CHUKA UNIVERSITY

FIRST YEAR EXAMINATION FOR BACHELOR OF PUBLIC HEALTH

PUHU 151: ENVIRONMENTAL CHEMISTRY 1

STREAMS: BPH Y1 **TIME: 2 HOURS**

DAY/DATE: …… **…….**

INSTRUCTIONS

Do not write anything on the question paper. Mobile phones and any other reference materials are NOT allowed in the examination room.
The paper has three sections. Answer ALL questions in Sections I and II and ONE question in section III.
All your answers for Section I (MCQs) should be on one page.
Number ALL your answers and indicate the order of appearance in the space provided in the cover page of the examination answer booklet.
Write your answers legibly and use your time wisely.

SECTION I
(20 Marks)

1. Depletion of the ozone layer is caused due to

a) Ferrocene

b) Fullerenes

c) Freons

d) Poly-halogens

2. Which one of the following pollutants cannot be degraded by natural process?

a) Heavy metals

b) DDT

c) Nuclear waste

d) All of these

3. Phosphate containing fertilisers cause water pollution. Addition of such compounds in water bodies causes_____.
   a) enhanced growth of algae.
   b) decrease in amount of dissolved oxygen in water.
   c) deposition of calcium phosphate.

d) increase in fish population.

4. Which of the following does not have a noble gas electron configuration? (Or Which of the following is not isoelectronic with a noble gas?

a) S^{2-}
b) Ba^{+}
c) Al^{3+}
d) Sb^{3-}

5. Which is classified as non-polar covalent?

a) the H-I bond in HI
b) the H-S bond in H_2S
c) the P-Cl bond in PCl_3
d) the N-Cl bond in NCl_3

6. Alum's capacity to purify water is due to

a) softens hard water.
b) pathogenic bacteria get destroyed.
c) impurities' coagulation
d) it improves taste.

7. The coldest region of the atmosphere

a) Troposphere
b) Thermosphere
c) Stratosphere
d) Mesosphere

8. Which of the oxide of nitrogen is not a common pollutant?

a) N_2O_5
b) N_2O
c) NO
d) NO_2

9. The element essential for the process of photosynthesis has this element

a) Ca
b) Ba
c) Fe
d) Mg

10. In the air, N_2 and O_2 occur naturally but they do not react to form oxides of nitrogen because

a) oxides of nitrogen are unstable
b) catalyst is required for the reaction
c) the reaction is endothermic
d) N_2 and O_2 do not react with each other

11. Which of the following statements about photochemical smog is wrong?

a) It has high concentration of oxidising agents.
b) It has low concentration of oxidising agent.
c) It can be controlled by controlling the release of NO_2, hydrocarbons,ozone

etc.

d) Plantation of some plants like pinus helps in controlling photochemicalsmog.

12. Which of the following conditions shows the polluted environment.

a) pH of rainwater is 5.6.
b) amount of carbon-dioxide in the atmosphere is 0.03%.
c) biochemical oxygen demand 10 ppm.
d) eutrophication.

13. Regular use of one of the following fertilizers increases the acidity of soil.

a) Potassium nitrate

b) Superphosphate of lime

c) Ammonium sulphate

d) Urea

14. Which of the following is an incorrect statement

a) BOD value of clean water is less than 5 ppm
b) Drinking water pH should be between 5.5-9.5
c) carbon, sulphur and nitrogen oxides are the most widespread air pollutants.
d) dissolved oxygen concentration below 5 ppm is ideal for the growth of fish

15. Which of the following techniques is used in controlling water hardness?

a) Reverse osmosis

b) Ion exchange process

c) Adsorption process

d) All of these

16. Which of the following metal is the most common pollutant in water?

a) Cd

b) Na

c) K

d) None of the above

17. Which element has the lowest first ionization energy?

a) He
b) Ne
c) Ar
d) Kr

18. Which of these isoelectronic species has the smallest radius?

a) Br^-
b) Sr^{2+}
c) Rb^+
d) Se^{2-}

19. Which of the following elements has the greatest attraction for electrons in a covalent bond?

a) Ge
b) As
c) Se
d) Br

20. Which of the following terms accurately describes the energy associated with the process:

$Li(g) \longrightarrow Li^+(g) + e^-$

a) electron affinity
b) binding energy
c) ionization energy
d) electronegativity

SECTION II
Short Answer questions.
30 MARKS
Answer all Questions in this section.

1. Explain how each of the following properties of elements change **across the periodic** table. (6 marks)
    a) Atomic Radius
    b) Ionic radius
    c) Electronegativity
2. Explain how each of the following properties of elements changes **down the groups** in the periodic table. (6 marks)
    a) Atomic Radius
    b) Ionic radius
    c) Electronegativity
3. Outline any ***Six*** major sources of halogens in the environment. (6 Marks)
4. Outline any ***Six*** adverse effects of heavy metals in the environment. (6 Marks)
5. The Haber's process has been acclaimed to be a major boost for solving the problem of the global food insecurity. Describe any ***three*** adverse effects of the Haber's process on the environment. (3Marks)
6. Plastic products contain chemical additives. A number of these chemicals have been associated with serious health problems. State any three harmful effects of plastic particles on human health.
    (3Marks)

SECTION III
Long Answer questions
20 Marks
Answer one Question from this section.

1. a). Products made from polymers are all around in and out of our homes. Using suitable examples, describe the two main types of polymerizations (4Marks)
   b). Discuss the adverse effects of polymers on the environment (16 Marks)

2. As a Public Health officer, you discover that the biggest health problem in one area is the presence of heavy metals. Discuss the strategies you would put in place to control the problems of heavy metals in the area. (20Marks)