



MACHAKOS UNIVERSITY

University Examinations for 2022/2023

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FIRST YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (AGRICULTURAL EDUCATION AND EXTENSION)

AGN 113: INTRODUCTORY WORKSHOP TECHNOLOGY

DATE:

TIME:

INSTRUCTIONS:

1. This examination contains **FIVE** questions. Question ONE (1) is compulsory and carries 30 marks. All the other questions carry 20 marks each.
2. Answer question **ONE** and any other **TWO** question

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Define clearly, the following terms as used in a workplace: (4 marks)
 - i) Safety
 - ii) Hazard
 - iii) Risk
 - iv) Accident
- b)
 - i) Distinguish between Safety hazards and health hazards, and give an example for each (3 marks)
 - ii) It is hard planning for safety, but harder planning for recovery after failure to plan. Explain this statement critically (2 marks)
- c) With respect to the Fire-Triangle:
 - i) Explain the ingredients of fire (3 marks)
 - ii) Outline the principle behind extinguishing of fires (2 marks)
- d) Explain with sufficient reasons the **classes** of fire likely to occur in the following work areas (6 marks)

- i) Fodder store
- ii) Petrol station
- iii) Arc welding shop

- e) Fig Q1 (d) shows a commonly used workshop equipment
- i) Identify this workshop equipment and briefly explain its function (3 marks)
 - ii) Name the parts labelled A, B, C and D and state their respective functions while using the equipment (4 marks)

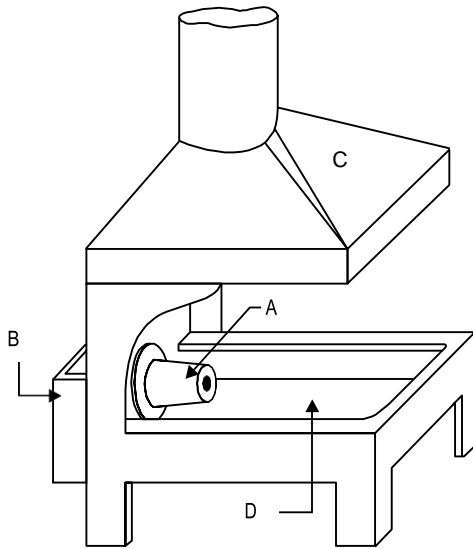
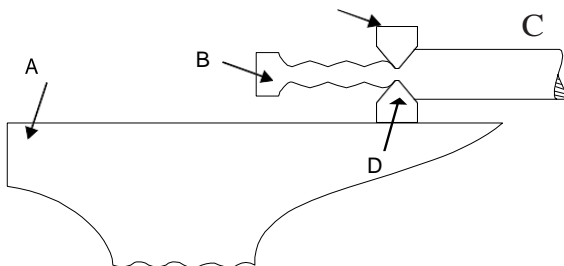


Figure Q1 (d)

- e) Electricity is the main source power in most workshops and can be fatal if not properly handled. Briefly explain the actions that you would take immediately you notice someone in electric shock (3 marks)

QUESTION TWO (20 MARKS)

- a) Explain with neat sketches the following forging operations
 - i) Upsetting, (2 marks)
 - ii) Drawing down (2 marks)
- b)
 - i) Describe the forging operation being carried out in Fig Q2c (3 marks)
 - ii) Name the parts labelled A,B,C,D in the Figure (2 marks)



- iii) Heat treatment is necessary after carrying out a forging operation on a part.
Explain (2 marks)
- iv) Describe how Annealing and Hardening processes are carried out on a forged component (5 marks)
- c) i) Outline two common forging defects and state their likely cause (2 marks)
- ii) State three (3) safety precautions to be observed while working in the forging shop (2 marks)

QUESTION THREE (20 MARKS)

- a) i) What is marking out (2 marks)
- ii) Explain the main reasons for marking out (3 marks)
- iii) Explain the significance of setting up a datum when marking out (3 marks)
- b) Describe with neat sketches how use following tools are used in marking out:
 - i) Angle plate (3 marks)
 - ii) Vee Block (3 marks)
 - iii) Indicate the readings given by the measuring instruments shown in Fig Q3b (3 marks)

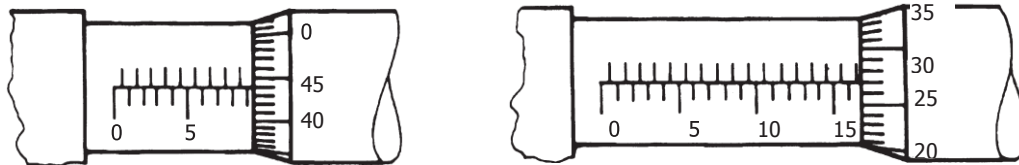


Figure Q3b

- iv) Explain with a sketch how you would locate the centre of circular work-piece such as a round bar (3 marks)

QUESTION FOUR (20 MARKS)

- a) i) Distinguish between Soldering and Brazing as used in metal joining (2 marks)
- ii) Explain the role of fluxes in soldering and brazing (2 marks)
- iii) Active fluxes should not be used in electrical applications. Explain (2 marks)
- iv) Outline two ways of increasing the strength of a soldered joint (2 marks)

- b) Figure question 4 shows a schematic diagram of a metal joining method:
Identify this joining method and explain the working principle behind it (3 marks)

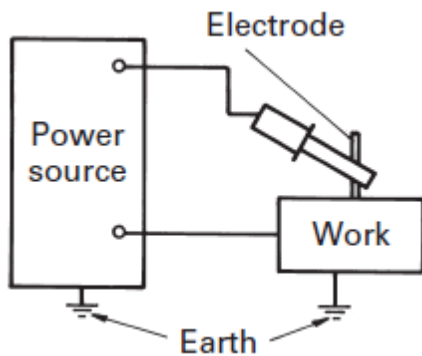


Figure Q4b

- c) Oxy- acetylene welding is the most common gas welding method:
- i) With the aid of a well labelled diagram, Illustrate an assembled oxy acetylene welding equipment (4 marks)
 - ii) Using neat sketches, outline the different types of oxy-acetylene flames (3 marks)
 - iii) To safeguard against fire, gas leakages in gas welding should be avoided. How can you test for gas leaks in an oxy acetylene assembly (2 marks)

QUESTION FIVE (20 MARKS)

- a) Define clearly the following properties a used in material forming processes (4 marks)
- i) Refractoriness
 - ii) Fluidity
 - iii) Ductility
 - iv) Malleability
- b) The steel component shown in Fig Qb is to be produced by sand casting. The component has a through hole and comprises two parts, a cylindrical top and a bottom conical frustum .



- i) Using simple sketches, discuss the step by step procedure of producing the component. (Assume the required pattern comprising two split halves and the molten steel are readily available). (6 marks)
- ii) Shrinkage and porosity are common casting defects. Briefly explain their likely causes and suggest the remedy (4 marks)

c) Distinguish with neat sketches between Rolling and Extrusion as used in material processing
(6 marks)