TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

UNIVERSITY EXAMINATION FOR:

CERTIFICATE IN TECHNOLOGY

EEP 1101: ENGINEERING SCIENCE 1

END OF SEMESTER EXAMINATION

SERIES: DECEMBER 2016

TIME: 2HOURS

DATE:

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

*This paper consists of five questions. Answer **ANY THREE QUESTIONS**.*

Do not write on the question paper.

QUESTION ONE

a) i. Explain the term 'polarization' as applied to batteries (3 marks)

ii. A battery is made up of four individual cells of which has an open circuit terminal voltage of 2V and an internal resistance of 0.1 Ω, calculate;

I) Terminal voltage of the battery under no load condition

II) Current that flows when the battery terminals are short circuited (7 marks)

b) A battery of e.m.f 48V and internal resistance 3Ω is charged on a 110 v.d.c supply, using the current method. If the lost of energy is sha. 0.95 per kwh, calculate;

I) The series resistance required to give a current of 4A

II) The cost of charge the battery for 18 hours. (10 marks)

QUESTION TWO

a) i. Define work

ii. Calculate the work done in raising a 2kg mass of metal through a height of 20 meters, take g = 9.81m/s^2 (5 marks)

b (i) A vehicle which has a mass of 10 kg is moving at a velocity of 60km/h, calculate its kinetic energy.

ii. Explain the terms vector and scalar quantities (7 marks)

c)With the aid of a diagram,; Describe briefly the changes in the potential and kinetic energies of the bob of a simple pendulum as it goes from one side of its swing to the other. (8 marks)

QUESTION THREE

a) i. Define the following terms as applied in magnetism;

I) Magnetic motive force

II) Reluctance

III) Magnetic flux

IV) Magnetic flux density

ii. Draw a diagram of the magnetic field produced by a current flowing in a long straight wire in a plane at right angles to the wire. (9 marks)

b) i. State a rule that gives the relation between the direction of the current and that of the field

ii. State four useful machines whose operation depends on the principle of a force in a current carrying conductor. (8 marks)

c) A flux of 300μwebers passing through a 150 turns coil is reversed in 40 ms. Determine the average induced e.m.f (3marks)

QUESTION FOUR

a. (i) State Kirchoff's laws

(ii) From the circuit of figure 1 below, calculate;

(I) Total resistance

(II) Power dissipated by the 10 Ω resistors

(III) Potential drop across R5 (12Ω)

(IV) Total power

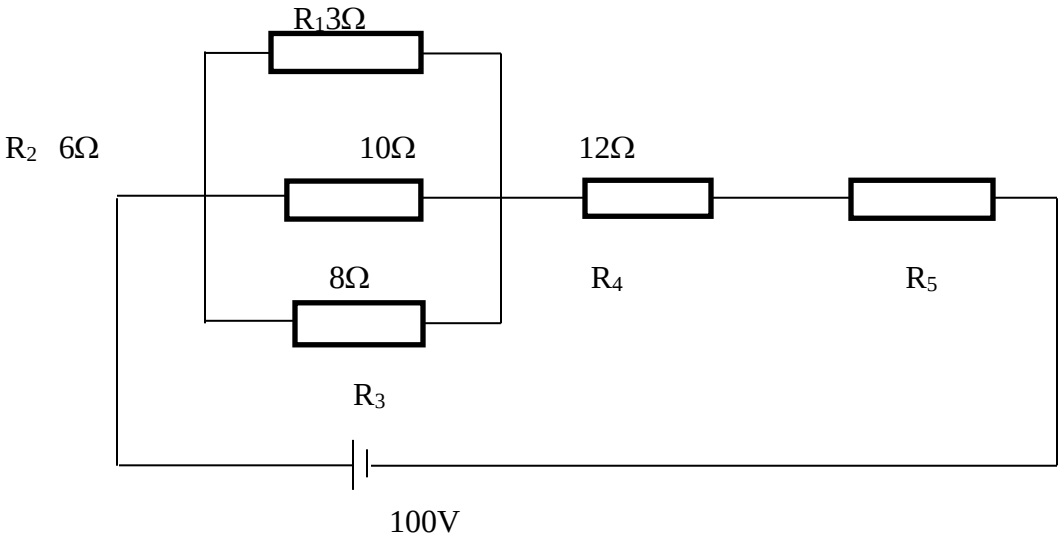


Figure 1

(10 marks)

b. i) State Ohm's law

ii) Define the following electrical quantities and state their units:-

(I) Voltage

(II) Current

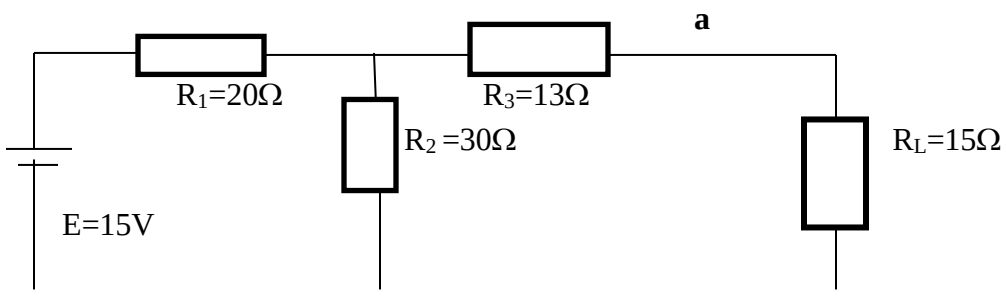
(III) Conductance

(IV) Conductivity

(V) Power (10 marks)

QUESTION FIVE

a (i) Determine the Therenin equivalent for the circuit in figure II between terminals 'a' and 'b' (5 marks)



b

Figure ii

(ii) Calculate (I) Current (II) Voltage across the 15Ω load resistor

(iii) If R_L is a variable load resistor, calculate its value to develop maximum power across it . (9marks)

b. Obtain norton's equivalent circuit of figure II above (6 marks)