



MACHAKOS UNIVERSITY

University Examinations for 2020/2021

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

CERTIFICATE IN ICT

ELECTRICAL PRINCIPLES I

Answer all the questions

Q1 a) State ohms law and give its formula (2 mark)

b) i) Draw the atomic structure of i) Magnesium ii) Carbon iii) Beryllium atoms. (6 marks)

ii) Explain the following terms as applied in conductors

I. Atomic structure

II. Valence (6 marks)

Two resistors each of $R\Omega$ are connected in parallel. Show that their equivalent resistance is $R/2 \Omega$. (6Marks)

Q2) a i) Find the conductance of a resistance of $5K\Omega$ (4 Marks)

ii) Two 400Ω resistors are connected in parallel. The combination is then connected in series to a cell of 500V. If the cell has internal resistance of 50Ω , calculate,

I) The total current flowing

II) The energy consumed by one resistor in 2hours 25 minutes 25 seconds by one resistor (6 Marks)

b i) Explain what doping is in electronics and give its uses. (4 Marks)

ii) Explain how P-type semiconductor material is made (6 Marks)

Q3 a) Define, and give an example, of a semi-conductor (2 Marks)

b) Explain what is meant by the following in electronics

i) Negative temperature coefficient

ii) Pentavalent material

iii) Doping

iv) P-N junction

v) Depletion region

(10 Marks)

c) Explain two reasons responsible for reverse bias breakdown (8Marks)

Q4. a) In the circuit given below Calculate;

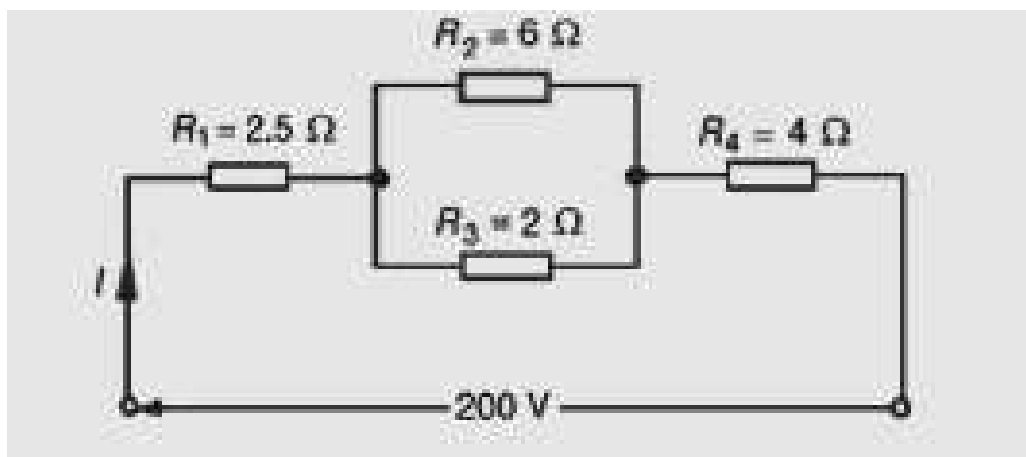
i) The supply current,

(a) The current flowing through resistor R2

(b) Power dissipated by R3 and

(c) The p.d. across resistor R4

(10 Marks)



b) i) Define 2' complement

ii) Do the following operations

a) $1101_2 \times 1100_2$

b) $110011_2 + 101101_2$

c) $11011_2 - 1101_2$

d) $11001_2 / 101_2$

(10 Marks)

Q5. a) i) Name three number systems in existence

(3 Marks)

ii) Convert to decimal

a) 11101.011_2

b) $7BF_{16}$

c) 175.15_{10}

(6 Marks)

b) Giving examples, explain what digital coding is as used in digital electronics

(3 Marks)

ii) Convert the hexagonal number F8E6 into the corresponding decimal number

(2 Marks)

c) Draw the following gates

a) AND gate

b) OR gate

c) NOT gate

(6 Marks)