60

(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS 2021/2022 ACADEMIC YEAR

FIFTH YEAR FIRST SEMESTER EXAMINATIONS

FOR THE BACHELOR OF SCIENCE IN MECHANICAL AND INDUSTRIAL ENGINEERING

COURSE CODE: MIE 513E

COURSE TITLE: SURFACE TREATMENT OF METALS

DATE: 19th April 2022 **TIME:** 3.00-5.00 p.m.

INSTRUCTIONS TO CANDIDATES

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

TIME: 2 Hours

MMUST observes ZERO tolerance to examination cheating

QUESTION ONE (30 marks)

a) Using a schematic, explain how silk screening is done **(6 marks)**

b) There are different coating and surface treatments processes, with different applications. briefly state five(5) important uses of surface treatment processes **(5 marks)**

c) Carburising is a hardening process in which carbon is introduced into the surface layer of the steel .Briefly explain the three (3) methods that can be used to do carburizing **(9 marks)**

d) Many common Aluminum parts are surface treated by anodizing to give them a different color. In this regard, explain the principle of the anodizing process **(4 marks)**

e) Briefly explain three (3) types of paints used to paint surfaces **(6 mark)**

QUESTION TWO (20 marks)

a) With the use of appropriate diagrams, explain how flame hardening and induction hardening are done **(8 marks)**

b) In surface treatment an item can be thermally sprayed in order to impart a particular property to it. In this regard and with the use of appropriate diagrams, explain any three (3) methods that can be used to thermally spray a surface **(12 marks)**

QUESTION THREE **(20 marks)**

a) Using a table, explain the difference between heat treatment and case hardening in terms of the following **(6 marks)**

I. Speed of procedure
II. Surface chemistry
III. Depth
IV. Surface hardness
V. Control
VI. Core toughness

b) Briefly discuss two procedures of high temperature oxidation **(8 marks)**

c) With the use of an appropriate diagram, explain how the electroplating process is done **(6 marks)**

QUESTION FOUR **(20 marks)**

a) Briefly highlight any five (5) applications of surface engineering **(5 marks)**

b) Briefly describe any three (3) methods that can be used to mechanically harden a surface **(9 marks)**

c) State at least six(6) functions of the ingredients found in the plating bath **(6 marks)**