THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF MECHANICAL & AUTOMOTIVE ENGINEERING

UNIVERSITY EXAMINATION FOR:
BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING

EMG 2312: METROLOGY

END OF SEMESTER EXAMINATION
SERIES: DECEMBER 2012
TIME: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer Booklet*

This paper consists of **FIVE** questions. Answer any other **THREE** questions
Maximum marks for each part of a question are as shown
This paper consists of **THREE** printed pages

Question One

a) Distinguish the following methods of measurements:
(i) Direct Method
(ii) Indirect Method **(3 marks)**

b) Explain: (i) Measurement
(ii) Inspection

For each provide examples **(4 marks)**

c) Describe the following using examples:
(i) Line standards
(ii) Light (wavelength) standards

(iii) End standards **(6 marks)**

d) With the aid of a diagram, outline how to determine the actual size of a 50mm slip gauge starting with three gauges namely:
TWO 50mm gauge and one master 100mm slip gauge. **(7 marks)**

Question Two

a) Give **FOUR** basic set of shapes for typical inspection gauges. **(2 marks)**

b) Describe the procedure for preparing simple "GO" and "NOT GO" gauges **(6 marks)**

c) State Taylors Principle of Gauging. Briefly illustrate this principle. **(10 marks)**

d) Distinguish between unilateral and bilateral tolerance. **(2 marks)**

Question Three

a) State **FOUR** common principles used to design comparators. **(4 marks)**

b) Outline **FIVE** desirable characteristics of comparators. **(5 marks)**

c) With the aid of a well labeled diagram, show the working principle of a mechanical comparator. **(8 marks)**

d) Mention **THREE** advantages for use of electronic over mechanical comparators. **(3 marks)**

Question Four

a) By use of examples, explain the difference between:
(i) Primary standard
(ii) Secondary standard
(iii) Working standard **(6 marks)**

b) Explain the following terms in precision measurement:
(i) Resolution
(ii) Sensitivity
(iii) Calibration
(iv) Accreditation
(v) Traceability **(10 marks)**

c) Explain **FOUR** sources of errors. **(4 marks)**

Question Five

a) State the main requirements of slip gauges. How are slip gauges manufactured? **(6 marks)**

b) Discuss limits, fits and tolerance in engineering metrology. **(6 marks)**

c) Describe **FOUR** main features on a calibration certificate. **(2 marks)**

d) An angle of 98^{o} 27' 15" is to be developed using an angle gauge set below. Show the arrangement with a sketch.

Degrees	1, 3, 9, 27, 41, 90
Minutes	1, 3, 9, 27
Seconds	3, 6, 18, 30

(6 marks)