



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

UNIVERSITY EXAMINATION FOR:

CERTIFICATE IN ELECTRICAL POWER ENGINEERING (CEPE 3)

TESTING METHODS AND RELIABILITY (ELECTRONICS)

EEE 1201

END OF SEMESTER EXAMINATION

SERIES: MAY 2016

TIME: 2 HOURS

DATE: Pick Date Select Month Pick Year

Instructions to Candidates

You should have the following for this examination

-*Answer Booklet, examination pass and student ID*

This paper consists of **five** Questions;. Attempt any **THREE** Questions.

Do not write on the question paper.

QUESTION ONE

- (i) Define the following terms.
- Measurement.
 - Derived units.
 - Fundamental units. (6 marks)
- (ii) State the three primary fundamental units commonly used in measurement. (3marks)
- (iii) A computer system consists of five identical terminals in series. The required system reliability for unit time ($T = 1$) hour is $R(1) = 0.999$. calculate each component's :
- Reliability.
 - Unreliability.
 - Failure rate values. (5 marks)
- (iv) Explain the following errors and the methods of minimizing them:
- Gross error.
 - Systematic error.
 - Parallax error. (6 marks)

QUESTION TWO

- (i) Define the following terms as used in measurement:
- Accuracy.
 - Error.
 - Precision.
 - Sensitivity.
 - Span. (5 marks)
- (ii) State and explain THREE main functions of instruments. (6 marks)
- (iii) a) What is a signal? (1 mark)
- b) Describe the three processes of signal conditioning. (6 marks)
- c) Calculate the power gain of an amplifier which has an input of 5mW and output of 6 watts. (2 marks)

QUESTION THREE

- (i) What is a signal converter? (2 marks)
- (ii) Explain with the aid of a diagram the measurement of resistance by the substitution method. Explain why the accuracy of the meter does not affect the result. (7 marks)
- (iii) A 250 volt moving iron voltmeter takes a current of 0.05A when connected to a 250v dc supply. The coil has an inductance of 1 Henry. Determine the reading on the voltmeter when connected to a 250volt, 100Hz ac supply. (3 marks)

- (iv) Draw and explain the bathtub diagram of a component of an engineering product. (6 marks)
- (v) A multimeter has full scale deflection current of 1 mA. Determine its sensitivity. (2 marks)

QUESTION FOUR

- (i) Explain the half split method of fault diagnosis. (5 marks)
- (ii) Give three examples of mechanical physical units. (3 marks)
- (iii) Describe the following standards:
- a. Primary standards.
 - b. Secondary standards.
 - c. Working standards.
 - d. International standards. (8 marks)
- (iv) A spring controlled moving iron voltmeter reads correctly on 250 v dc. Calculate the scale reading when 250v ac is applied at 50Hz. The instrument coil has a resistance of 500Ω and inductance of 1 H and the series (non reactive) resistance is 2000Ω . (4 marks)

QUESTION FIVE

- (a) Explain the following failures:
- i. Catastrophic.
 - ii. Degradation.
 - iii. Inherent weakness. (6 marks)
- (b) Explain the following:
- i. MTBF.
 - ii. Reliability.
 - iii. Availability.
 - iv. Maintainability. (8 marks)
- (c) An electronic equipment has an MTBF of 500 hours. Determine the probability of failure for this equipment in 1000 hours of life. (6 marks)