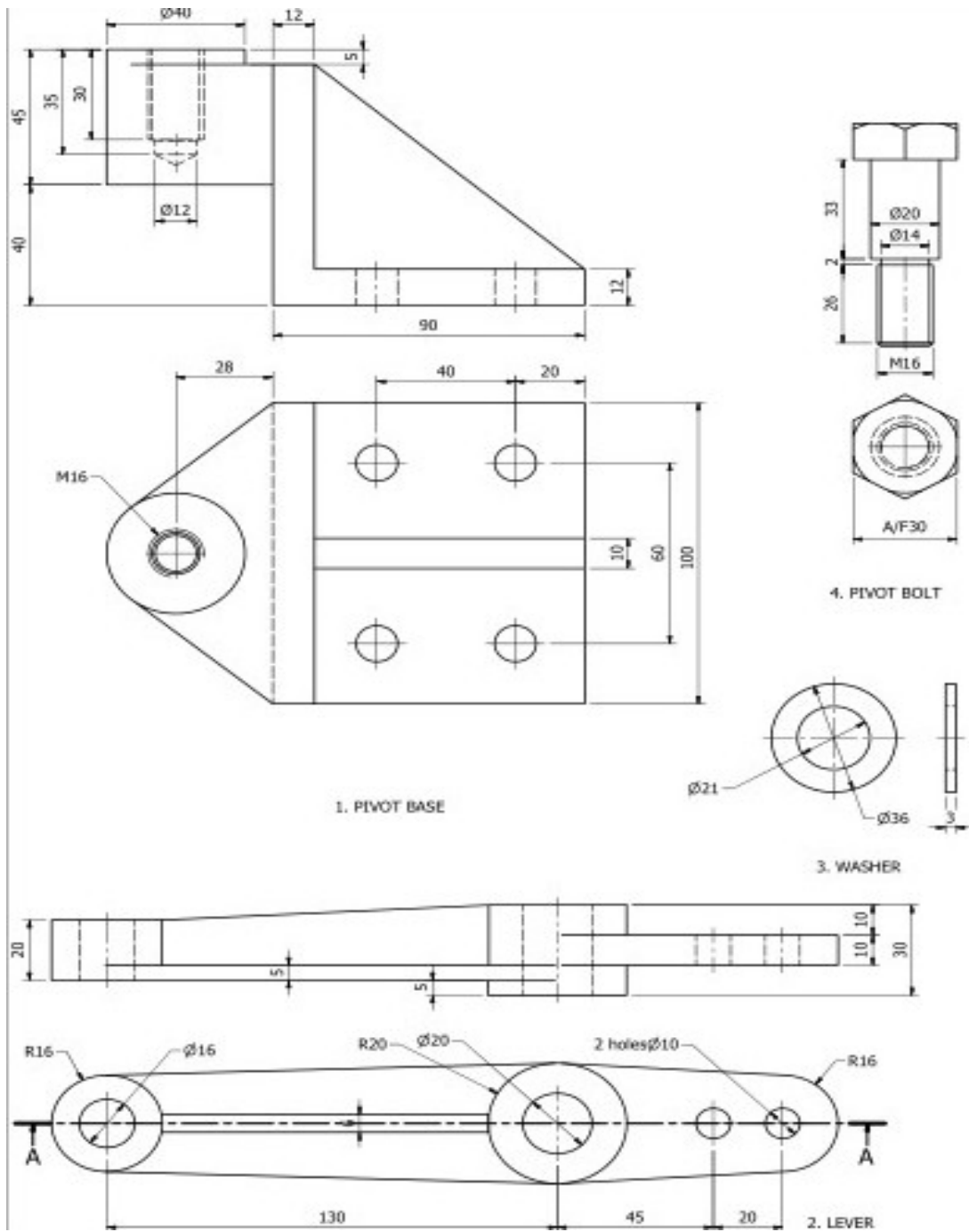


Fig. Q1

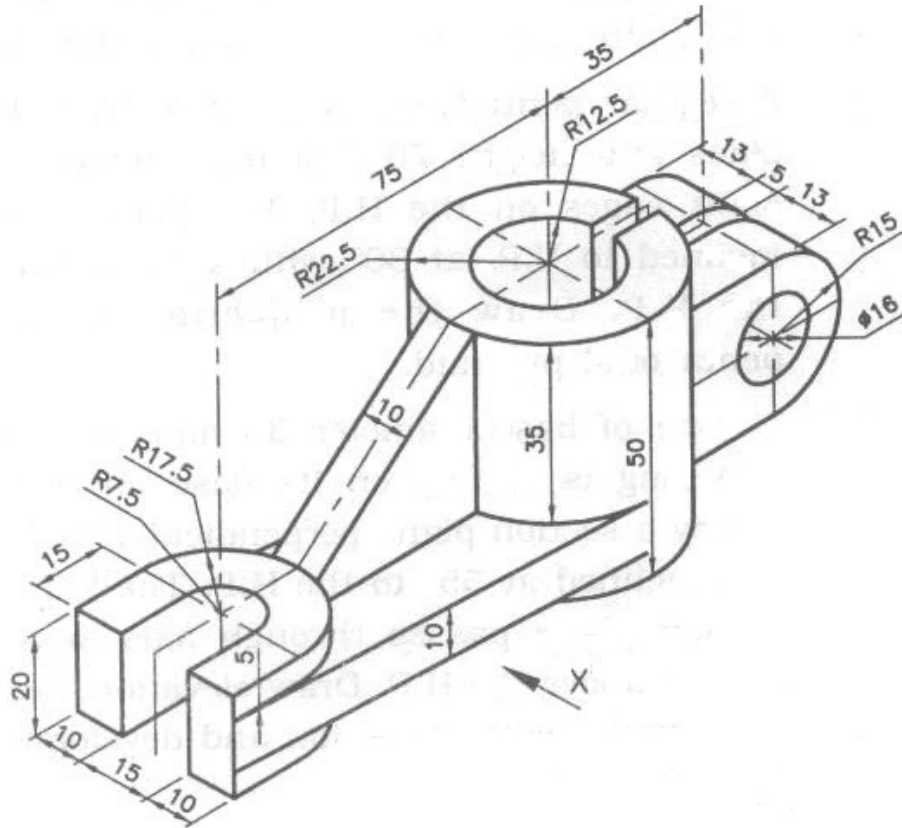


