



(University of Choice)

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

MAIN CAMPUS

**UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR**

THIRD YEAR SECOND SEMESTER EXAMINATIONS

**FOR THE BACHELOR OF SCIENCE
IN
MECHANICAL & INDUSTRIAL ENGINEERING**

COURSE CODE: MIE 382 MAIN EXAMS

COURSE TITLE: MANUFACTURING PROCESS I

DATE: 26-04-2022

TIME: 12:00-14:00

INSTRUCTIONS TO CANDIDATES

Question ONE (1) is compulsory
Answer Any Other TWO (2) questions

TIME: 2 Hours

MMUST observes Zero tolerance to examination cheating

THIS PAPER CONSISTS OF (3) PRINTED PAGES

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QUESTION 1**(30 Marks)**

- i. Describe the basic categories of material removal processes 6mks
- ii. State the reasons why machining is commercially and technologically preferred
6mks
- iii. With the help of relevant sketches differentiate the two main types of metal cutting processes 4mks
- iv. a) What are the functions of a machine tool 2mks
b) Discuss the various ways in which a work part can be held in a lathe 6mks
- v. Briefly explain the three modes of tool failure 3mks
- vi. Why do you think tool grinding and setting is an important practice in cutting tool technology? 3mks

QUESTION 2**(20 Marks)**

- i. Write the Merchant equation and explain the variables. What is the significance of this equation? 4mks
- ii. Discuss the various types of chips formed in metal machining processes, indicating favorable conditions for each. 8mks
- iii. Describe the various types of drilling machines citing their key distinguishing features 6mks
- iv. What is the difference between threading and tapping? 2mks

QUESTION THREE**(20 Marks)**

- i. Explain the various mechanisms of tool wear 6mks
- ii. Briefly talk about the two aspects of cutting tool design. What is their significance in metal machining? 5mks
- iii. In a turning operation a tool life of 80 minutes is obtained at a cutting speed of 30m/min and 8 minutes at a cutting speed of 60m/min. Determine:-
 - a) Tool life equation
 - b) Cutting speed for 4min tool life 5mks
- iv. Explain four functions of a cutting fluid 4mks

QUESTION FOUR**(20 Marks)**

- i. What is the difference between peripheral and face milling? 4mks
- ii. Draw a tool wear curve as a function of cutting time and explain the three distinct regions identified in the curve 6mks
- iii. State the parameters of a machining operation that are included within the scope of cutting conditions 4mks
- iv. A slab milling operation is performed on the top surface of a steel rectangular workpiece 300 mm long by 60mm wide. The helical milling cutter, which has a 75mm diameter and ten teeth, is set up to overhang the width of the part on both sides. Cutting speed is 36m/min, feed is 0.15mm/tooth, and depth of cut = 7.2mm. Determine (a) the actual machining time to make one pass across the surface and (b) the maximum metal removal rate during the cut. (c) If an additional approach distance of 12mm is provided at the beginning of the pass (before cutting begins), and an overtravel distance is provided at the end of the pass equal to the cutter radius plus 12mm, what is the duration of the feed motion. 6mks

