



MACHAKOS UNIVERSITY

University Examinations 2020/2021

SCHOOL OF PURE AND APPLIED SCIENCES

DEPARTMENT OF PHYSICAL SCIENCES

FIRST YEAR FIRST SEMESTER EXAMINATION

DIPLOMA IN ELECTRICAL & ELECTRONICS AND TELECOMMUNICATION
ENGINEERING

2601/102: PHYSICAL SCIENCE

AUGUST, 2021

INSTRUCTIONS:

a) Write your Registration Number in the Answer Booklet

b) Answer all questions

1.
 - a). Brief describe The Periodic Table of Elements (4 marks)
 - b). State the common names given to elements in Group I, II & VII (3 marks)
 - c). Explain the reason behind coating metallic ornaments with gold (3 marks)
 - d). Draw a suitable diagram to demonstrate the existence of sub-atomic particles (3 marks)
 - e). Explain briefly the relationship between atomic number (Z) and electrons. (3 marks)
 - f). The atomic nuclei of elements Q and P contain the following particles:-
Q 7 neutrons and 7 protons
P 14 neutrons and 12 protons
State the atomic and mass numbers of Q and P (2 marks)
 - g). Using dots (•) or crosses (X) draw the electronic structures of Q and P (2 marks)
2. Describe a laboratory activity to demonstrate that the water molecule is electrically polarized (4 marks)

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

- a) Metallic bond (4 marks)
- b) Covalent bond (4 marks)
- c) Ionic bond (4 marks)
- d) Name two intermolecular forces (2 marks)
- e) Describe electron affinity and formation of hydrogen bonds. (2 marks)

3. a) Write the molecular, ionic and net equations for the reactions between Hydrochloric acid and Sodium Hydroxide (6 marks)

b) Write the number of protons, neutrons and electrons for the following:-

- i) ${}^{56}_{26}\text{F}^{3+}$
- ii) ${}^{127}_{53}\text{I}$ (4 marks)

c) The electronic configuration of element W is 2:8:7

- i) Write its atomic number (Z) (1 mark)
- ii) State, with a reason, the type of bonds it is likely to form with Magnesium (3 marks)
- iii) State with a reason whether W is a metallic or a non-metallic element (3 marks)
- d). Differentiate between Aliphatic and Aromatic hydrocarbons (3 marks)

4. a). State the difference between an Isotope and an Allotrope (2 marks)

b). Explain why water does not mix with kerosene (3 marks)

c) Using the reaction between Copper (II) Sulphate and Iron explain what is meant by oxidation and reduction in terms of electron transfer (3 marks)

d) Name the chemical reaction takes place when the two, in 4(a) above (1 marks)

e) Relate the reaction in 4(a) above with that of Zinc and dilute Hydrochloric acid (2 marks).

f). Describe the pH Scale with the aid of a diagram (4 marks)

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

h). Calculate the mole of Calcium Chloride that is contained in 4 grammes (2 marks)

5. a). Calculate the relative molecular mass of the following organic compounds (8 marks)

- i. Ethyl Acetate- $\text{C}_4\text{H}_8\text{O}_2$
- ii. Acetaldehyde- $\text{C}_2\text{H}_4\text{O}$
- iii. Hexane- C_6H_{14}
- iv. Carbon (iv) Oxide- CO_2

- b). Work out the mass of carbon in Ethyl Acetate (3 marks)
- c). Calculate the percentage mass of Hydrogen in Hexane (3 marks)
- d). Make a list of chemical elements as they appear on the electrochemical series (6 marks)