



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

FIRST YEAR FIRST TERM EXAMINATION FOR

CERTIFICATE IN ELECTRICAL AND ELECTRONICS ENGINEERING

ANALOGUE ELECTRONICS

DATE: 10/6/2021

TIME: 8.30-11.30 AM

INSTRUCTIONS

ATTEMPT ALL QUESTIONS

- 1
 - a) With an aid of a labelled diagram explain components of an atom whose atomic number is 10. (12 marks)
 - b) Explain four postulates of the Bohr's atomic model. (8 marks)
- 2
 - a) An atom is revolving in Bohr's second orbit of a silicon element. Given that;
Mass of an electron is 9.1×10^{-31} kg
Charge of electron is 1.6×10^{-19} C
Planck's constant is 6.635×10^{-34}
Permittivity of free space is 8.854×10^{-12} F/m
Determine;
 - i. Kinetic energy in joules
 - ii. Kinetic energy in eV
 - iii. Potential energy in joules
 - iv. Potential energy in eV
 - v. Total energy in eV. (14 marks)
 - b) Describe each of the following;
 - i. Valence electron
 - ii. Valency
 - iii. Covalent bond. (6 marks)

3. a) Define each of the following terms
- i. Atomic number
 - ii. Atomic mass
 - iii. Ion
 - iv. Potential energy
 - v. Kinetic energy. (5 marks)
- b) Distinguish between Intrinsic and extrinsic semiconductor material (6 marks)
- c) Describe three types of materials used in electrical engineering. State one application for each material. (9 marks)
4. a) i Draw labelled energy bands diagrams for a conductor and a semiconductor
- ii Explain the various regions of energy bands in (i).
- iii Comment on the difference between the two diagrams in (ii) (15 marks)
- b) Draw a labelled diagram of a silicon atom . (5 marks)
- 5 a) With an aid to a labelled crystalline structure diagram, explain an n-type semiconductor material formation. (12 marks)
- b) Distinguish between the following pairs:
- i. Donor and acceptor impurity.
 - ii. Majority and minority charge carriers. (8 marks)