



(University of Choice)

**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)**

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2021 / 2022 ACADEMIC YEAR**

FIRST YEAR SECOND SEMESTER EXAMINATIONS

**FOR THE DIPLOMA
IN
ELECTRICAL AND ELECTRONICS ENGINEERING**

COURSE CODE: DME 057

COURSE TITLE: MATERIALS AND PROCESSES

DATE: Friday 22nd April, 2022

TIME: 12.00 p.m – 2.00 p.m

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS.
QUESTION ONE CARRIES 30 MARKS AND ALL OTHERS 20 MARKS EACH.

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating
This Paper Consists of 4 Printed Pages. Please Turn Over. ►

Question One (30 Marks)

- a. Define the following terms as applied in press operations;
- i. Shearing [1 mark]
 - ii. Lancing [1 mark]
 - iii. Nibbling [1 mark]
 - iv. Notching [1 mark]
 - v. Parting [1 mark]
- b. Name the *two* basic ways of specifying the working tolerances on mating parts of a high speed chaff cutter. [1 mark]
- c. Give the main metals used in nuclear energy generation process. [3 marks]
- d. Explain the *three* types of furnaces applicable in heat treatment processes including there sub-classes. [3 marks]
- e. List any *three* limitations of jigs and fixtures. [3 marks]
- f. Give any *eight* properties of plastics. [4 marks]
- g. Explain the following common methods of safety found at the MMUST TVET complex construction site. [5 marks]
- i. Safety by Using Fixed Guards
 - ii. Safety by Using Distance Guards
 - iii. Safety by Using Trip Guards
 - iv. Safety by Using Interlock Guards
 - v. Safety by Using Automatic Guards
- h. Name and sketch any *six* market forms of steel structure shapes available for engineering work. [6 marks]

Question Two (20 Marks)

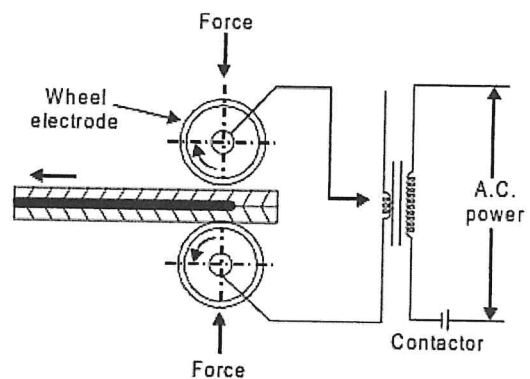
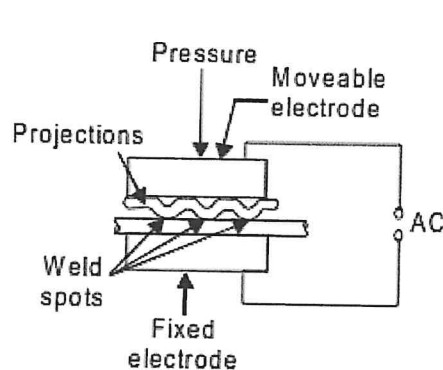
- a. Enumerate with reasons any *two* examples each of common manufactured items that may receive; [3 marks]
- i. 100% inspection.
 - ii. no final inspection.
 - iii. some final inspection, that is, sampling.
- b. Explain in brief the various methods of safety adopted in a paint shop. [5 marks]
- c. Explain *six* comparisons of hot working with cold working of a fire-tube boiler to be used in the manufacture of sugar. [6 marks]
- d. Explain how the defects in forging can be removed from high speed steam turbine steel blade. [6 marks]

Question Three (20 Marks)

- Give any *four* forging operations that can be performed in a smithy shop. [2 marks]
- Explain any *four* common characteristics of forged parts. [4 marks]
- Give and explain any *four* electrical properties of materials suitable for the body of an American spy satellite due to be launched into the thermosphere. [4 marks]
- Because of inherent improvement in the grain size and introduction of un-interrupted grain flow in the structure of finished forged component forging has advantages in comparison to casting and machining. Give any *five*. [5 marks]
- With the aid of relevant diagrams, name and explain the *four* bath type furnaces used in the heat treatment process. [5 marks]

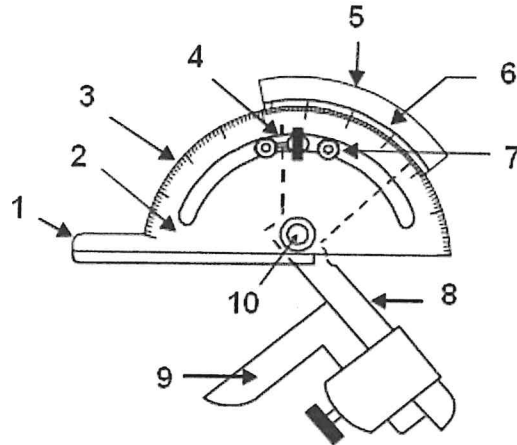
Question Four (20 Marks)

- Explain the *two* reasons why so many variable-type devices in automobiles been replaced with attribute-type devices. [2 marks]
- Explain why it is necessary to perform heat treatment after forging. [3 marks]
- With the help of a neat sketch explain the process of rotary swaging. [5 marks]
- Briefly describe an engineering application where the density of the selected material would be an important material consideration. [4 marks]
- Identify the processes illustrated in the figure below and explain how they contrast in their applications. [6 marks]



Question Five (20 Marks)

- a. Name and explain the *four* kinds of tongs and how they are used at Tororo screw mines. [4 marks]
- b. The Figure below is a Bevel Protractor; name and give the function of the parts labeled 1 to 10. [5 marks]



- c. Inspection gauges are commonly employed to avoid costly and lengthy process of testing the component dimensions. Name the *five* classifications of Reference or Master gauges. [5 marks]
- d. Explain how will you achieve the following in a busy paper factory [6 marks]
- Rate of production
 - Accuracy
 - Surface finish.