MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL ENGINEERING.

UNIVERSITY ORDINARY EXAMINATION

2024/2025 ACADEMIC YEAR

THIRD YEAR **FIRST** SEMESTER EXAMINATION FOR BACHELOR OF TECHNOLOGY IN MECHANICAL ENGINEERING

EMT 303– ENGINEERING DESIGN I

DURATION: 2 HOURS

INSTRUCTIONS TO CANDIDATES:

1. Answer question ONE and any other two questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

SECTION A – ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

(a) Define the following terms as used in engineering design:

i. Ergonomics
ii. Anthropometrics
iii. Aesthetics (3 marks)

(b) State the objectives of Design for Manufacturing (DFM). (2 marks)

(c) Describe **FIVE** steps used in solving a design problem. (10 marks)

(d) State **TWO** advantages of using a Gantt chart and **THREE** for network diagrams. (5 marks)

(e) List any **FOUR** design considerations for a bearing element to be used on a propeller hub shaft. (2 marks)

(f) Describe **TWO** ways in which the cost of manufacturing a product can be reduced. (4 marks)

(g) Outline the objectives of audio-visual in project presentation. (4 marks)

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO (20 MARKS)

a) Highlight any **TWO** attributes that should be considered as the criteria of success for the design of a motor car engine cooler. (2 marks)

b) With relevant examples describe any **FIVE** types of controls grouped according to the mode of operation. (10 marks)

c) Using relevant examples discuss the following types of displays and their designs requirements:

i. Quantitative displays

ii. Qualitative displays (8 marks)

QUESTION THREE (20 MARKS)

A workshop you working in intends to invest in means of carrying equipment and tools within the production room. A decision was reached to fabricate a trolley which allows for loading and unloading. Design the desired trolley and show with the help of sketches, in good proportion the following aspects of your design;

i. Generate **TWO** possible design concepts for the trolley. (14 marks)

ii. Select the most suitable design concept in (i) and give reasons. (4 marks)

iii. Give **TWO** ways in which you can reduce or lower the cost of your design. (2 marks)

QUESTION FOUR (20 MARKS)

a) Distinguish between the terms 'symmetry' and 'balance' (2 marks)

b) Name and explain any **FIVE** good DFM objectives. (10 marks)

c) Discuss **FOUR** design constraints which must be addressed by design engineers for better design when undertaking design projects, products or processes. (8 marks)