



MACHAKOS UNIVERSITY

University Examinations for 2021/2022 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FIRST YEAR SECOND SEMESTER EXAMINATIONS FOR

BACHELOR OF SCIENCE (MECHANICAL ENGINEERING)

EMM 121: ENGINEERING DRAWING & DESIGN II

DATE: 30/5/2022

TIME: 2.00-5.00 PM

INSTRUCTIONS

1. This paper contains FIVE questions.
2. Answer Question **ONE** and any other **TWO** questions
3. All dimensions are in millimetres unless otherwise stated.
4. Construction lines should be faint and should not be erased.
5. Accuracy and good line work are essential.

QUESTION ONE (30 MARKS)

The parts drawings of a pulley assembly are shown in **Fig. Q1: Parts 1 to 5**. The components of the pulley are assembled as shown in **Fig. Q1; assembly**.

Draw in third angle projection:

- a) The **Sectional Front View** of the assembly from the front elevation through the centre plane (plane of symmetry) of the pulley assembly as shown in **Fig. Q1: Assembly** (14 marks)
- b) The **End elevation** of the assembly from the right as indicated in **Fig. Q1: assembly**. (Do not indicate the dimensions and hidden details) (10 marks)
- c) Insert a parts list showing all the components. (3 marks)
- d) Insert a suitable title block (3 marks)

QUESTION TWO (20 MARKS)

- a) i. Define clearly the term tolerance and explain its significance in machining (3 marks)
- ii. Distinguish between unilateral and bilateral tolerances (3 marks)
- b) With the aid of sketches, Describe clearly the three types of fits. (6 marks)
- c) Using the data sheet BS 4500A, calculate the working limits of the different parts in the assembly drawing shown in Fig Q 2c. (8 marks)

QUESTION THREE (20 MARKS)

- a) Fig.Q3a) shows a scale layout of a piping system. Develop a schematic drawing of the piping system in appropriate conventional symbols using a suitable scale. Missing dimensions may be reasonably assumed. (10 marks)
- b) Fig. Q3b) shows a schematic drawing of a radio kit. Redraw the circuit with the proper symbols for the missing components (include component designation and their values) (10 marks)

QUESTION FOUR (20 MARKS)

Threaded fasteners are commonly used to form temporary joints between two or more components.

- a) Define and **Illustrate** with a suitable sketch, the following terms as used in screw threads:
 - i. Pitch
 - ii. crest
 - iii. Root
 - iv. Flank (6 marks)
- b) A screw thread profile is designated as SQ42x10. Explain with a sketch (3 marks)
- c) Sketch the conventional representation of the following:
 - i. Internal threads
 - ii. Assembled threads in section
 - iii. Stud
 - iv. Stud joint with a washer (6 marks)
- d) Illustrate the hexagonal bolt and nut assembly using the elevation and its side view, given the major diameter (d) as 100 mm. (5 marks)

QUESTION FIVE (20 MARKS)

Fig. Q5 shows a machine element. Draw in full size, the following views in **FIRST ANGLE** orthographic projection:

- a) The Sectional Front view B-B. (7 marks)
 - b) End Elevation. (5 marks)
 - c) A plan view (5 marks)
- Include 6 major dimensions (radii, diameter, 2 major and 2 minor dimensions) (3 marks)

