



MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

SECOND YEAR FIRST SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE IN
CIVIL ENGINEERING

SPECIAL / SUPPLEMENTARY EXAMINATION

ECV 211: ELECTROMECHANICAL ENGINEERING

DATE:

TIME:

INSTRUCTIONS

Answer question One and any other Two questions

Question ONE (COMPULSORY)

- a) Outline the relevance of this course to your area of study (5 marks)
- b) Explain the following terms
- i) Current
 - ii) Voltage
 - iii) Resistance
 - iv) Joule's law
 - v) Ohm's law
 - vi) Impedance
 - vii) Admittance
 - viii) Kirchoff's laws
 - ix) Parallel arrangement of resistors
 - x) Series arrangement of resistors
 - xi) Parallel circuit
 - xii) Series circuit

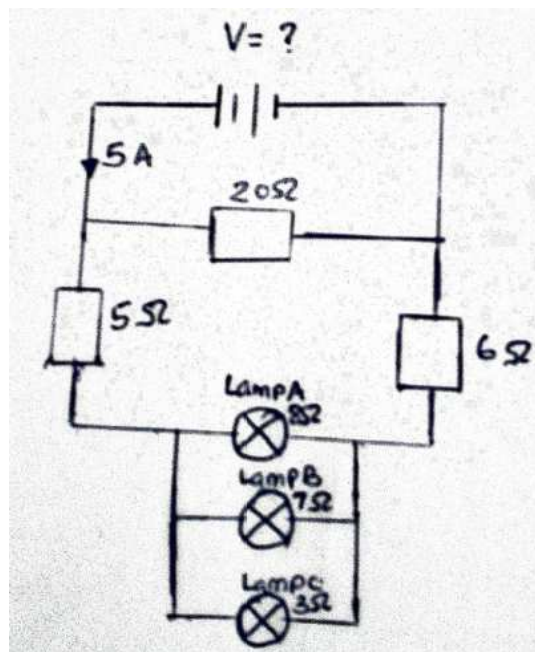
- i) Direct current, D.C
- ii) Alternating current, A.C
- iii) Step-up and step-down transformers. (15 marks)

QUESTION TWO

- i) In Kenya the domestic supply of electricity is 240V stepped down from the national grid. Find the peak voltage values V_0 . Why would you consider this more dangerous than a d.c supply of an equivalent voltage? (8 marks)
- ii) Domestic supply for country B is 220V. The frequency is 50Hz. Calculate the periodic time? If an appliance of 20 ohms is used, calculate the mean power? (4 marks)
- iii) Prove the following in alternating current supply. (8 marks)
 - a. $I_{\text{mean}} = 0.637 I_0$
 - b. $I_{\text{rms}} = 0.707 I_0$

QUESTION TWO

- a) Calculate the voltage V across the cell in the diagram below. (10 marks)



- b) If the cell had an internal resistance of 2 ohms repeat a). Find the emf and the p.d across the cell. Are the e.m.f and p.d across the cell equal? Justify. Would the lamps A, B and C light brighter or not? Justify. (10 marks)

QUESTION FOUR

- a) Distinguish between 3 phase A.C and single phase A.C (4 marks)
- b) What are the advantages of 3-phase A.C (6 marks)
- c) Describe the components and the working of a hot wire ammeter. What advantage does this ammeter have over ordinary ammeters? (10 marks)

QUESTION FIVE

- a) Differentiate between macerator equipment and garchery systems (8 marks)
- b) Describe how electrical systems are useful in lifts, excavators, air conditioning and refrigeration (12 marks)