



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FIRST YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (MECHANICAL ENGINEERING)

EMM 101: ENGINEERING DRAWING & DESIGN II

DATE: 26/3/2021

TIME: 8.30-10.30 AM

INSTRUCTIONS

- This paper contains **FIVE (5)** questions.
- Question **ONE** is **COMPULSORY** and carries 30 marks
- Answer any other **TWO (2)** questions that carry 20 marks each.
- All dimensions are in millimeters.

SECTION ONE (COMPULSORY)

(30 MARKS)

QUESTION ONE

Figure: Question 1 shows seven parts of a belt pulley unit, a support bracket, a spindle, two washers, a bush, a pulley, a key, and a hexagonal nut drawn in first angle orthographic projection. Draw full size in first angle projection the following views:

- A sectional front elevation of the Pulley unit assembly on the vertical cutting plane A-A. (10 marks)
- End elevation (7 marks)
- A plan view. (7 marks)
- Insert a parts list showing all the components. (3 marks)
- Insert a suitable title block (3 marks)

SECTION TWO (ANSWER ANY TWO) (20 MARKS EACH)

QUESTION TWO

- a) State the three principle considerations in establishing reasonable tolerances and explain briefly the connection between them. (4.5 marks)
- b) With the aid of sketches, illustrate the following types of fits:
- i. Clearance (1.5 marks)
 - ii. Transition (1.5 marks)
 - iii. Interference (1.5 marks)
- c) Figure: Question 2 (c) shows a pulley assembly. Using the data sheet BS 4500A, calculate the working limits of the different parts in the assembly. (11 marks)

QUESTION THREE

- a) Figure: Question 3 (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. Missing dimensions may be reasonably assumed. (10 marks)
- b) Figure: Question 3 (b) shows a schematic drawing of a radio kit. Redraw the circuit with the proper symbols for the components missing and include component designation and their values. (10 marks)

QUESTION FOUR

- a) Using well labelled sketches, illustrate the following thread fasteners:.
- i. Sectional view of a cap screw, (3 marks)
 - ii. Machine screw with a nut (round head) (3 marks)
- b) Describe the following thread forms using neat and well labelled sketches:.
- i. External ISO metric thread (2 marks)
 - ii. ACME thread (2 marks)
- c) Illustrate the hexagonal bolt and nut assembly using the elevation and its side view, given the major diameter (d) as 100 mm. (10 marks)

QUESTION FIVE

Figure: Question 5 shows a machine element. Draw in full size, the following views in **FIRST ANGLE** orthographic projection:

- a) The **FULL** section of the front view along B-B. (7 marks)
 - b) End Elevation. (5 marks)
 - c) A plan view projected from the front and end elevation. (5 marks)
- Include 6 major dimensions (radii, diameter, 2 major and 2 minor dimensions) (3 marks)