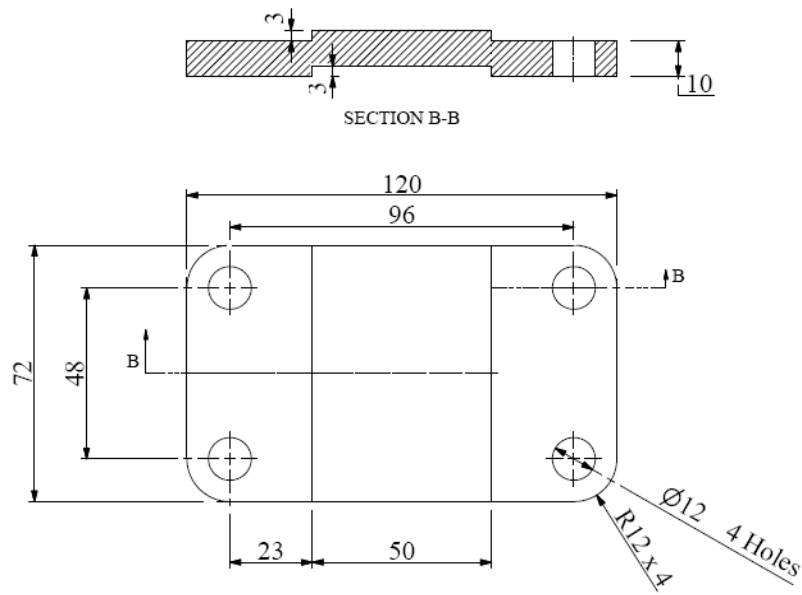


Fig Q1: Part 1

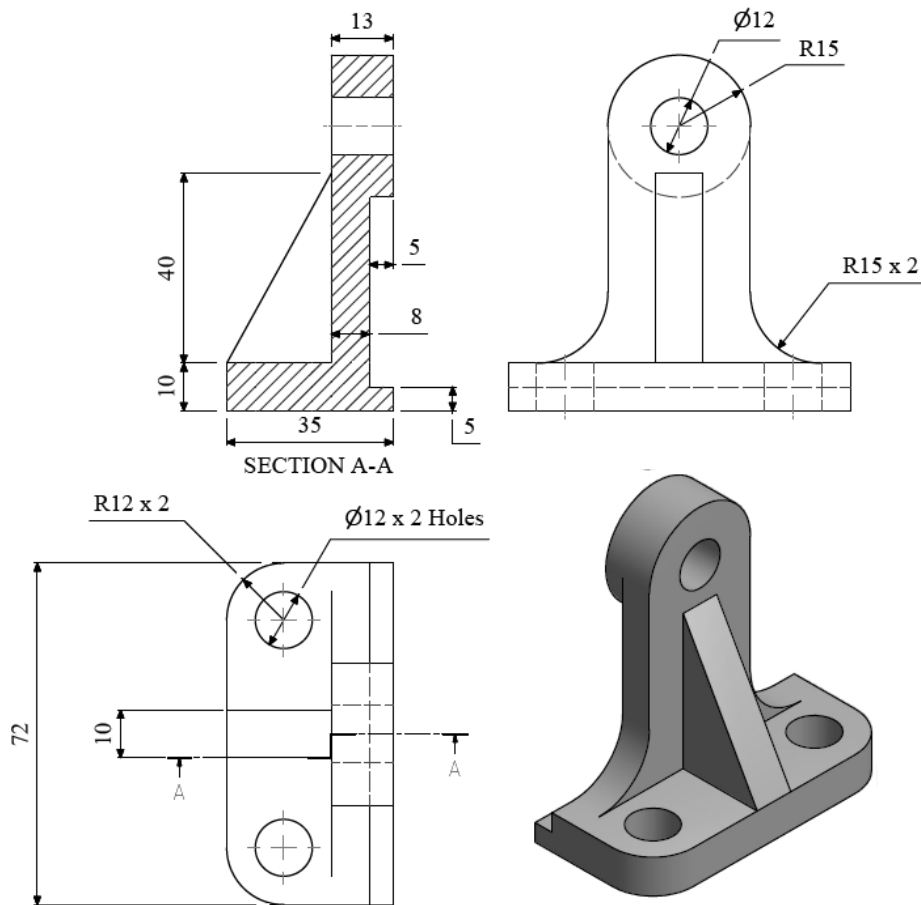


Fig Q1: Part 2

