



University of Choice)

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

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

2021 / 2022 ACADEMIC YEAR

FOURTH YEAR SECOND SEMESTER EXAMINATIONS

FOR THE DEGREE

OF

**BACHELOR OF TECHNOLOGY IN EDUCATION AND
MECHANICAL ENGINEERING**

COURSE CODE: MIE 483

COURSE TITLE: MANUFACTURING PROCESSES II

MAIN EXAM PAPER

DATE: 22.04.2022

TIME: 12.00 - 14.00 HRS

INSTRUCTIONS TO CANDIDATES

Question ONE is compulsory ; and then choose to answer any other TWO additional questions

DURATION: 2 Hours

MMUST observes ZERO tolerance to examination
cheating

This Paper Consists of 2 Printed Pages. Please Turn Over

QUESTION ONE (30 marks)

Q1(a) Name FIVE disadvantages of; explain the main applications of straight oils. [5]

Q1(b) Elaborate on what Cutting Fluid Maintenance and Disposal involve. [5]

Q1(c) What are TEN major effects of cutting fluid in machining? [10]

Q1(d) Name FIVE desirable properties for cutting fluids [5]

Q1(e) List FIVE effects of gradually growing tool – wear during machining. [5]

QUESTION TWO (20 marks)

Q2(a) Different machining applications require different cutting tool materials. Explain at least FIVE characteristics a cutting tool material must possess. [5]

Q2(b) Explain, clearly, the essence of Built Up Edge (use diagrams) [5]

Q2(c) Determine the chip reduction coefficient, ξ ; and the shear angle, β ; if the tool of signature $(0^\circ, 0^\circ, 8^\circ, 7^\circ, 15^\circ, 90^\circ, 0)$ [mm], in turning a mild steel material with feed, $S_o = 0.2 \text{ mm}\cdot\text{rev}^{-1}$. [10]

QUESTION THREE (20 marks)

Q3(a) If in turning of a steel rod by a given cutting tool (material and geometry) at a given machining condition (S_o and t) under a given environment (cutting fluid application), the tool life decreases from 80 min to 20 min. due to increase in cutting velocity, V_c from 60 m/min to 120 m/min., then at what cutting velocity the life of that tool under the same condition and environment will be 40 min.? [5]

Q3 (b) Drilling was done of a through hole diameter, $D=25\text{mm}$, cutting speed, $V_c = 44 \text{ m/min}$, half drill point angle, $\lambda=60^\circ$, the overall thickness of workpiece, $L_w = 60 \text{ mm}$, the longitudinal feed, $S_o = 0.25 \text{ mm/rev}$, assume approach and over travel are 2.0 mm each. Determine the time for drilling the hole. [10]

Q3(c) What are truing and dressing of a grinding wheel? Explain the need for and the method of truing and of dressing a grinding wheel [5]

QUESTION FOUR (20 marks)

Q4(a) Assuming orthogonal turning tool of $\gamma = 0^\circ$ and $\phi = 90^\circ$, the force components P_x and P_z are measured to be $P_x = 400$ N and $P_z = 800$ N respectively, then what will be the value of apparent coefficient of friction, μ_a at the chip – tool interface? In solving, don't use MCD but equations only. **[5]**

Q4(b) what are the FIVE most notorious effects of BUE? **[5]**

Q4(c) Determine total machining time, T for plain milling a rectangular bronze component of length, $L_w = 100$ mm and width, $B = 50$ mm with the help of a helical fluted plain HSS milling cutter of diameter, $D_c = 60$ mm, length, $L_w = 75$ mm, and number of teeth, $Z = 6$. Assume approach, A and over-travel O are each 5,0 mm, cutting velocity, $V_c = 40$ m/min and longitudinal feed, $S_o = 0,1$ mm/dent. **[10]**

