INTERNATIONAL UNIVERSITY OF EAST AFRICA

'Learning to Succeed'

**FACULTY OF SCIENCE AND TECHNOLOGY**

**END OF SEMESTER EXAMINATIONS - MAY 2024/2025**

**PROGRAMME: BSEM**

**YEAR/SEM: YEAR 1/SEMESTER 1**

**COURSE CODE: BSE1104**

**NAME: ENVIRONMENTAL CHEMISTRY**

**DATE: 2025-08-06**

**TIME: 2:00-5:00PM**

**INSTRUCTIONS TO CANDIDATES:**

1. Read the instructions very carefully
2. The time allowed for this examination is STRICTLY three hours
3. Read each question carefully before you attempt and allocate your time equally between all the Sections
4. Write clearly and legibly. Illegible handwriting cannot be marked
5. Number the questions you have attempted
6. Use of appropriate workplace examples to illustrate your answers will earn you bonus marks
7. Any examination malpractice detected will lead to automatic disqualification.

**DO NOT WRITE ANYTHING ON THE QUESTION PAPER**

# Section A Section A: Attempt all questions in this section (40 marks)

**Question 1:**

1. Which international agreement was signed to reduce the production of ozone-depleting substances? A. Kyoto Protocol
B. Montreal Protocol
C. Paris Agreement
D. Geneva Convention
2. Albedo refers to the fraction of solar energy reflected by a surface. A. True B. False
3. What role does UV-B radiation play in environmental damage due to ozone depletion? A. It causes water pollution
B. It warms the oceans
C. It damages DNA in living organisms
D. It blocks photosynthesis
4. Which of the following represents the largest reservoir of freshwater on Earth? A. Rivers and streams
B. Ice caps and glaciers
C. Groundwater
D. Lakes
5. Which gas is primarily responsible for absorbing ultraviolet radiation in the stratosphere? A. Carbon dioxide
B. Methane
C. Ozone
D. Nitrogen dioxide
6. In terms of volume, the greatest proportion of liquid freshwater is found in: A. Lakes
B. Rivers
C. Groundwater
D. Soil moisture
7. Which of the following layers contains the coldest temperatures in the atmosphere? A.Troposphere
B. Stratosphere
C. Mesosphere
D. Thermosphere
8. Environmental chemistry is the discipline which deals with; A. The movement of chemicals through the various environmental segments and their impacts B. The reduction of contamination C. Management of the environment D. None of the above
9. That part of the Earth upon which animals, plants, and mircoorganisms live and from which they extract most of their food, minerals, and fuels is known as; A. Lithosphere B. Geo-sphere C. Atmosphere D. Biosphere
10. …….. is the introduction of harmful substances into the environment.A.Contamination B. PollutionC. EutrophicationD. Evaporation
11. Identify the chemical reaction below $CO_{2\ g}$+ $H_2O_{\ l}$ + energy ? $C_6H_{12}O_6$ +$O_2$ g
A. Respiration B. Combustion C. Photosynthesis D. Oxidation
12. What is the primary source of CO? emissions?

A. Volcanic activity
B. Deforestation
C. Industrial processes
D. Fossil fuel combustion

13. Ice and snow help cool the Earth by reflecting sunlight back into space. A. True
B. False
14. Atmospheric gases are evenly mixed in all layers of the atmosphere. A. True
B. False
15. How do CFCs destroy ozone molecules? A. By absorbing UV light
B. By combining with oxygen
C. By releasing chlorine atoms in the stratosphere
D. By increasing global temperatures
**16.** Which segment of the environment is essential for regulating Earth's temperature and weather patterns?
A. Lithosphere
B. Atmosphere
C. Hydrosphere
D. Biosphere 17. Which pollutant is produced mainly by vehicle exhaust and industrial activities and is harmful because it replaces oxygen in the bloodstream? A. COB. O?C. NO?D. $PM_{2.5}$
18. Which of the following best describes the greenhouse effect?A.The release of harmful chemicals into the atmosphereB. The trapping of heat by certain atmospheric gasesC. The destruction of the ozone layer D.The process of photosynthesis in plants
19. What is the term used to describe the thinning of the ozone layer over Antarctica? A. Ozone gap
B. Ozone deficit
C. Ozone hole
D. Ozone leak
20. What is the term for the process by which contaminants are removed from groundwater as it passes through layers of soil and rock?
A. FiltrationB. DesalinationC. EutrophicationD. Leaching

## Section B Section B; Answer any 3 questions. (20 marks each)

### Question 1:

a. What are environmental compartments? (2 marks)
b. Describe the various environmental segments that do exist on planet Earth. How do they relate with each other? (18 marks)

### Question 2:

a. Define the following terminologies in the context of environmental chemistry (2 marks each)
i. Eutrophication
ii. Dissolution
iii. Suspension
b. Compare the troposphere and stratosphere in terms of their composition, temperature patterns, and relevance to weather and aviation. (14 marks)

### Question 3:

Using relevant diagrams, briefly describe the following biogeochemical cycles. (10 marks each)
i. Carbon cycle
ii. Hydrological cycle

**Question 4:**

Discuss the following concepts, highlighting their causes and effects. (10 marks each)

i. i). Global warming
ii. ii). Ozone layer depletion

**Question 5:**

How do forest ecosystems serve as a link between the atmosphere, lithosphere, and hydrosphere? What are the consequences of deforestation on these linkages? (20 MARKS)

**Question 6:**

a. Draw and name the different layers that make up the atmosphere (10 marks)
b. The atmosphere serves several critical roles that are essential for life on Earth and the planet's overall stability. Discuss (10 marks)