MACHAKOS UNIVERSITY

University Examinations 2016/2017

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

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

ECV 211: ELECTROMECHANICAL ENGINEERING

DATE: 20/6/2017 **TIME: 8:30 – 10:30 AM**

INSTRUCTIONS

- *This paper comprises of **five** questions*
- *Question **one** is **compulsory** and carry 30 marks*
- *Answer any **other two** questions*

QUESTION ONE (COMPULSORY) (30 MARKS)

Explain the following terms

i	Current	ix	Parallel arrangement of resistors
ii	Voltage	x	Series arrangement of resistor
iii	Resistance	xi	Parallel circuit
iv	Joule's law	xii	Series circuit
v	Ohm's law	xiii	Direct current, D.C
vi	Impedance	xiv	Alternating current, A.C
vii	Admittance	xv	Step-up and step-down transformer
viii	Kirchoff's laws		

(30 marks)

QUESTION TWO (20 MARKS)

a) 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)

b) 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)

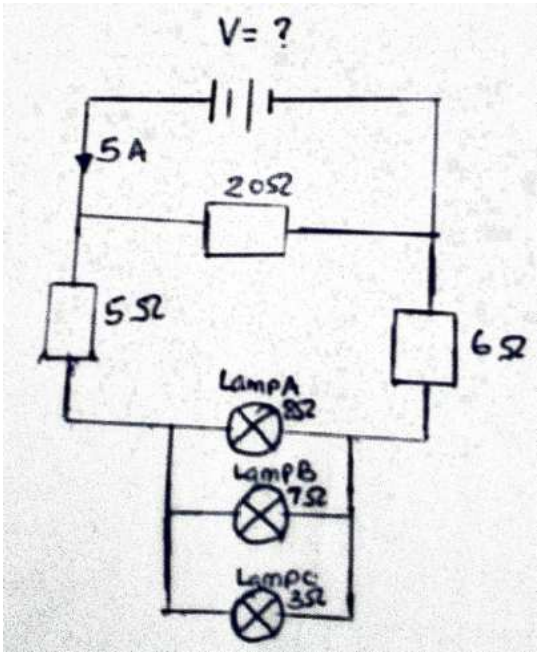
c) Prove the following in alternating current supply. (8 marks)

i $I_{mean}=0.637I_0$

ii $I_{rms}=0.707I_0$

QUESTION THREE (20 MARKS)

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 (20 MARKS)

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 (20 MARKS)

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)