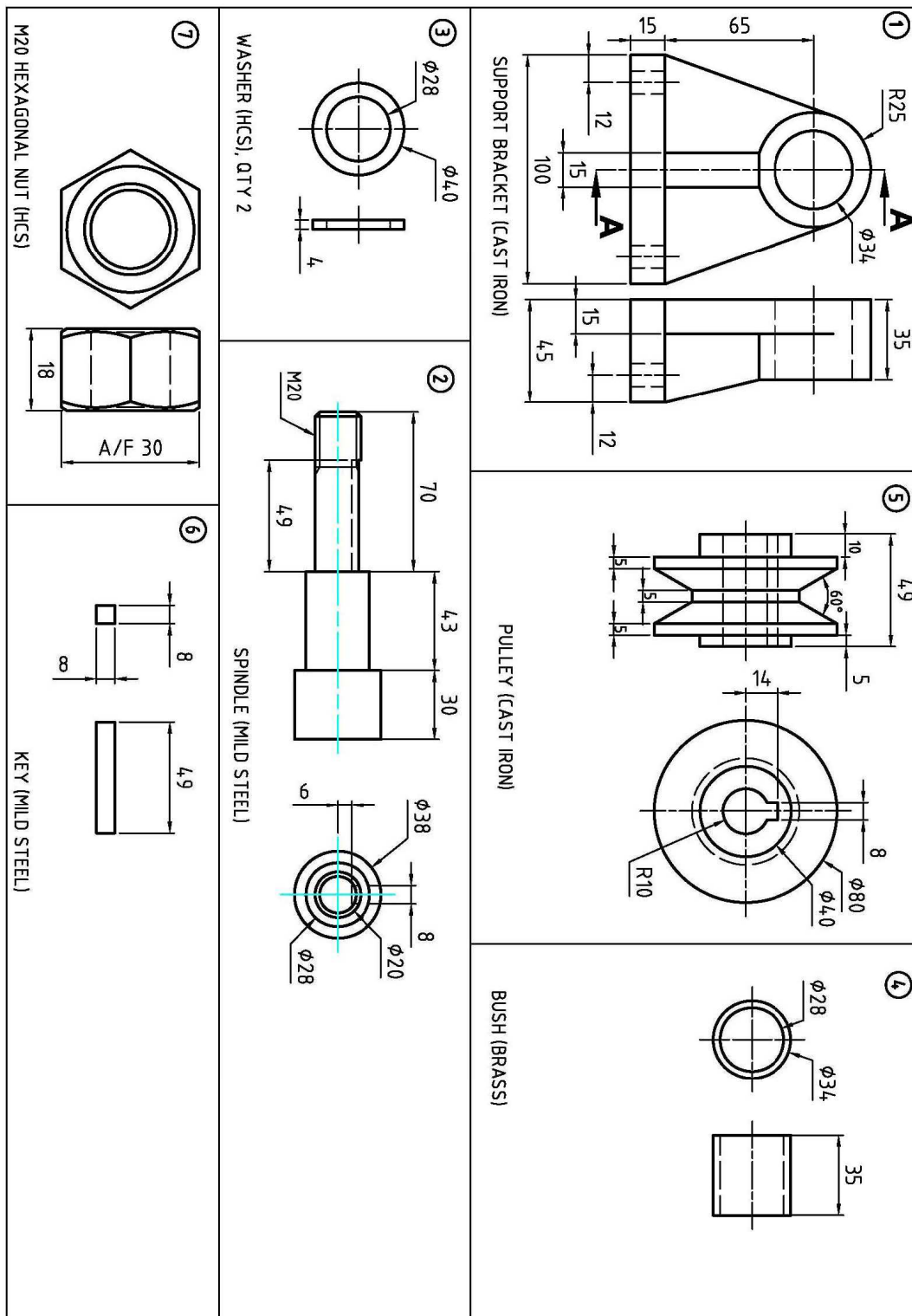


Figure: Question 1

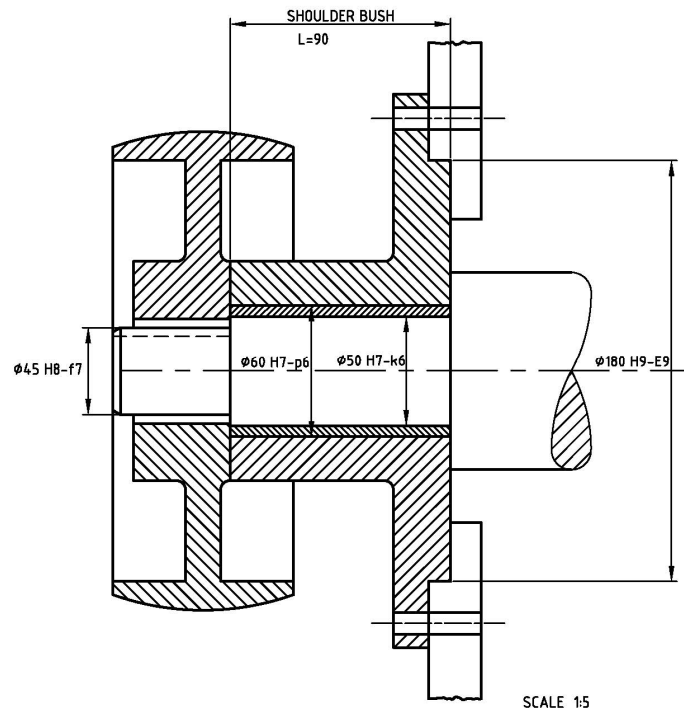


Figure: Question 2 (c)

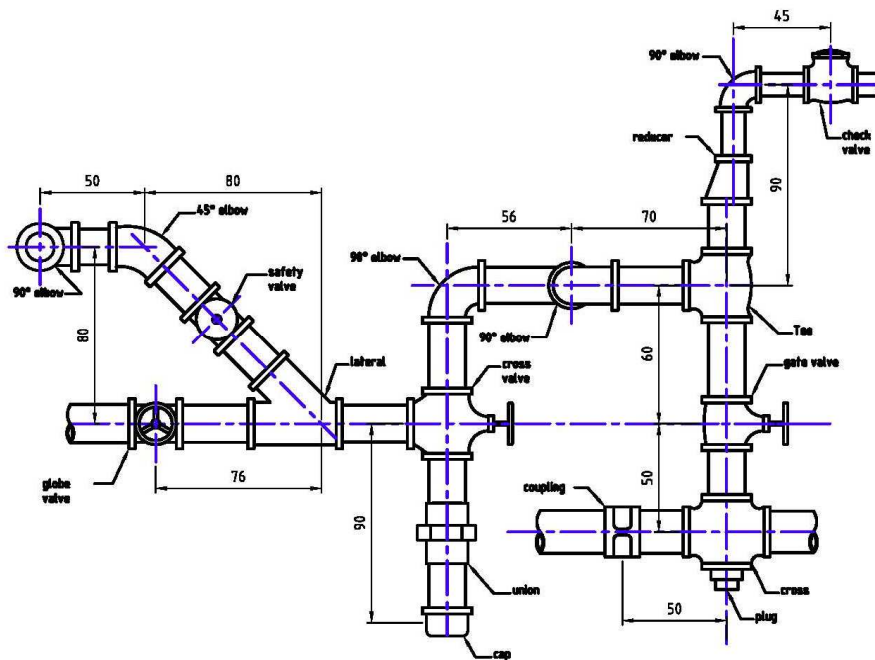


Figure: Question 3 (a)

