



MACHAKOS UNIVERSITY

University Examinations 2020/2021

**FIRST YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR THE
DEGREE OF BACHELOR OF SCIENCE MECHANICAL ENGINEERING
EMM 101: ENGINEERING DRAWING & DESIGN II**

DATE: AUGUST 2021

TIME: 3 HOURS

INSTRUCTIONS

- I) This paper contains **FIVE (5)** questions.
- II) Question **ONE** is **COMPULSORY** and carries 30 marks
- III) Answer any other **TWO (2)** questions that carry 20 marks each.
- IV) 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) A sectional front elevation of the Pulley unit assembly on the vertical cutting plane A-A. [10 marks]
- b) End elevation [7 marks]
- c) A plan view. [7 marks]
- d) Insert a parts list showing all the components. [3 marks]
- e) 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]

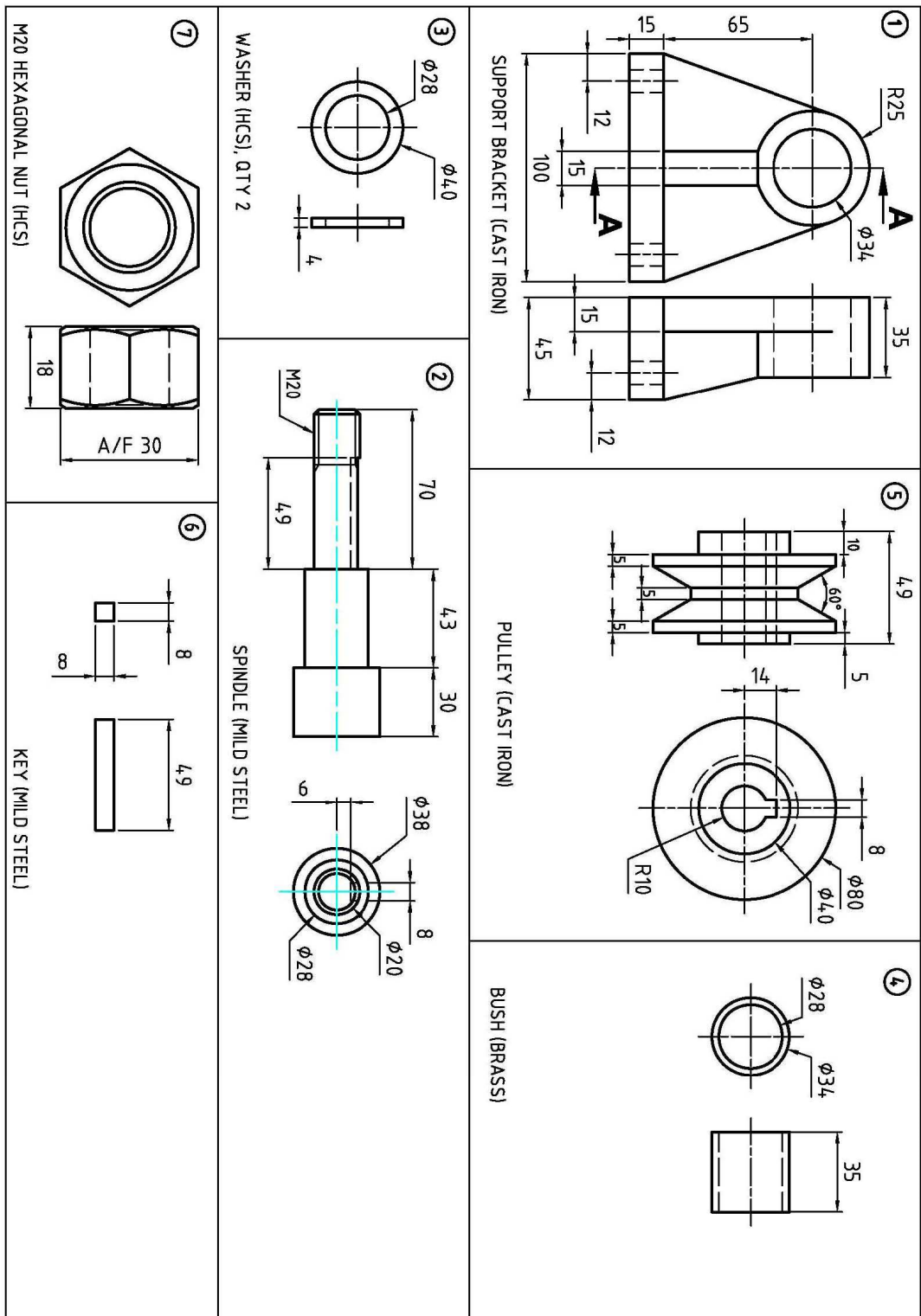


Figure: Question 1

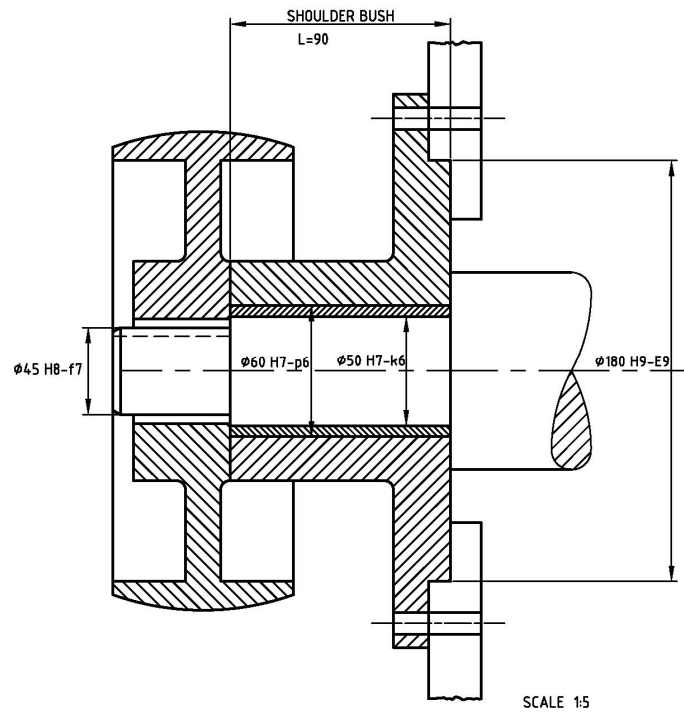


Figure: Question 2 (c)

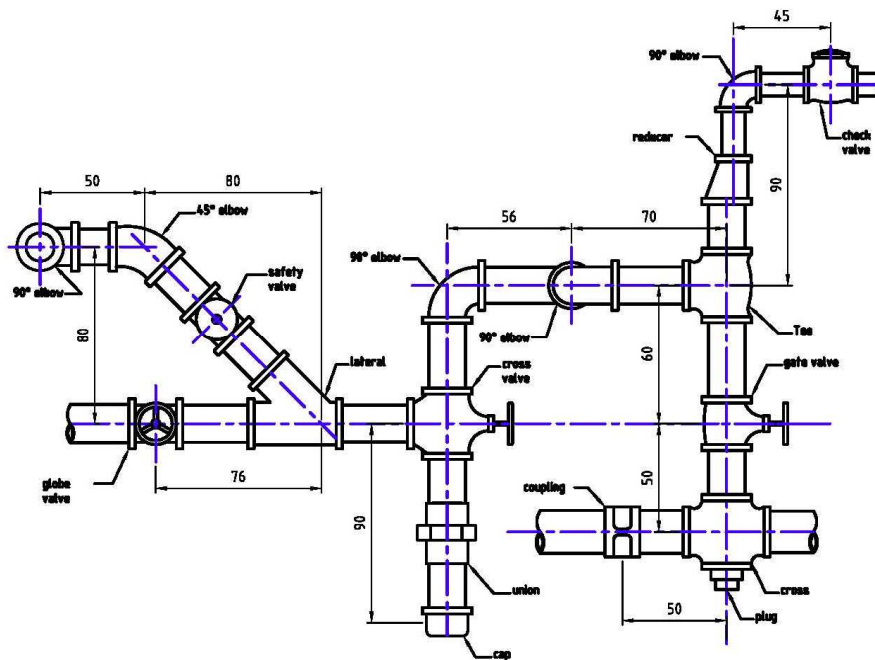


Figure: Question 3 (a)

