



MACHAKOS UNIVERSITY

University Examinations for 2021/2022

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MECHANICAL AND MANUFACTURING ENGINEERING

FIRST YEAR FIRST SEMESTER EXAMINATION FOR

DIPLOMA IN ELECTRICAL & ELECTRONICS ENGINEERING

2601/102: PHYSICAL SCIENCE

DATE:

TIME:

INSTRUCTIONS.

1. Answer all the questions.

2. Write your registration number and course in the answer sheet.

1. a) With the help of sketch diagrams describe the distribution of bond electrons in;
 - i). Ionic
 - ii). Covalent and
 - iii). Polar Covalent compounds (6 marks)
- b). Explain why ammonia gas dissolved in kerosene does not have effect on litmus dye (2 marks)
- c) Briefly describe the nature of the following; (6 marks)
 - i). Amphoteric salts
 - ii). Hygroscopic
 - iii). Efflorescent and
 - iv). Deliquescent compounds
- d) With Examples, list any four methods of preparing salts (6 marks)

2. a) Define, with examples, acids and bases according to:
- i) Arrhenius (3 marks)
 - ii) Bronsted-Lowry (3 marks)
- b) Outline the difference between strong acid and a concentrated acid. Give an appropriate example in each case (5 marks)
- c) Using examples, differentiate between an acid salt and a normal salt. (3 marks)
- d) Arrange elements as they appear in the electrochemical series (6 marks)
3. a) Briefly describe the mole concept. (4 marks)
- b) Calculate the mole of Potassium Chloride that is contained in 4grammes (3 marks)
- c) Calculate the mass of Magnesium Chloride that is contained in 0.02 mole solution. (Potassium 19, Magnesium 23, Chlorine 35) (3 marks)
- d) Find the concentration of a solution that is made by dissolving 3grammes of Potassium Sulphate in 100cm³ of water. (4 marks)
- e) With the aid of a diagram, describe a laboratory activity to demonstrate that the water is electrically charged (6 marks)
4. a) Using an appropriate example in each case describe the following:-
- i) Fused Calcium Chloride is a laboratory drying agent (3 marks)
 - ii). Cobalt Chloride paper is a laboratory moisture detector (3 marks)
- b). Name two intermolecular forces (2 marks)
- c). Briefly explain why Methane (CH₄) is a gas while trichloromethane (CHCl₃) is a liquid at room temperature. (4 marks)
- d). Complete the table below (8 marks)

Particle	Number of Electrons	Number of Neutrons	Number of protons	Mass number
K ²⁺		12	12	
L	35	45		
M ²⁻	18			32
N			13	27

5. a) Using the outermost energy level shell show how atoms are bonded in the following molecules. Use dots (.) and crosses (x) to represent electrons. (6 marks)
- i) CCl_4
 - ii) PCl_3
 - iii) CHCl_3
 - iv) N_2
 - v) CO_2
 - vi) NH_3

(C= 6, Cl =17, P= 15, H= 1, O=8, N= 7)

- b) Describe how the metallic bond favours the existence of the three major properties of metals, namely; (9 marks)
- i. Malleability
 - ii. Ductility and
 - iii. Conductivity
- c) With appropriate example describe the concept Isotopy (5marks)