



*(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 DEGREE  
OF  
BACHELOR OF TECHNOLOGY EDUCATION  
(MECHANICAL)**

**COURSE CODE: TEM 382**

**COURSE TITLE: MECHANICAL TECHNOLOGY AND  
PRACTICE III**

**DATE: 29<sup>TH</sup> April 2022**

**TIME: 8.00-10.00 a.m.**

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**INSTRUCTIONS**

- Answer question ONE and any other TWO questions.
- All dimensions are millimetres

**Time : 2 hours.**

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over

### QUESTION ONE (30 MARKS)

- a) Give three cautions that must be taken in order to come up with defect free casting. (3marks)
- b) Identify any three factors that dictate the choice of a casting process (3marks)
- c) Describe the following as applied to casting sand and give their significance.
  - i. Hot strength
  - ii. permeability (4 marks)
- d) "Good gating design is an effective tool in coming up with a sound cast". Justify this statement taking into consideration any three situations. (9 marks)
- e) Describe any three ways of controlling the entry of dirt/dross in the mould cavity (6 marks)
- f) With an example differentiate between pressurized and non pressurized gating system. (2 marks)
- g) What is the function of each of the following features in a casting process
  - i) Chaplets
  - ii) Pads
  - iii) Chills. (3 marks)

### QUESTION TWO (20 MARKS)

- a) Products of sand casting process in most cases do have non-intended cavities in them. Discuss two situations under which the cavities do come about. In your discussion, explain the precautions that must be taken to minimize their occurrence. (8 marks)
- b) With aid of sketches show how the following are used
  - i) Loose piece
  - ii) Draw back (5 marks)
- c) Why are the following pattern allowance given on a pattern
  - i) Draft allowance
  - ii) Machining allowance
  - iii) shrinkage allowance (3 marks)
- d) Pure materials freeze by forming a solid skin with relatively smooth wall between solid and liquid; most impure/alloys do not. Explain (4 marks)

### QUESTION THREE (20 MARKS)

- a) Describe the investment moulding process. (8 marks)
- b) Describe the following sand casting defects, giving the possible cause for each:-
  - i) Swell
  - ii) Shift (4 marks)
- c) You are to produce high quality aluminium castings for aircraft use. It is important that each one to be completely sound and thus free from internal and surface defects. Explain how you can carry out the test(s) to establish the soundness of the castings. (8 marks)

**QUESTION FOUR (20 MARKS)**

- a) Describe the slush casting process. Which precaution should be observed when using this method of casting. (8 marks)
- b) Give any two items that can be produce by method describe in (a) above. (2 marks)
- c) Identify any three factors that influence the solidification rate of a casting. (3marks)
- d) Sand casting **X** and **Y** are geometrically similar. **Y** weighs three times as much as **X**; **Y** freezes in 10 minutes. How long will it take **X** to freeze. Give assumptions taken. (7 marks)

