



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 IN ELECTRICAL ENGINEERING.

PHYSICAL SCIENCE

DATE: 18/12/2020

TIME: 2.30-5.30 PM

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.
 - a) Describe a laboratory activity to demonstrate that the water molecule is electrically polarized (4 marks)

- b) Using an appropriate example in each case, and with dots (•) and crosses (X), where applicable, describe the following:-
- Metallic bond (4 marks)
 - Covalent bond (4 marks)
 - Ionic bond (4 marks)
 - Name two intermolecular forces (2 marks)
 - 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:-
- ${}_{26}^{56}\text{Fe}^{3+}$
 - ${}_{53}^{127}\text{I}$ (4 marks)
- marks)
- c) The electronic configuration of element W is 2:8:7
- Write its atomic number (Z) (1 mark)
 - State, with a reason, the type of bonds it is likely to form with Magnesium (3 marks)
 - 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)
- marks)

- d) Name the chemical reaction takes place when the two, in 4(a) above (1 mark)
- 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- $C_4H_8O_2$
 - ii. Acetaldehyde- C_2H_4O
 - iii. Hexane- C_6H_{14}
 - iv. Carbon (iv) Oxide- ?
- 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)