MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

UNIVERSITY ORDINARY EXAMINATION

2021/2022 ACADEMIC YEAR

FOURTH YEAR **SECOND** SEMESTER EXAMINATION FOR BACHELOR OF EDUCATION IN MECHANICAL ENGINEERING

EMT 415: TOOLROOM PROCESSES.

DURATION: 2 HOURS

Instructions to candidates:

1. Question One is compulsory
2. Attempt any other Two questions in section B
3. Mobile phones are not allowed in the examination room
4. You are not allowed to write on this examination question paper

SECTION A: ANSWER ALL QUESTIONS IN THIS SECTION

QUESTION ONE (30 MARKS)

a) Describe five factors to be considered during design of Jigs and fixtures. (5marks)

b) With the aid of neat sketches describe the following:
   -Discontinuous chips
   - Continuous chips with BUE (6marks)

c) State four basic purposes of cutting fluid applications (4marks)

d) State and explain three types of cutting fluids. (6marks)

e) List any four types of tool materials. (4marks)

f) With the aid of a neat labelled sketch describe the elements of a single point cutting tool. (5marks)

SECTION B – ANSWER ANY TWO QUESTIONS IN THIS SECTION

QUESTION TWO (20 MARKS)

a) With the aid of a neat labelled sketch illustrate a Swinging Strap Clamp as applied in Jigs and fixtures. (5marks)

b) State and explain five fundamental principles of Jigs and fixtures. (10marks)

c) List five essential features of Jigs and fixtures (5marks)

QUESTION THREE (20 MARKS)

a) In an orthogonal cutting test with a tool of rake angle 15^0 the following data was collected.

   Chip thickness=0.5

   F_c=1350N

   F_t=1800N

From Merchant Circle, calculate the following,

 i) Shear plane angle (ϕ)

 ii) Frictional force (F)

 iii) Normal force (N)

 iv) Coefficient of friction at tool chip interface.

 v) Shear force along the shear plane. (10marks)

b) Outline five essential properties that cutting fluid should possess. (5marks)

c) State five assumptions of merchant theory. (5marks)

QUESTION FOUR (20 MARKS)

a) With the aid of neat sketch illustrate Forced Chip breaking technique. (6marks)

b) List four principles of Chip breaking. (4marks)

c) Outline three advantages of merchant circle diagram. (3marks)

d) Define tool life. (2marks)

e) State five essential properties for cutting tool materials. (5marks)