

30



(University of Choice)

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

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

2023/2024 ACADEMIC YEAR

FOURTH YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DEGREE

OF

BACHELOR OF EDUCATION IN TECHNOLOGY EDUCATION

COURSE CODE: TEM 481

**COURSE TITLE: MECHANICAL TECHNOLOGY AND
PRACTICE V**

DATE: 6/12/2023

TIME: 12:00 PM – 2:00 PM

INSTRUCTIONS TO CANDIDATES

1. This paper consists of **FOUR** questions
2. Answer Question **ONE (Compulsory)** and any other **TWO** Questions
3. All symbols have their usual meaning

TIME: 2 Hours

MMUST observes **ZERO** tolerance to examination cheating

This Paper Consists of 3 Printed Pages. Please Turn Over

Question One

- a) Explain TWO reasons behind development of Unconventional Machining as alternative but important machining process. (4 Marks)
- b) Using a well labeled schematic diagram explain basic working principle of Electro-Discharge Machining (EDM) process. (6 Marks)
- c) Explain TWO reasons behind discouraging the use of explosive forming as a High Energy Rate Forming (HERF) process. (4 Marks)
- d) Discuss THREE instances you recommend use of High Energy Rate Forming (HERF) as modern forming process over conventional forming processes such as forging. (6 Marks)
- e) Discuss THREE factors affecting material removal rate in Electro-Chemical Machining (ECM) process. (6 Marks)
- f) An Electro-Chemical Machining (ECM) operation is to be used to cut a hole into a plate of aluminum that is 12 mm thick. The hole has a rectangular cross section, 10 mm by 30 mm. The ECM operation will be accomplished at a current of 1200 amps. Efficiency is expected to be 95%.

Determine feed rate and time required to cut through the plate. If
specific removal rate C for aluminium = $3.44 \times 10^{-2} \text{mm}^3/\text{A} - \text{s}$

(4 Marks)

Question Two

- a) With help of well labeled schematic diagram describe the mechanism of material removal in Electro-Chemical Machining (ECM) process. (8 Marks)
- b) Explain TWO functions of electrolyte used in Electro-Chemical Machining (ECM) process. (4 Marks)
- c) Using a label schematic sketches describe the basic mechanism of material removal in Ultrasonic machining (USM) process. (8 Marks)

Question Three

- a) Use neat sketches to discuss operation Electro-hydraulic Forming as a High Energy Rate Forming (HERF). (6 Marks)
- b) Discuss FOUR situations where you prefer Electro-Discharge Machining (EDM) over Electro-Chemical Machining (ECM) process. (8 Marks)
- c) Explain THREE main uses of water in the High Energy Rate Forming (HERF) specifically in explosive kind of forming process. (6 Marks)

Question Four

- a) Join the following parts of a Computerized Numerical Control (CNC) Machine to show its representative diagram and explain the function of each of the parts. (10 Marks)
 - i) Input Device
 - ii) Central Processing Unit/ Machine Control Unit
 - iii) Machine Tool
 - iv) Driving System
 - v) Feedback Devices
 - vi) Display Unit
- b) Discuss THREE limitations of Ultrasonic machining (USM) process. (6 Marks)
- c) Explain TWO functions of constant supply of abrasive grains or slurry used in Ultrasonic machining (USM) process. (4 Marks)

TEM 481: MECHANICAL TECHNOLOGY & PRACTICE V