



MACHAKOS UNIVERSITY

University Examinations for 2021/2022 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (MECHANICAL ENGINEERING)

EMM 414 – INDUSTRIAL ERGONOMICS

DATE: 16/12/2021

TIME: 8:30 – 10:30 AM

INSTRUCTIONS

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) A Production Engineer in car manufacturing company is in charge of many productions lines. The company produces different model of car. 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 vies what are three requirements that influence workspace design: (6 marks)
- b) A Mechanical engineering student in Machakos University is doing a final year project of designing a ergonomics chair to be used in office. The designed is supposed to be produced in the mechanical workshop within the university. As a designer, describe are ergonomics factors required to be put in to consideration in design stage (10 marks)

Figure 1 shows a plastic jug kettle and its base unit

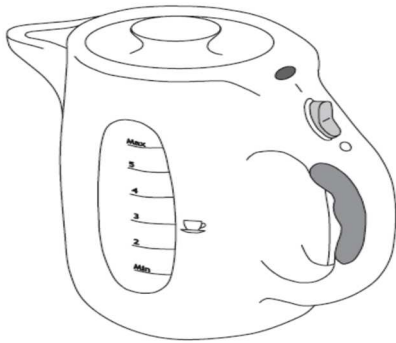


Figure 1.: Plastic jug kettle

Identify and explain **seven** ergonomic features of the kettle

(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 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) Figure 2 shows a person required to lift some load to certain height.



Figure 2 : person lifting the object

Explain are five ergonomics aspect required as he lifts the object (10 marks)

- b) During the designing of workshop layout, illumination is one of the aspects considered in provision of conducive environment for the employees. As an consultant, discuss five guidelines needed considered for improving (10 marks)

QUESTION FOUR – 20 MARKS

- a) A Mechanical engineering student made a site visit to the ongoing administration block at Machakos University. It was noted that many casual workers are employed on temporary basis and they work from 8 am to 5pm with a one hour lunch break. It was noted that most activities being are manual work including transporting materials from one place to another. As an ergonomics discuss aspects that will increase productivity of employees (10 marks)
- b) A newly established firm in Kenya runs a workshop. Because of the nature of the machines, a lot of noise are generated which has affected the working conditions of the employees in other adjacent departments. As a design Engineer, Discuss four ways to reduce noise in workplace (10 marks)

QUESTION FIVE (20 MARKS)

- a) A supermarkets in Machakos town safety committee had recently begun dealing with ergonomics issues in their offices, and their first step was to review accident and injury data to help them decide which work areas and individual employees needed attention. The committee found that one area, which consisted mostly of data entry personnel and clerks, had an injury rate much higher than other areas in the company, and decided to make this area a priority. Discuss risk factors present and remedial measures that can be put in place. (10 marks)
- b) In a continuous casting production line, the shift quality control inspector is supposed to monitor quality as shown in figure 2 for 8 hours working. Explain some of the techniques that are supposed to adopt so as to reduce the risks factors (10 marks)

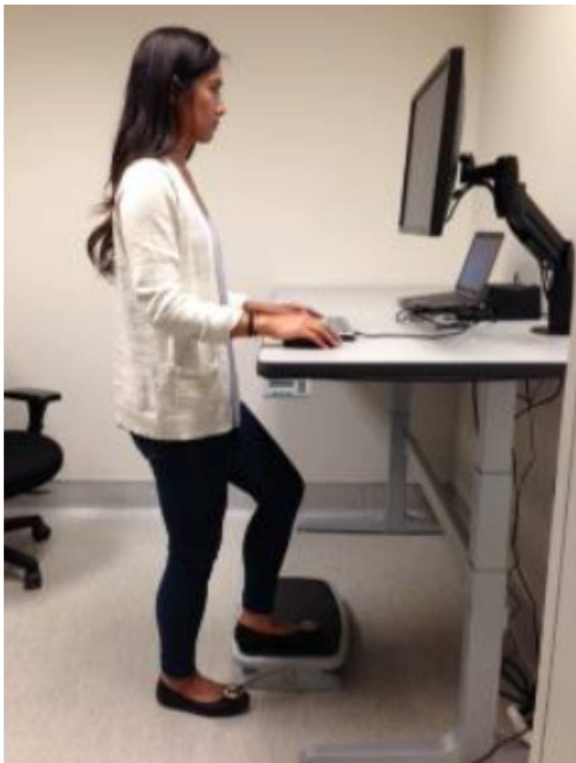


Fig 2: Machine operator