Fig. Q2

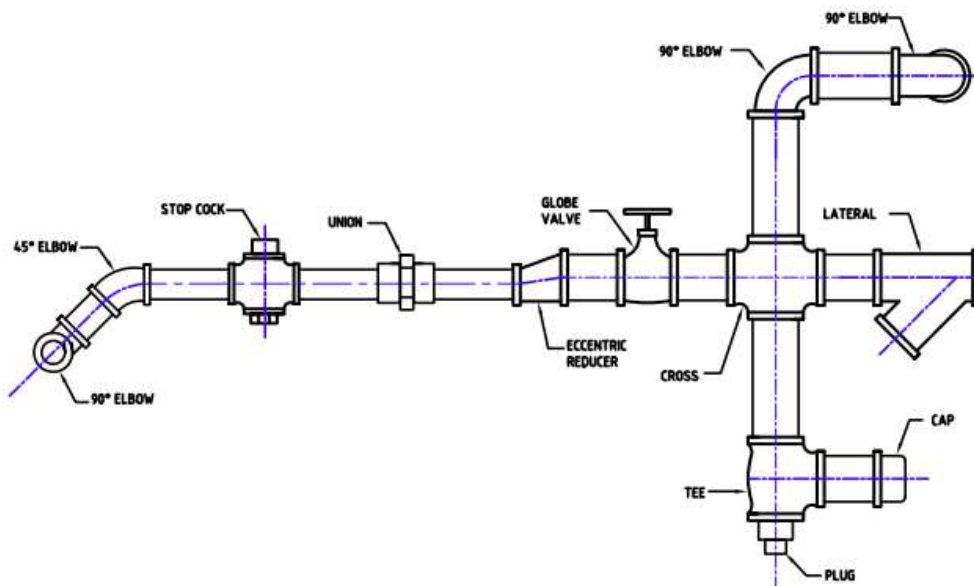


Fig. Q4c