MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FIRST YEAR SPECIAL/SUPPLIMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (MECHANICAL ENGINEERING)

EMM 101: ENGINEERING DRAWING & DESIGN II

DATE: 26/3/2021 **TIME: 8.30-10.30 AM**

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 briefy 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)

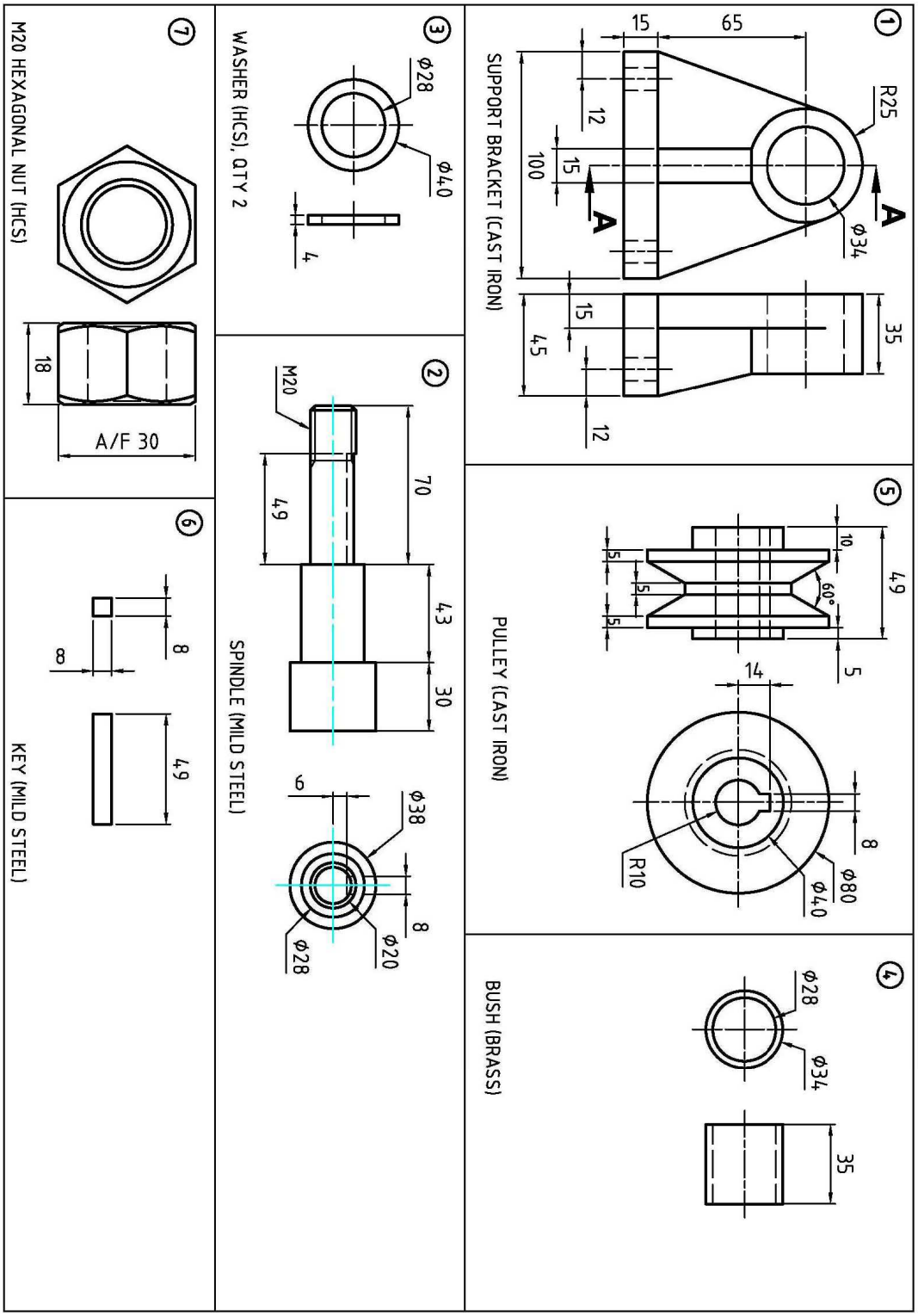

Figure: Question 1

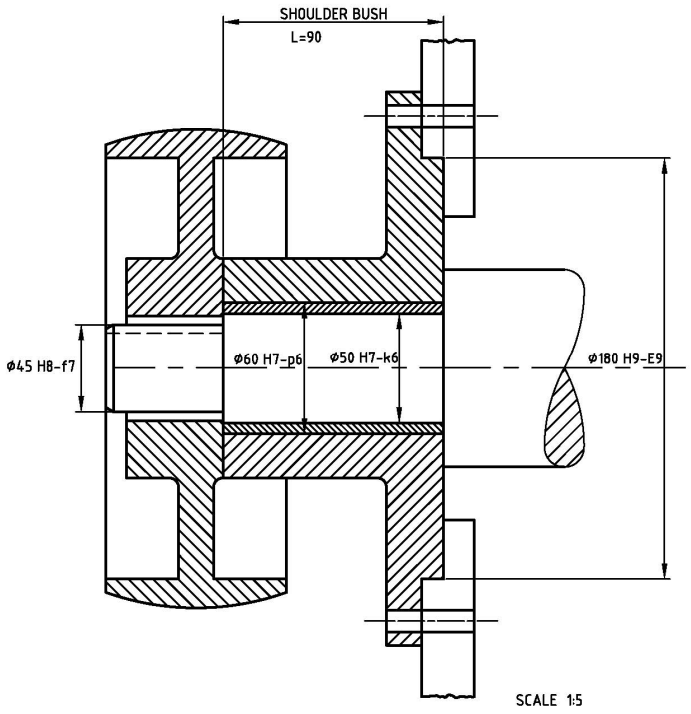

Figure: Question 2 (c)

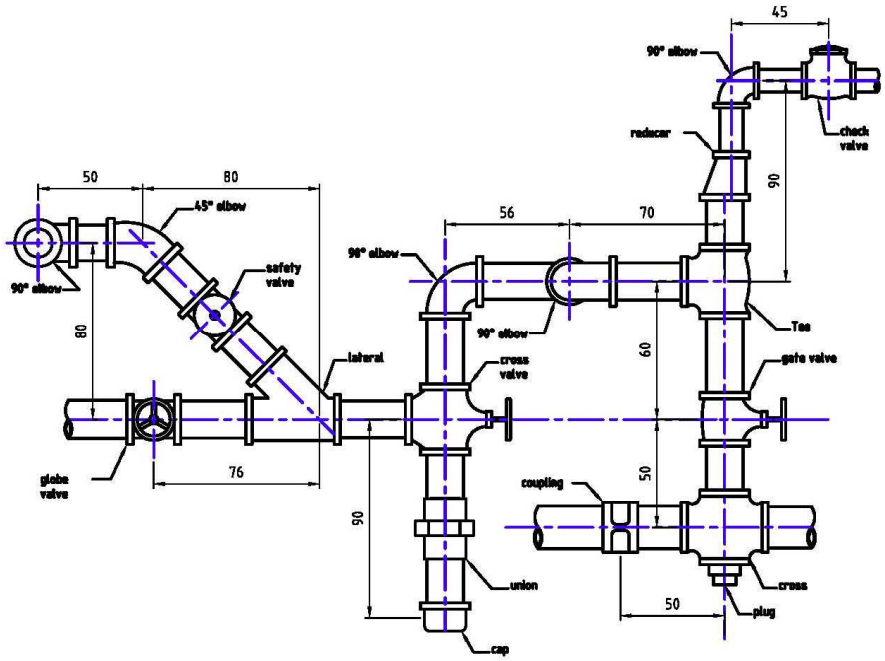

Figure: Question 3 (a)

