



MACHAKOS UNIVERSITY

University Examinations for 2020/2021

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

FIRST YEAR FIRST SEMESTER EXAMINATION FOR

CERTIFICATE IN ELECTRICAL ENGINEERING

1602/102 ELECTRICAL PRINCIPLES I

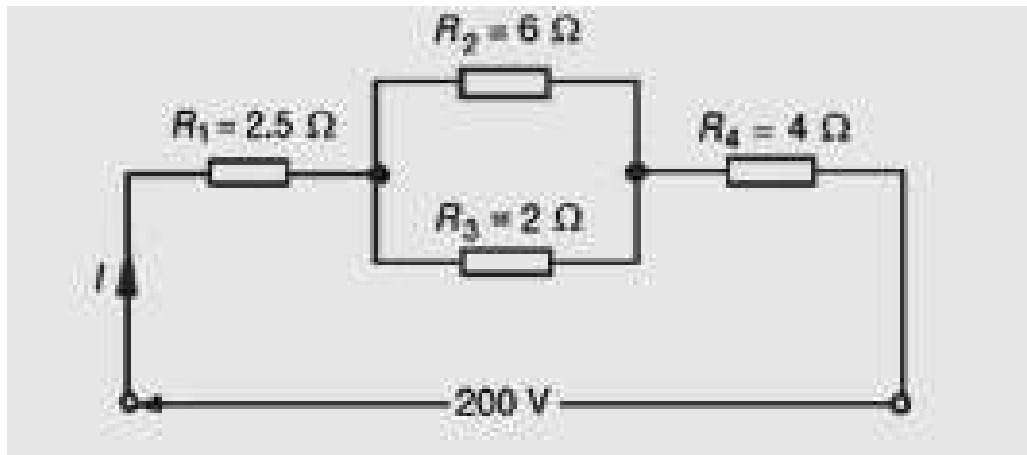
DATE: 31/8/2021

TIME: 8:30 – 11:30 AM

INSTRUCTIONS: Answer all the questions

1. a) State ohms law and give its formula (4 marks)
- b) Draw the lines of magnetic field around a magnet (4 marks)
- c) Explain the following terms as applied in conductors
 - I. Atomic structure
 - II. Valence (6 marks)
- d) Explain six characteristics of magnetic field lines (6 marks)
2. a) i) Name four uses of magnets (4 marks)
- ii) Eight cells each with an internal resistance of 0.2Ω and an e.m.f of 2.2V are connected a) in series ii) in parallel. Determine the total e.m.f and the internal resistance of the batteries so formed. (8 marks)
- b) Explain the following
 - i) An electrolyte
 - ii) an electrode (4 marks)
- c) Give the differences between
 - i) Wet and dry cell
 - ii) Primary and secondary cells (4 marks)

3. a) i) Name three (3) types of capacitors
 ii) Name four (4) uses of capacitors (7 marks)
 iii) An electric kettle has a resistance of 30Ω . What current will flow when connected to a 240V source supply. (5 marks)
- b) i) Define resistance and give its symbol (3 marks)
 ii) A coil of copper wire has a resistance of 10 at 20°C . if the temperature coefficient resistance of copper at 20°C is $0.004/^{\circ}\text{C}$, determine the resistance of the coil when the temperature rises to 100°C . (5 marks)
4. a) In the circuit given below. Calculate;
 i) The supply current,
 ii) The current flowing through resistor R2
 iii) Power dissipated by R3 and
 iv) The p.d. across resistor R4 (10 marks)



- b) Ten 1.5V cells each having an internal resistance of 0.2 are connected in series to a load of 58Ω . Determine the current flowing in the circuit and the p.d at the battery terminals (10 marks)

5. a) i) Define magnetism
- ii) Name two uses of magnetism (3 marks)
- b) i) Explain two problems associated with simple cells (4 marks)
- ii) Name three items to be present for electricity production
- iii) Explain four methods of magnetizing a magnetic material. (5 marks)
- c) A parallel plate capacitor has area of 0.5m^2 and separated by a dielectric of 0.3 cm thick of relative permittivity of 2.5. Determine the
- i) Capacitance of the capacitor
- ii) Energy stored in the capacitor when charged to 1,000 Volts. (8 marks)