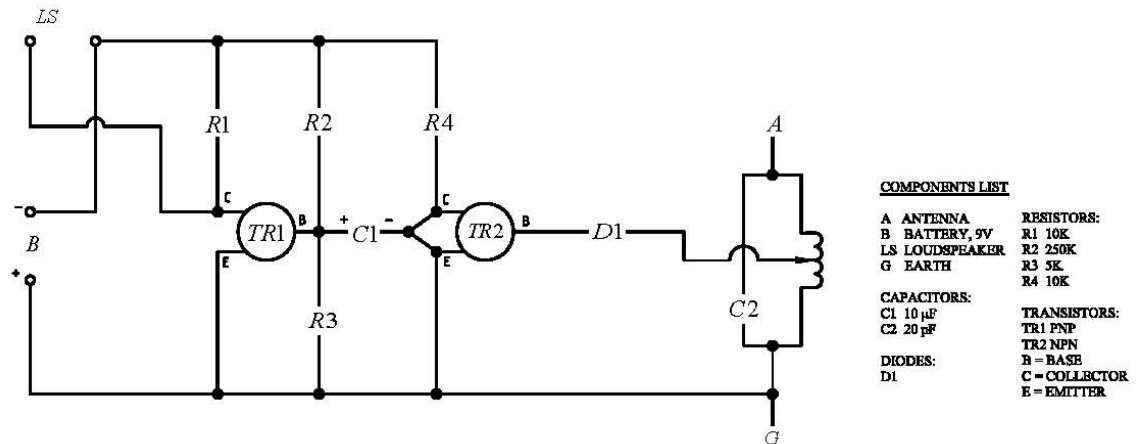


Figure: Question 3 (b)

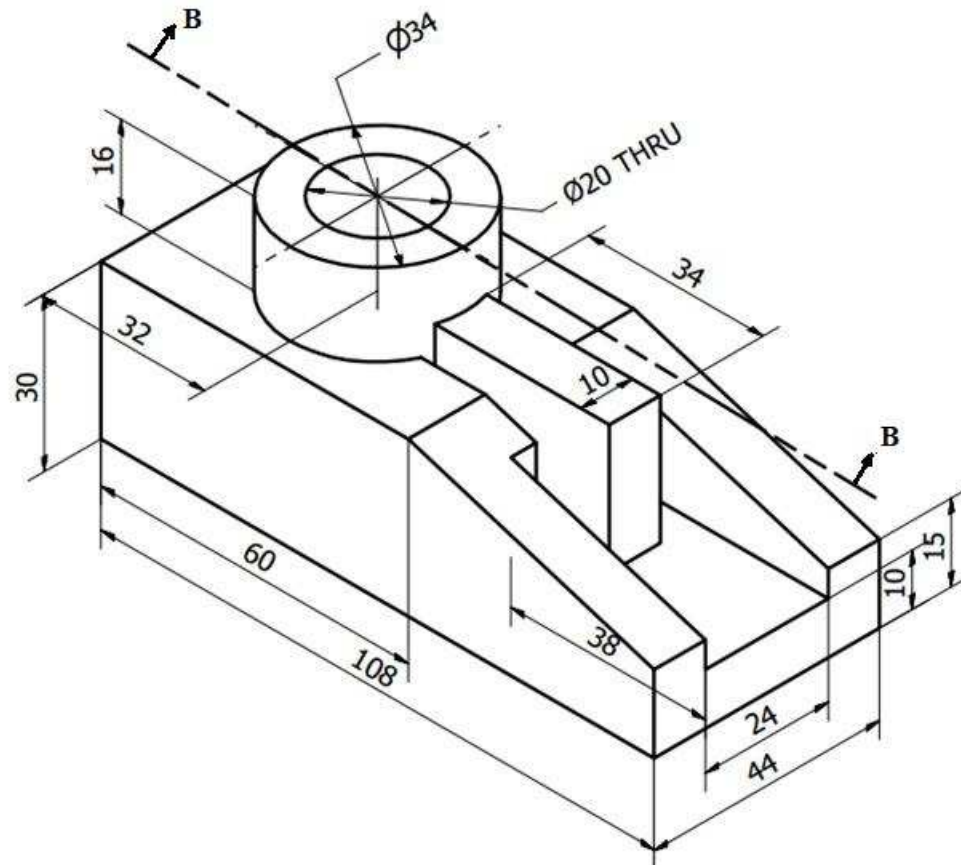


Figure: Question 5