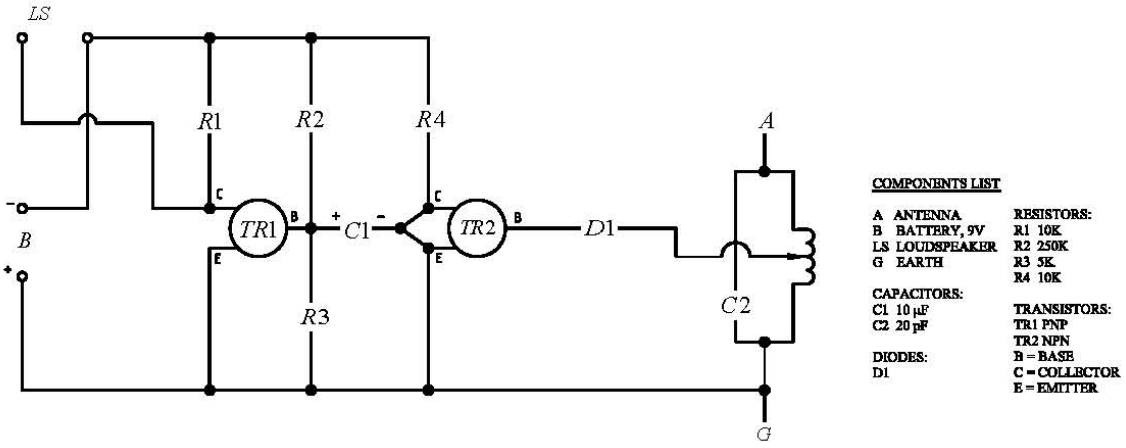

Figure: Question 3 (b)

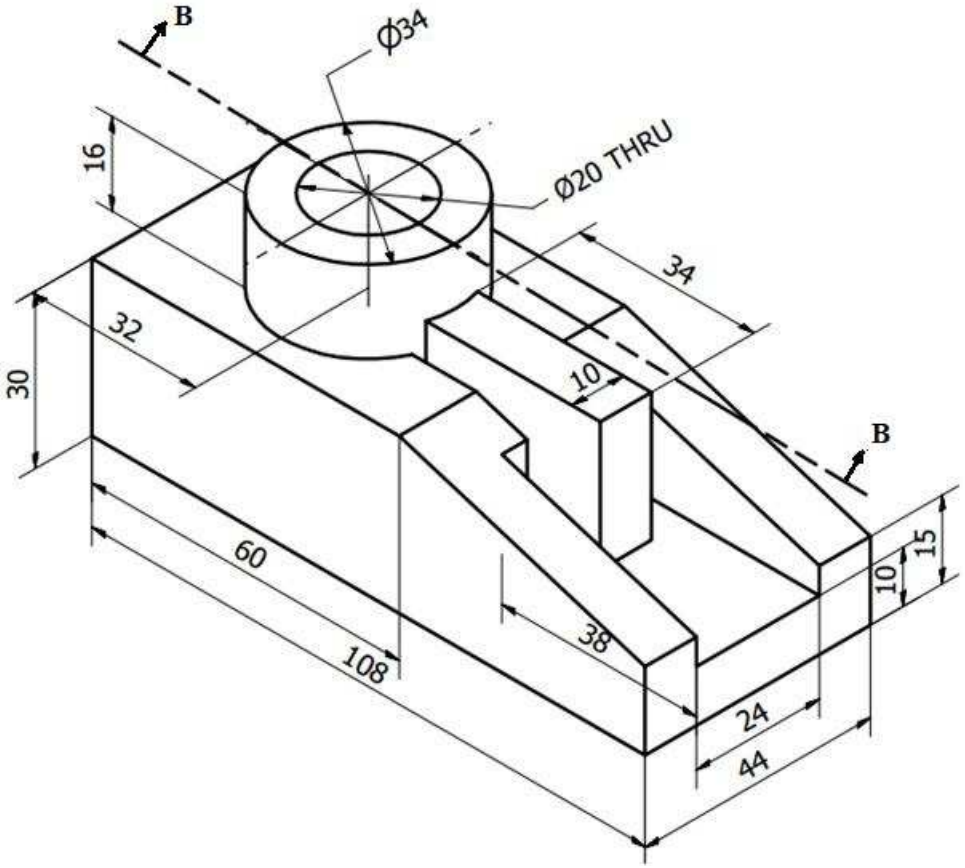

Figure: Question 5