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Masinde Muliro University of Science and Technology (MMUST)

P.O. Box 190-50100, Kakamega

UNIVERSITY EXAMINATIONS  
2021/2022 ACADEMIC YEAR

**FIFTH YEAR SECOND SEMESTER SUPPLEMENTARY/SPECIAL EXAMINATIONS**

**FOR THE DEGREE OF  
BACHELOR OF SCIENCE  
IN  
MECHANICAL AND INDUSTRIAL ENGINEERING**

**COURSE CODE: MIE 582**

**COURSE TITLE: MANUFACTURING PROCESSES IV**

**DATE : 06/10/2022**

**TIME: 12.00-2.00PM**

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**INSTRUCTIONS TO CANDIDATES**

- This paper consists of **FOUR** questions
- Answer question **ONE** and any other TWO questions
- Marks are as indicated against each question
- ALL symbols have their usual meaning unless stated otherwise

**This paper consists of 2 printed pages Please Turn Over →**

**QUESTION 1 (30 Marks)**

- a) Mention any THREE non- conventional methods and any THREE conventional methods of machining (6Mks)
- b) With respect to non- traditional machining, differentiate between thermal methods and thermoelectric method of non conventional machining. Mention two processes under each category. (8 Mks)
- c) By the aid of a sketch, describe the process of metal removal in electron beam machining (6Mks)
- d) By the aid of a well labeled diagram describe the ultrasonic machining Method (10mks)

**Question 2**

- a) Sketch the variation of current –time for the charging and discharging in RC- EDM circuit (4Mks)
- b) By the aid of simple sketches, show the variations of the following in an EDM operation. Indicate any points of interest.
- i) Material removal rate with frequency
- ii) Material removal rate with breakdown voltage
- iii) Material removal rate with tool work gap resistance (6Mks)
- c) State FIVE important properties required of a work piece in EDM (5Mks)
- d) State any FIVE properties of any dielectric fluid suitable for EDM operation (5Mks)

**Question 3**

- a) Draw a fully labelled electro-chemical machining setup (8 Mks)
- b) Derive an equation for the feed rate in electro chemical machining. Define all terms used (8Mks)
- c) Write down any TWO advantages and TWO disadvantages of the process (4Mks)

**Question 4**

- a) Define the term LASER (2Mks)
- b) Write down any three types of Laser that are in existence (3Mks)
- c) Sketch the LASER machine set up (6Mks)
- d) By the aid of a sketch describe the unconfined explosive forming of materials (9 Mks)