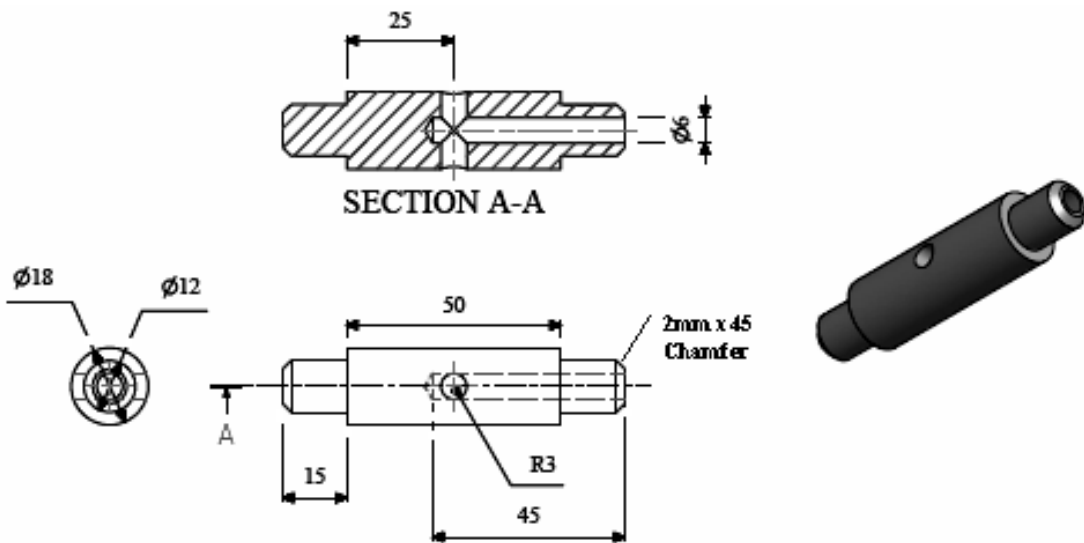


Fig Q1: Part 3

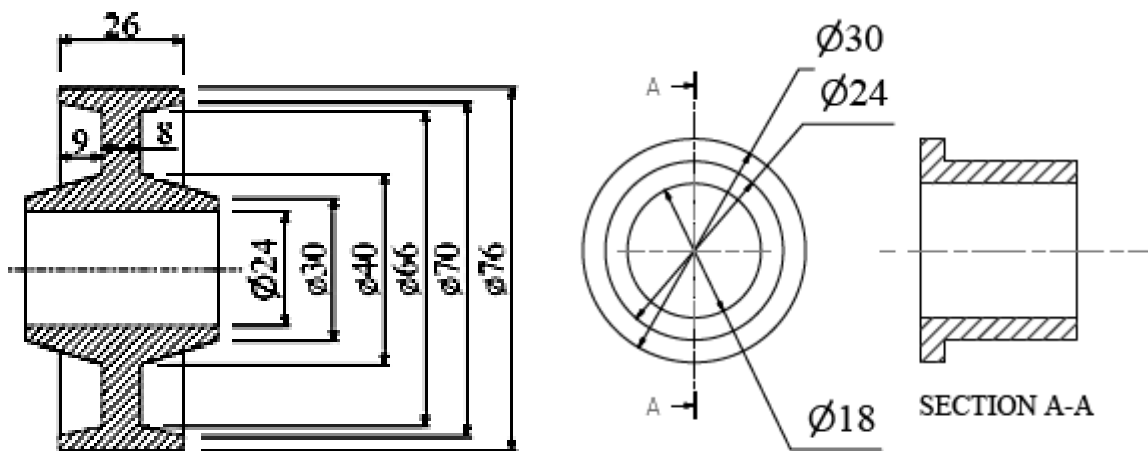
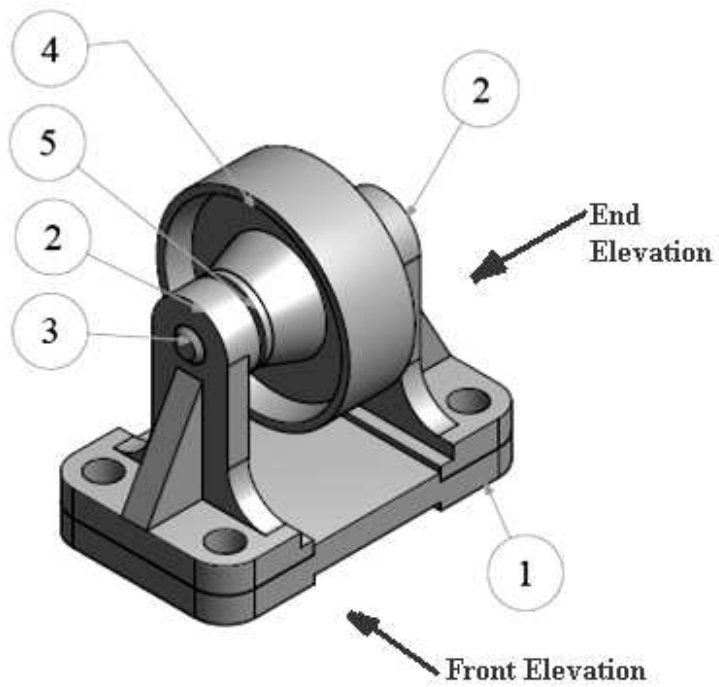


