



# MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FIRST YEAR SECOND SEMESTER EXAMINATION FOR

CERTIFICATE IN ELECTRICAL & ELECTRONICS ENGINEERING

1601/106/WT WORKSHOP TECHNOLOGY

DATE: 17/12/2020

TIME: 2.30-5.30 PM

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## INSTRUCTIONS TO CANDIDATES

*Answer all the FIVE questions.*

*All questions carry equal marks*

1. a) Define the following terms as used in workshop technology;
  - i. Near-miss accident (1 mark)
  - ii. Industrial safety (1 mark)
- b) State any THREE objectives of industrial safety (3 marks)
- c) Briefly explain any three causes of workshop accidents (3 marks)
- d) What do you understand by the term electric shock? (1 mark)
- e) As an electrician, how will you ensure you avoid electric shock in practice? (2 marks)
- f) State any THREE electrical injuries that are bound to occur due to failure to observe
- g) electrical safety precautions. (3 marks)
- h) Assume that your colleague has been shocked with heavy electrical current and his heart has stopped beating. Explain how you can use Holger Nielson Method to give him first aid (4 marks)

- i) Study the following fire extinguisher



- i. What type of extinguisher is this? (1 mark)
- ii. What kind of fire can it extinguish? (1 mark)
2. a) Describe the following properties of materials
- i. Conductivity (2 marks)
- ii. Elasticity (2 marks)
- iii. Toughness (2 marks)
- b) A mild steel structure is used to support a load of 250 kN as shown in figure 1 below.

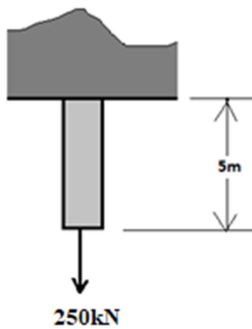


Figure 1

- i. If the maximum allowable stress of steel is 812 MPa, what is the minimum diameter of the structure required to just support the load? (3 marks)
- ii. If the Young's Modulus of mild still is 210 GPa, determine the maximum extension of the structure. (2 marks)
- c) Describe the following electrical materials giving one example and one application of each
- i. Conductor (2 marks)

- ii. Semi-conductor (2 marks)
- d) Why do you need to treat the edges of a sheet metal product? State any two methods of treating (3 marks)
- e) Explain the meaning of the following decorative processes (2 marks)
- i. Lacquering
- ii. Enameling
3. a) What do you understand by the terms: (3 marks)
- i. Tolerance
- ii. Fits
- iii. Upper limit
- b) Using line diagrams, sketch the following readings on;
- i. 5.33 mm on Micrometer screw gauge (2 marks)
- ii. 12.9 mm on Vernier caliper (2 marks)
- c) Describe the following tools using sketches;
- i. Scribing block
- ii. Odd leg caliper (4 marks)
- d) What is Galvanized steel? (1 mark)
- e) Explain how you can test for flatness in metal sheets. (2 marks)
- f) Using sketches, describe the following processes done on a lathe machine;
- i. Turning. (2 marks)
- ii. Knurling. (2 marks)
- iii. Facing. (2 marks)
4. a) Study the tools in Figure 2.

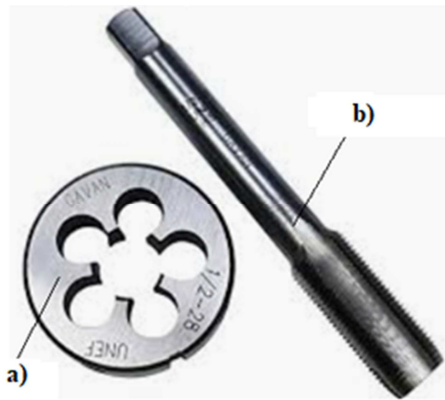


Figure 2

- i. Name the tools identified as a) and b)? (2 marks)
- ii. State the type of mechanical joint that requires the above tools. (1 mark)
- b) Using sketches, describe the following types of welded joints (2 marks)
  - i. Lap joint
  - ii. Butt joint
- c) Using a sketch, describe the MIG welding processes (3 marks)
- d) What are the disadvantages of welding as metal joining processes? (3 marks)
- e) State any THREE welding defects (3 marks)
- f) What any one function of flux during welding? (1 mark)
- g) Explain the effect of temperature on the strength of a soldered joint. (1 mark)
- h) What is the difference between a consumable and non-consumable electrode? (2 marks)
- i) State any TWO precautions taken when dealing with Oxy-acetylene welding. (2 marks)
5. a) Why do we need workshop machines? (1 mark)
- b) i. Apart from bench drill, state the other types of drilling machines. (3 marks)
- ii. Explain the operation of a bench drill. (3 marks)
- c) Distinguish between additive manufacturing and subtractive manufacturing. (2 marks)
- d) Study the grinding machine shown in figure 3 below;

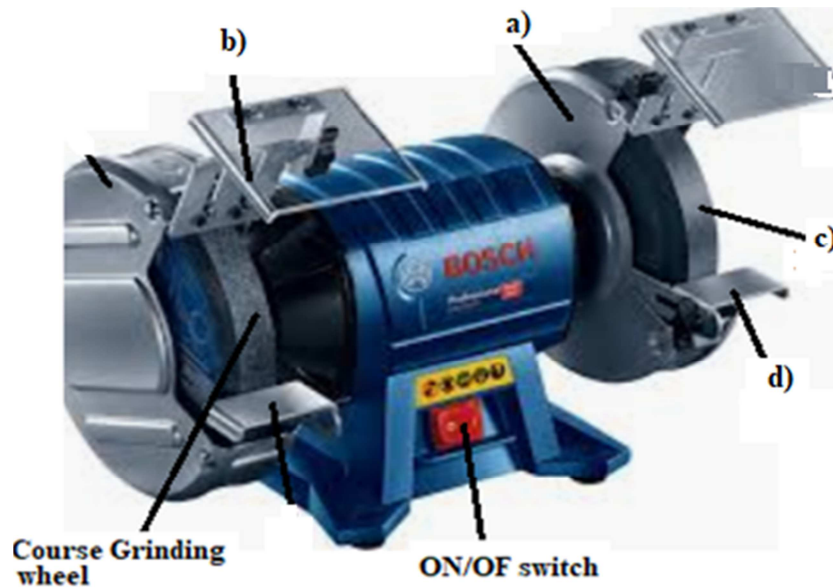
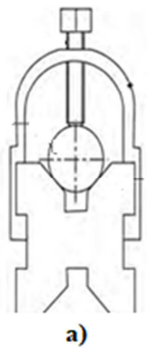


Figure 1: Grinding machine

- i. What type of grinding machine is this? (1 mark)
  - ii. Name the parts labelled a) to d). (2 marks)
- e) i Name the following work holding devices (3 marks)



- ii On what machine are devices b) and c) used? (1 mark)
- f) Describe how you can produce the following component in the workshop from a stock 32 mm diameter and 100 mm long, state the machine and tools used. (4 marks)

