MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2015/2016

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

SECOND SEMESTER EXAMINATION FOR DIPLOMA IN MECHANICAL ENGINEERING

SUPPLEMENTARY EXAMINATION

METROLOGY AND INDUSTRIAL MEASUREMENTS I

DATE: 5/8/2016 **TIME: 2.00-4.00 PM**

INSTRUCTIONS:

i. This examination contains two sections A and B.
ii. Section A is compulsory.
iii. Attempt any other two questions from Section B.

SECTION A(COMPULSORY) 30 MARKS

1. a) i) State any four objectives of metrology (4 marks)

ii) List any four requirements of an inspection tool (4 marks)

b) i) State any four functions ofthe Kenya Bureau of standards (4 marks)

ii) Describe the sequence followed in the manufacture of slip Gauges. (6 marks)

c) Define the following terms

i) Limits of size (6 marks)

ii) Tolerance

iii) Allowance

d) With the aid of sketches describe any two types of fits. (6 mark)

SECTION B (ATTEMPTANY TWO QUESTIONS FROM THIS SECTION)

2. a) i) Differentiate between gauging and measuring.

ii) State Taylor's principle of gauging (3 marks)

iii) List any three materials suitable for the manufacture of gauges. (3 marks)

b) Explain any four essential requirements for materials for making Gauges (4 marks)

c) Explain the following with reference to gauging.

i) Minimum metal condition (4 marks)

ii) Maximum metal condition (4 marks)

3. a) i) State the principle of operation of a comparator (3 marks)

ii) List any four requirements of a comparator (4 marks)

b) State any three advantages and three disadvantages of mechanical comparators. (6 marks)

c) With aid of a suitable sketch describe the construction and the working principle of the sigma comparator. (7 marks)

4. a) Define the following terms as applied to surface texture.

i. waviness (2 marks)

ii. roughness (2 marks)

b) Explain the effect of surface texture on the following

i. Fatigue life

ii. Bearing properties

iii. Wear (6 marks)

c) With the aid of a sketch explain the principle of operation of the Tomlinson surface meter a s a method of measuring surface texture (5 marks)

d) The following eleven heights in mm were obtained from a trace in a surface texture test (5 marks)

43, 39, 37, 46, 26, 20, 40, 27, 35, 18, and 32

If a vertical magnification of x 100 was used, determine the root mean square value in micrometers

5. a) Define the following terms

i) inspection (4 marks)

ii) statistical quality control

b) Describe any two types of inspection (6 marks)

c) Describe any three areas of inspection (6 marks)

d) Differentiate between inspection by 'variables' and inspection by "attributes" (4 marks)