MACHAKOS UNIVERSITY

University Examinations 2019/2020Academic year

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF PHYSICAL SCIENCES

FIRST YEAR SECOND SEMESTER EXAMINATION FOR

DIPLOMA IN CIVIL ENGINEERING

DIPLOMA IN BUILDING TECHNOLOGY

2601/102: PHYSICAL SCIENCE

DATE: 4/11/2020   **TIME: 8.30-11.30 AM**

INSTRUCTIONS TO CANDIDATES

Answer all the questions.

1. a). Differentiate between permanent and temporary hardness of water. State the chemical compounds that cause each type of hardness   (4 marks)

    b). Briefly, describe the procedure of removing permanent hardness of water

        (4 marks)

    c). Outline the disadvantages of hard water in the following situations   (6 marks)

        i. Industrial

        ii. Domestic

        iii. Health

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   (4 marks)

    c) Using examples, differentiate between acid salt and normal salt   (4 marks)

3. a) Briefly describe the mole concept.   (3 marks)

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b) Calculate the mole of Potassium Chloride that is contained in 4grammes of potassium chloride (3 marks)

c) Calculate the mass of Magnesium Chloride that is contained in 0.02 mole solution. (Potassium 19, Magnesium 23, Chlorine 35) (4 marks)

d) Find the concentration of a solution that is made by dissolving 3grammes of Potassium Sulphate in 100cm^3 of water. (4 marks)

4. Using an appropriate example in each case, and with dots (.) and crosses (x), describe the following:-

a) Ionic bond (4 marks)

b) Covalent bond (4 marks)

c) Name two intermolecular forces (2 marks)

d) Briefly explain why Methane (CH_4) is a gas while trichloromethane ($CHCl_3$) is a liquid at room temperature. (4 marks)

5. 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)

a) CCl_4

b) PCl_3

c) $CHCl_3$

d) N_2

e) CO_2

f) NH_3

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

6. Complete the table below (8 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