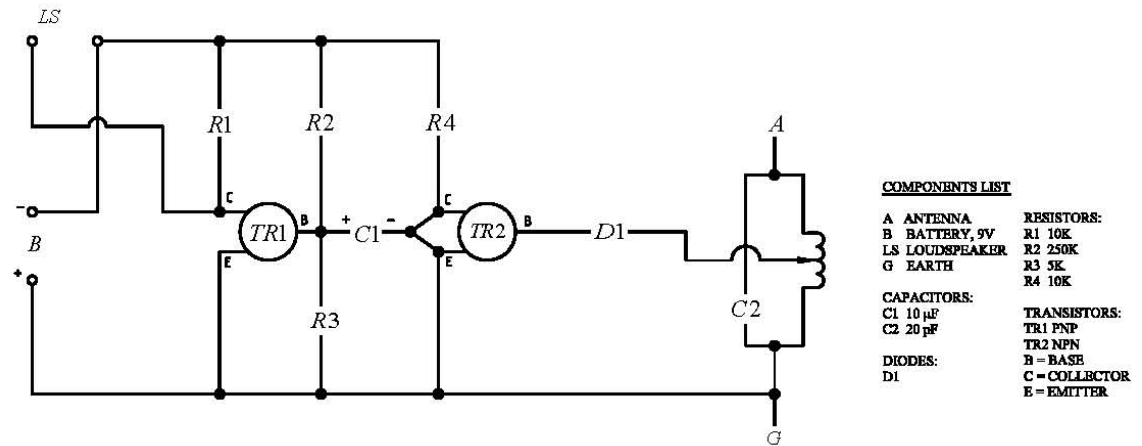


Figure: Question 3 (b)

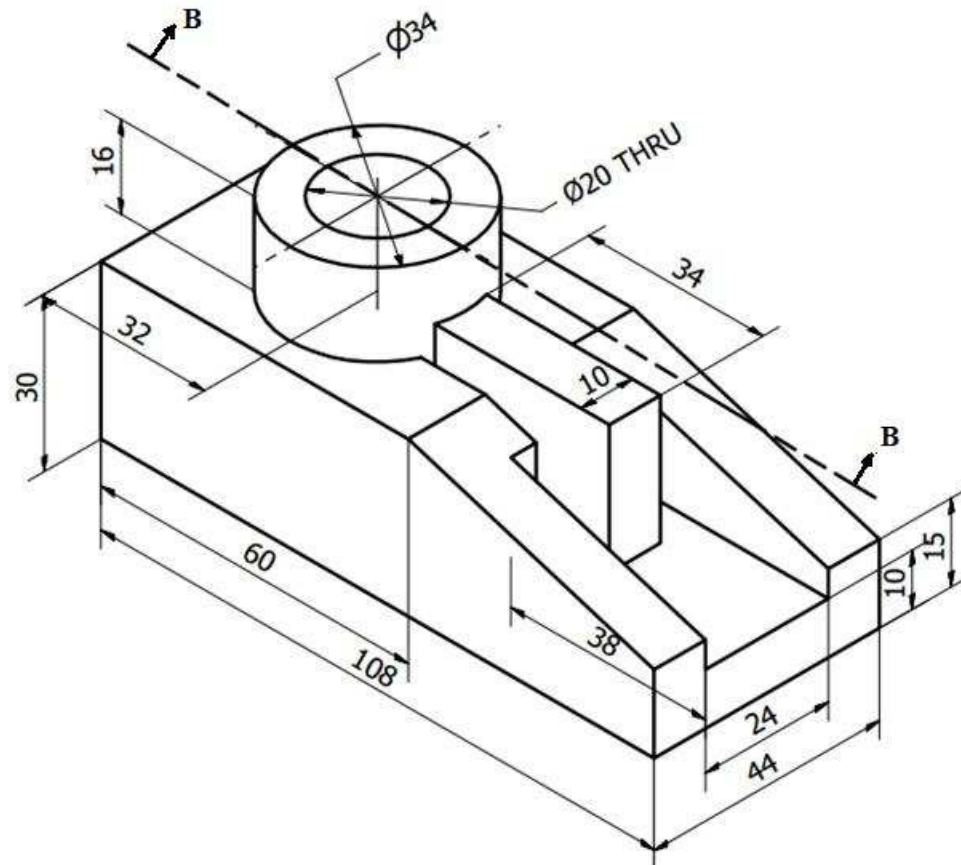


Figure: Question 5