



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF PHYSICAL SCIENCE

FIRST YEAR THIRD SEMESTER EXAMINATION FOR

DIPLOMA BUILDING TECHNOLOGY

PHYSICAL SCIENCE

DATE: 18/12/2020

TIME: 2.30-5.30 PM

INSTRUCTIONS

1. Write your Registration number on the answer booklet
2. Answer *all* questions

1. a) Briefly describe the three (3) main properties of metals that arise from the nature of metallic bonding (6 marks)
- b) List elements as they appear in the electrochemical series (6 marks)
- c) Write the molecular equation for the reaction between Hydrochloric Acid and Calcium metal (2 marks)
- d) Explain the difference between a strong acid and a weak acid (2 marks)
- e) Complete the table below (4 marks)

Particle	Number of Electrons	Number of Neutrons	Number of protons	Mass number
P^{2+}		12	12	
Q	35	45		
R^{2-}	18			32
S			13	27

2. a) Explain, using water, how polarity occurs in chemical molecules (5 marks)
- b) Using Chlorine and Sodium show how atoms react (3 marks)
- c) With examples describe monoprotic, diprotic and triprotic acids (3 marks)

- d) Explain how a covalent bond is formed (2 marks)
- e) Write the molecular, ionic and net equation for the reaction between Calcium Hydroxide and sulphuric acid (3 marks)
- f) Demonstrate that the water molecule is electrically charged (4 marks)
3. a). Define the four laws of reflection (8 marks)
- b). With the aid of simple sketches explain the characteristics of images formed by concave mirrors with the object at the following;
- Infinity
 - Beyond 'C'
 - At 'C'
 - Between 'C' and 'F'
 - At 'F'
 - Between 'F' and 'C' (12 marks)
4. a) i) Briefly describe the mole concept. (3 marks)
- ii). Calculate the mole of Calcium Chloride that is contained in 4 grammes (3 marks)
- iii). Calculate the mass of Magnesium Chloride that is contained in 0.02 mole solution (4 marks)
- iv). Find the concentration of a solution that is made by dissolving 3grammes of Calcium Nitrate in 100cm³ of water. (4 marks)
- (Calcium 20, Magnesium 23, Chlorine 35, Sulphur 16)
- b). Explain why paint is used to coat most metallic surfaces (3 marks)
- c). Giving an example, state what is meant by redox reaction (3 marks)
5. a). State the difference between temporary and permanent hardness of water (4 marks)
- Using chemical equations, show how each of the types of hardness of water in 5 (a), above is removed (6 marks)
 - State two commercial and one health disadvantages of hard water (4 marks)
- b). Differentiate between the following;
- Natural and synthetic polymers,
 - Linear and branched polymers
 - Addition and condensation polymerization (6 marks)