Fig Q1: Part 4

Fig Q1: Part 5



Parts List	
PART NUMBER	QTY
1	1
2	2
3	1
4	1
5	2

Fig Q1: Assembly

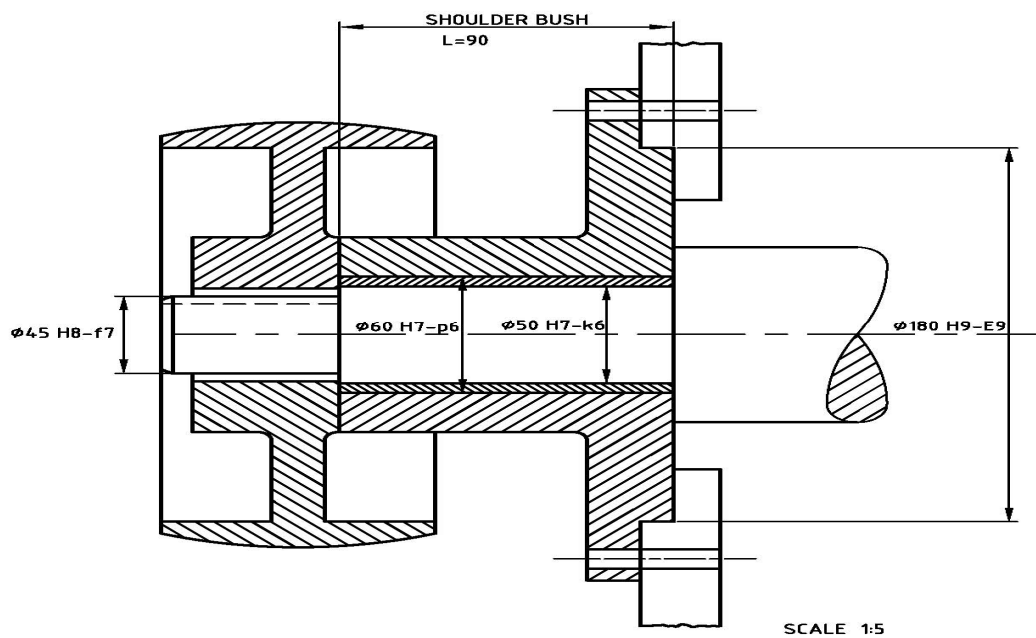


Fig. Q 2c

Extracted
from
BS 4500 : 1969

BRITISH STANDARD

SELECTED ISO FITS—HOLE BASIS

Data Sheet
4500A
Issue 1, February 1970
