



(University of Choice)

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

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

2021/2022 ACADEMIC YEAR

**FOURTH YEAR FIRST SEMESTER
SPECIAL/SUPPLEMENTARY EXAMINATIONS**

FOR THE DEGREE

OF

**BACHELOR OF SCIENCE IN MECHANICAL AND INDUSTRIAL
ENGINEERING**

COURSE CODE: MIE 481

COURSE TITLE: FOUNDRY TECHNOLOGY

DATE: 4 – 10 - 2022 TIME: 9:00 AM – 11:00 AM

INSTRUCTIONS TO CANDIDATES

Question ONE (1) is compulsory

Answer Question ONE and any other TWO questions

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

Question 1

- a) Analyze the two main stages of casting solidification process in foundry technology [12 marks]
- b) Describe the following terms with regard to casting of molten metal. Use suitable detailed diagram(s) [12 marks]
- i. Core
 - ii. Riser
 - iii. sprue
 - iv. Draft
- c) A mold sprue is 20 cm long, and the cross-sectional area at its base is 2.5 cm^2 . The sprue feeds a horizontal runner leading into a mold cavity whose volume is 1560 cm^3 . Calculate:
- i. The velocity of the molten metal at the base of the sprue [2 marks]
 - ii. The volume rate of flow [2 marks]
 - iii. The time to fill the mold [2 marks]

Question 2

- a) In casting, solidification involves the transformation of the molten metal back into the solid state. Discuss the solidification process of the following phases of materials
- i. Pure metals [5 marks]
 - ii. Metal alloys [5 marks]
 - iii. Eutectic alloys [4 marks]
- b) Outline four advantages and two limitations of using wood as a pattern material in foundry technology [6 marks]

Question 3

- a) Explain three requirements of a riser in a casting mold system. [6 marks]
- b) Several indicators are used to determine the quality of sand mold. Describe four of these indicators [8 marks]
- c) Compare hot chamber die casting to cold – chamber die casting machines used in die casting [6 marks]

Question 4

- a) Explain the use and working principle of the following furnaces in foundry technology: [3 marks]
- i. Direct fuel furnaces [4 marks]
 - ii. Electric – Arc Furnaces [4 marks]
 - iii. Induction Furnaces
- b) Explain with the help of a well labelled diagram the following defects in casting. [3 marks]
- i. Shrinkage Cavity [3 marks]
 - ii. Microsporosity [3 marks]
 - iii. Hot tearing

