



MACHAKOS UNIVERSITY

University Examinations for 2022/2023 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FIRST YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (AGRICULTURAL EDUCATION AND EXTENSION)

AGN113: INTRODUCTORY WORKSHOP TECHNOLOGY

DATE: 19/4/2023

TIME: 8:30 – 10:30 AM

INSTRUCTIONS:

Answer Question One and Any Other Two Questions

QUESTION ONE (30 MARKS)

- a) i) Define clearly the term safety as used in the workshop (2 marks)
- ii) Explain briefly the 3- step approach to safety in the workplace (3 marks)
- iii) It is hard planning for safety, but harder planning for recovery after failure to plan for safety. Critically examine this statement. (3 marks)
- b) With respect to workshop operations distinguish between the following:
- i) Physical and operating environment. (2 marks)
- ii) Safety hazards and health hazards (2 marks)
- iii) Commend on the main cause of workshop accidents (1 mark)
- c) Metals are the most commonly used materials in an engineering workshop. Distinguish between the following types of metals:
- i) Ferrous and non-ferrous metals (2 marks)
- ii) Plain carbon steels and alloy steels (4 marks)
- d) With the aid of a graphical sketch, discuss the effects of increasing carbon content on the properties of steel (5 marks)
- e) i) Distinguish between Taps and Dies as used in the workshop (2 marks)
- ii) Outline the procedure of cutting external threads on the bench (4 marks)

QUESTION TWO (20 MARKS)

- a) i) Define the term Forging (2 marks)
ii) State two advantages and two limitations of forge-work (4 marks)
- b) i) Distinguish between upsetting and drawing down processes as used in forging (4 marks)
- c) i) Define the term heat treatment as used in a workshop (2 marks)
ii) Explain the significance of heat treatment of metals (3 marks)
iii) Discuss the Annealing process of heat treating metals (3 marks)
iv) Heat treatment is necessary after carrying out a forging operation on a part. Explain (2 marks)

QUESTION THREE (20 MARKS)

- a) i) Define the term marking out (2 marks)
ii) Explain the main reasons for marking out (3 marks)
iii) It is necessary to set up a datum when marking out Explain (2 marks)
- b) Explain with neat sketches the use of the following tools
 - i) Angle plate (3 marks)
 - ii) vee block (3 marks)
 - iii) Try Square (3 marks)
- c) The plate shown in Figure Q3c has been cut out 2 mm oversize on length and width and has not been filed. All four sides have sawn edges.

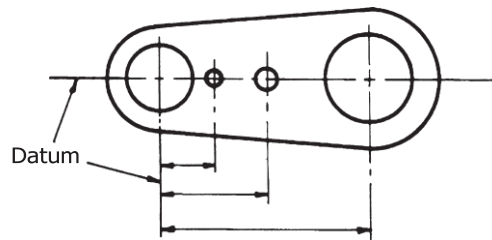


Fig Q3c Bracket

Outline with clear sketches the step by step procedure of marking out the profile of this component (4 marks)

QUESTION FOUR (20 MARKS)

- a) i) Distinguish between Soldering and Brazing as used in metal joining (4 marks)
ii) Outline two ways of increasing the strength of a soldered joint (2 marks)
- b) Figure question 4 show a schematic diagram of a metal joining method: Identify this joining method and explain the principle behind it (4 marks)

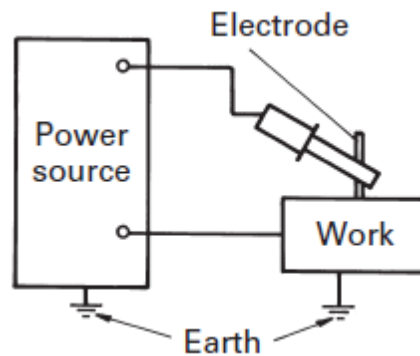


Figure Q4b

- 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 (6 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 flow chart (a-d) in Fig Q5b below represents the manufacturing process for a certain component.
- i) Identify the process shown in the flow chart (1 mark)
 - ii) Briefly explain the procedures as outlined in (a-d) (6 marks)
 - iii) State the role of the following parts: **Rise, Runner, Core** (3 marks)

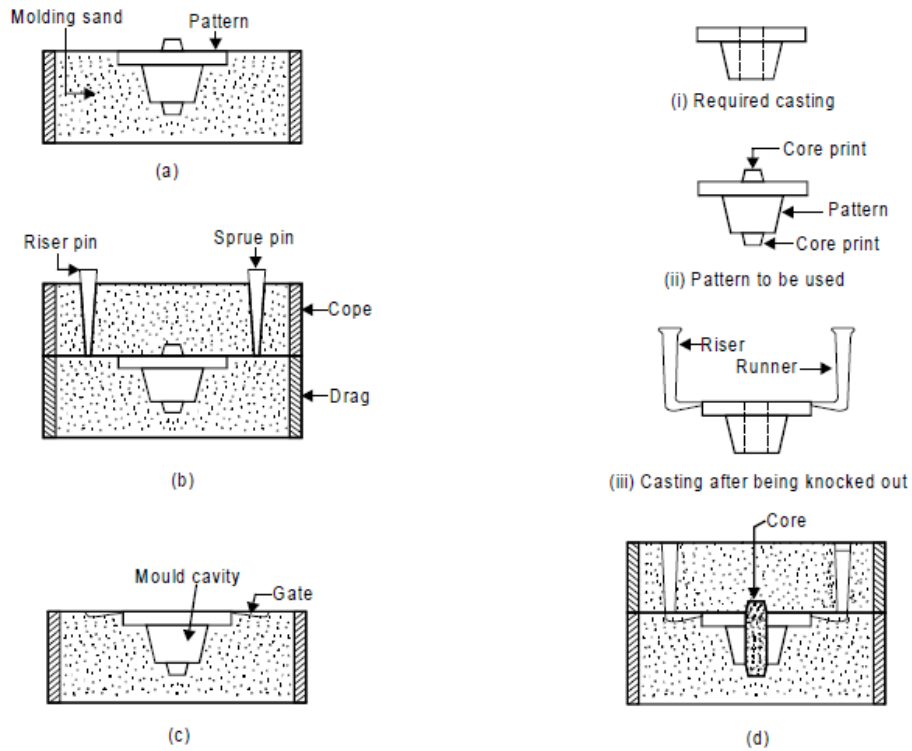


Fig Q5b: manufacturing flow chart

- c) Discuss with neat sketches the following material forming processes (6 marks)
- Rolling
 - Extrusion