confirmed August 1985

Clearance fits										Transition fits						Interference fits					
+																					
Diagram to be used for 25 mm diameter																					
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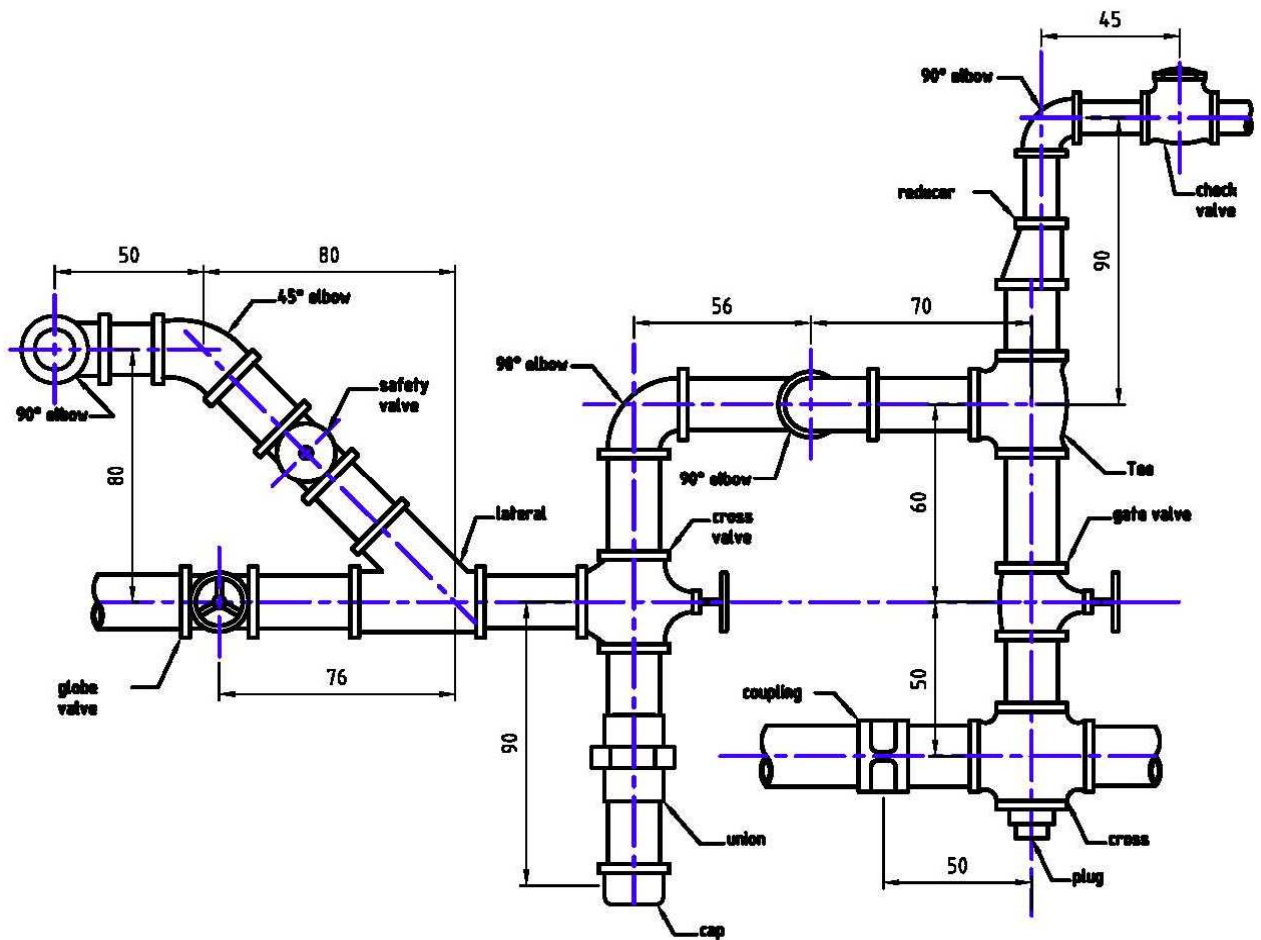


Fig. Q 3 a)

