



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

SPEC / SUPP EXAM

DATE: 4 – 10 - 2022

TIME: 12:00 PM – 2:00 PM

INSTRUCTIONS TO CANDIDATES

Question ONE is compulsory to answer

Choose to answer any other TWO additional questions

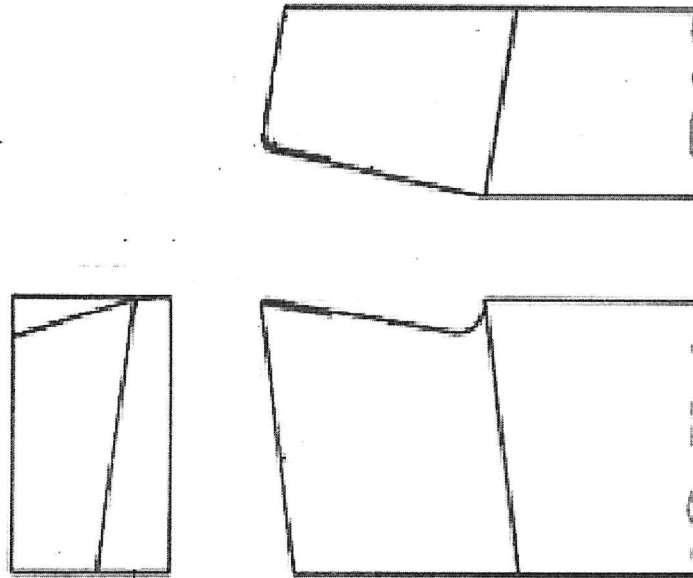
DURATION:

2 Hours

**MMUST observes ZERO tolerance to examination
cheating**

QUESTION ONE**(30 marks)**

Q1(a) study the diagram given in fig, Q1(a), resketch it ; and then label it indicating all essential parts and nomenclature of the single point cutting tool. **[10]**



SINGLE POINT CUTTING TOOL

Q1(b) Listed here below are FIVE types of tool wear. Explain in reasonable detail the mechanism and the cause of each. Sketches are recommended. **[10]**

- (i) Hard particle wear (abrasive wear)
- (ii) Adhesive wear
- (iii) Diffusion wear
- (iv) Chemical wear
- (v) Fracture wear

Q1(c) Identify the correct answer from the given four options: **[10 @ 1 mark]**

- (i) Cutting fluid is employed in machining for (a) cooling the tool and the job (b) lubricate at the rubbing surfaces (c) cleaning the machining zone (d) all of the above
- (ii) For same tool-work materials and speed, feed and depth of cut, the average cutting temperature will decrease (a) with the increase in principal cutting edge angle (ϕ) (b) with the decrease in principal cutting edge angle (ϕ) (c) with the increase in auxiliary cutting edge angle (ϕ) (d) with the decrease in the auxiliary cutting edge angle (ϕ) 1)

- (iii) The work material, which is machined by HSS tool generally in dry condition, is (a) grey cast iron (b) mild steel (c) stainless steel (d) low alloy steel
- (iv) Extreme pressure additive (EPA) is mixed with cutting fluid for improving its power of (a) cooling (b) lubrication (c) cleaning of the cutting zone (d) protection of the machined surface
- (v) More lubricating type cutting fluid should be used while machining (a) easily machinable material at high speed (b) grey cast iron at low speed (c) high alloy steels at low speed (d) aluminium at high speed
- (vi) In Z-Z method of cooling in surface grinding, the cutting fluid is employed (a) in the form of flood under gravity (b) in the form of jet at the grinding zone (c) drop by drop (d) none of the above
- (vii) In machining copper under heavy cut one should use (a) light soluble oil (b) active type chemical fluid (c) heavy lubricating oil (d) CO₂
- (viii) In high speed machining of steels the teeth of milling cutters may fail by (a) mechanical breakage (b) plastic deformation (c) wear (d) all of the above
- (ix) Tool life in turning will decrease by maximum extent if we double the (a) depth of cut (b) feed (c) cutting velocity (d) tool rake angle
- (x) In cutting tools, crater wear develops at (a) the rake surface (b) the principal flank (c) the auxiliary flank (d) the tool nose

QUESTION TWO (20 marks)

Q2(a) During turning of a steel rod of diameter 100 mm with a ceramic cutting tool of nomenclature (0° , -10°, 8°, 7°, 15°, 75°, 0.5), at a speed of 625 rpm, feed, $S_o = 0.36$ mm/rev; depth of cut, $t = 5.0$ mm the average chip thickness was measured to be 1.0 mm. Estimate , reasonably, the amount of power consumed in this particular machining if: (i) workpiece material is semi-ductile, and

(ii) BHN = 240 kg/mm².

Q2 (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]

QUESTION THREE (20 marks)

Q3(a) Prove that $(\beta = (\text{rcos}\gamma / 1 - r \text{sin}\gamma)^{-1})$, where β is shear angle, and γ is back rake angle. [10]

Q3(b) . Explain FIVE advantages and FIVE limitations of broaching. [10]

QUESTION FOUR (20 marks)

Q4(a) Q15. Explain the meaning of the marking on a conventional industrial grinding wheel marked as follows: [10]

51 A 60 K 5 V 05

Q4(b) Explain FOUR major mechanisms of wear of a cutting tool. Sketch a tool tip and shoe crater, principal flank and auxiliary flank wear. [10]