NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES

DEPARTMENT OF NATURAL AND APPLIED SCIENCES

QUALIFICATION: BACHELOR OF SCIENCE HONOURS	
QUALIFICATION CODE: 08BOSH	LEVEL: 8
COURSE NAME: ENVIRONMENTAL POLLUTION, MONITORING AND REMEDIATION	COURSE CODE: EPM821S
SESSION: JANUARY 2023	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

SUPPLEMENTARY/SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	DR JULIEN LUSILAO
MODERATOR:	DR JAMES ABAH

INSTRUCTIONS
1. Answer ALL the questions in the answer book provided.
2. Write and number your answers clearly.
3. All written works MUST be done in blue or black ink.

PERMISSIBLE MATERIALS
None

ATTACHMENT
None

THIS QUESTION PAPER CONSISTS OF 4 PAGES (Including this front page)

Question 1 [20]

1.1 Define the following properties of hazardous waste:
   (a) Explosive (2)

   (b) Oxidising (2)

   (c) Harmful (2)

   (d) Infectious (2)

1.2 The different components of a Hazard Incident Response are: *Recognition, Evaluation, Information, Safety and Control.* Briefly describe the process involving these components. (6)

1.3 Name the main categories of waste-treatment technologies. (6)

Question 2 [20]

2.1 Many climate experts agree that it is not possible to unambiguously separate atmospheric compounds into distinct groups of either air pollutants or climate-influencing gases and particles. Use different examples of known compounds to demonstrate the air pollution and climate nexus (i.e. connection). (5)

2.2 (a) Define Radiative Forcing Geoengineering Technologies with respect to climate change. (2)

   (b) Describe how are the strategies in (a) achieved. (4)

   (c) Name two technologies that belong to this group. (2)

2.3. The following questions relate to the remote sensing technique called LIDAR.

   (a) What does LIDAR stand for? (1)

   (b) What is the basic principle of this analytical method? (2)

   (c) What useful information can be obtained from the atmospheric components that are analysed through this method? (4)

Question 3 [20]

3.1 Define the following concepts:
   (a) Water pollution (2)

   (b) Watershed (2)

   (c) Estuary (2)

   (d) True water colour (2)

3.2 (a) Differentiate between external and internal treatments of industrial waters. (4)

   (b) Describe the process of wastewater treatment in facultative ponds (with generic reactions). (8)

Question 4 [20]

4.1 Briefly discuss the main sources of acid drainage (AD) generation with examples. (6)

4.2 (a) Define the term carbonation. (2)

   (b) Write the generic chemical reaction(s) involved in the carbonation process. (2)

   (c) What are the key factors controlling the carbonation process? (3)

4.3 (a) What are the main goals of the neutralization of acid-pyritic waste? (2)

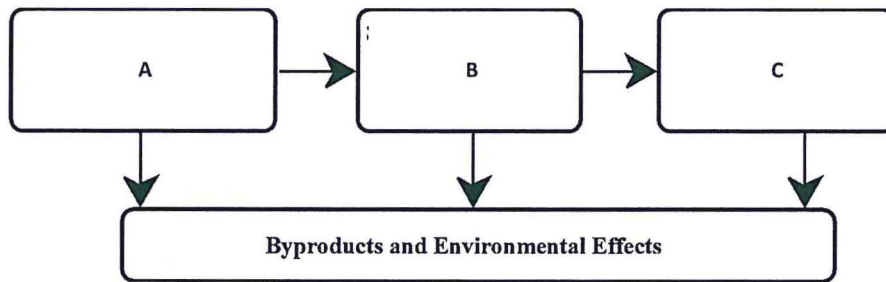   (b) Discuss the Anoxic Limestone Drain (ALD) process. (5)

Question 5 [20]

5.1 (a) Define a dense phase fluid. (2)

   (b) Supercritical carbon dioxide is the most used dense phase fluid in Green procedures. Provide the advantages of this solvent. (5)

5.2 (a) Define a feedstock. (2)

   (b) The schematic representation below shows the major steps in obtaining and utilising feedstock.

Describe the steps in A, B and C. (3)

(c) What are the main advantage and disadvantage of biological feedstock? (2)

5.3 (a) What was the problem with the old model of industrial production? (2)

(b) Describe the different streams of recycled materials in industrial ecosystems. (4)

END