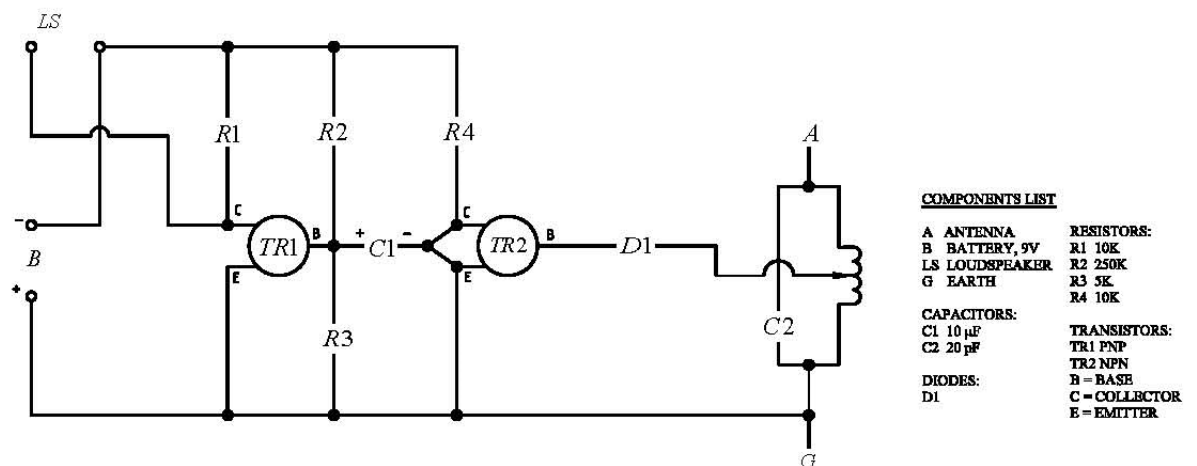


Fig. Q 3 b)

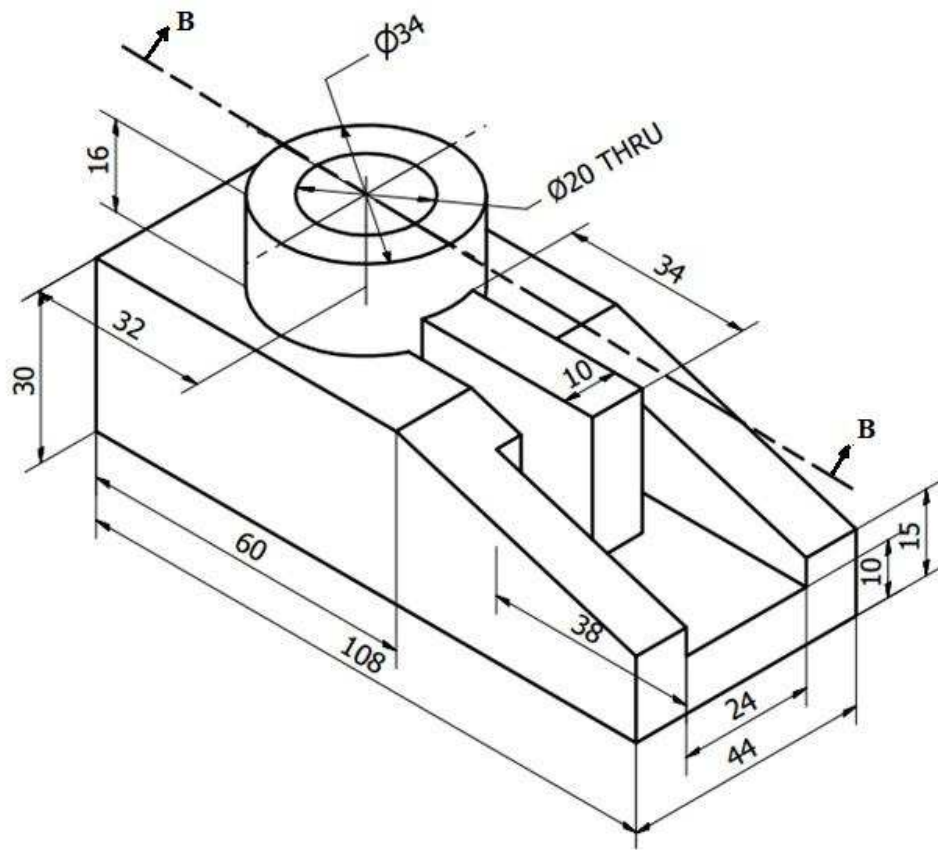


Fig. Q 5