



# MACHAKOS UNIVERSITY

University Examinations 2023/2024 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING  
FOURTH YEAR SECOND SEMESTER EXAMINATIONS FOR

BACHELOR OF MECHANICAL

EMM 414 – INDUSTRIAL ERGONOMICS      TIME: 2 HOURS

DATE

TIME

## INSTRUCTIONS

Answer Question one and *any other two questions*

## SECTION A

### QUESTION ONE – 30 MARKS

- a) A Production Engineer in car manufacturing company is in charge of many productions lines. The company produces different model of cars. Production runs 24 hours and employees works in shifts. Because of the increase in demand, the management is planning to increase production lines. To accommodate more workers, workspace is supposed to be redesign. In your own view what are three requirements that influence workspace design: (6marks)
- b) A Mechanical engineering student in Machakos University is doing a final year project of designing a chair to be used in office. The designed is supposed to be produced in the mechanical workshop within the university. As a designer, describe five ergonomics factors required to be put in to consideration in design stage (10marks )
- c) Figure 1 shows a Digital Micrometer

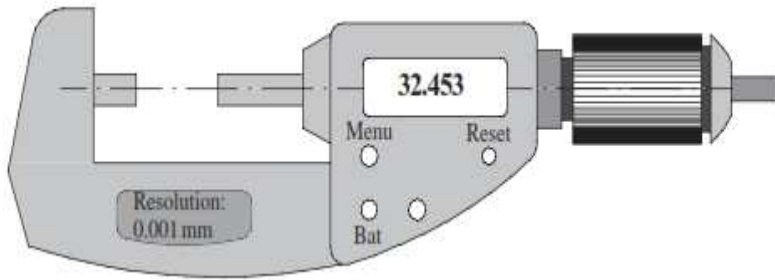


Figure 1: Digital Micrometer

Identify and explain **seven** ergonomic features of the Digital Micrometer (14 marks)

## QUESTION TWO – 20 MARKS

- a) Typists working on a computer for the whole day tend to experience strain in the shoulder and eyes. As an ergonomist, what measures requires to create friendly man-machine relationship. (10 marks)
- b) People with disability require special design attention during design. Usually special consideration is given to them. As an ergonomist, what special consideration put in place during design stage (10 marks)

## QUESTION THREE – 20 MARKS

- a) A Project Engineer is overseeing the construction of a factory. It is still in the early stage of construction. The company has one overhead crane which malfunctioned and its spares are not available within the local market including the expertise required to maintain the crane. Because of the urgency of completing the factors, most activities are manually done. Describe re four ergonomics aspect required as he lift the object in this scenario (10marks)
- b) Spray painting tends to emit hazardous fumes hence should be done in conducive place. From ergonomics aspect, how should the booth be design (10 marks)

#### QUESTION FOUR – 20 MARKS

a) Figures below shows different postures.

i.



ii.



iii.



iv.



v.



vi.



vii.



viii.



Discuss the above postures based on ergonomics aspects

(10 marks)

- b) A newly established firm in Kenya wants to put up a workshop in the site. A Design Engineer has been contracted to do feasibility study and design it. Discuss five ergonomics factors to be incorporated in the design (10 marks)

### **QUESTION FIVE – 20 MARKS**

A trainee engineer joined a company which design of a variety of hand tools. Because of huge demand of hand tools, the company intended to increase the production lines. The company wanted to maintain customers by producing high quality hand tools. In your own opinion, discuss 10 critical ergonomics aspect required in design of hand tools.