

**UNIVERSITY OF SWAZILAND
FIRST SEMESTER EXAMINATION, 2014/2015**

TITLE OF PAPER : Environmental Pollution

COURSE CODE : ERM 603

TIME ALLOWED : Three (3) Hours

INSTRUCTIONS : Answer any Four (4) Questions. Each question carries 25 marks.

DO NOT OPEN THIS QUESTION PAPER UNTIL PERMISSION TO DO SO HAS BEEN GRANTED BY THE CHIEF INVIGILATOR.

Question 1 (25 marks)

- (a) Distinguish between a contaminant and a pollutant. Under what condition does a contaminant become a pollutant? [3]
- (b) Discuss the sources and health hazards associated with acute poisoning of the following on humans and animals : [12]
- (i) Mercury,
 - (ii) Lead,
 - (iii) Cadmium.
- (c) Discuss the origin and consequences of eutrophication. [4]
- (d) Write short notes the following, [6]
- (i) BOD.
 - (ii) COD and
 - (iii) DDT

Question 2 (25 marks)

- (a) With regards to the four major constituents of the environment, namely, the atmosphere, the hydrosphere, the biosphere and the geosphere : [4]
- (i) Offer a precise definition (or description) of each of them.
 - (ii) Employ a diagram to illustrate the close relationship between each other and technology. [5]
- (b) Differentiate between the following terms : [2]
- (i) The biotic environment and the abiotic environment.
 - (ii) Habitat and niche. [2]
- (c) In Ecology, the environment is often conveniently divided into four categories: [2]
- (i) Identify the four categories.
 - (ii) Summarize the peculiar features and the constituents of each of them. [8]
- (d) Discuss the major challenges facing chemical analysis of environmental samples. [2]

Question 3 (25 marks)

- (a) The existence of the ozone layer is critically important for the living things on earth. Discuss: [15]
- (i) The source or formation of the ozone layer.
 - (ii) The recent damage to or depletion of the ozone layer.
 - (iii) The consequences of ozone depletion.

- (b) NO_x , (the oxides of nitrogen) are among the most notorious atmospheric pollutants.
- Identify them.
 - Discuss two of the specific atmospheric pollutions in which they are involved, their involvement and the corresponding environmental impacts of the pollution processes. [6]
- (c)
- Explain the term 'photochemical smog'
 - Identify its usual constituents and the conditions necessary for its formation.
 - Give an example of its occurrence and one of its environmental impacts. [4]

Question 4 (25 marks)

- (a) Explain the following terms with respect to atmospheric pollution:
- Residence time.
 - Particulate matter.
 - Primary and Secondary pollutants. [4]
- (b) Give four examples of air pollutants that are hazardous to humans, animals and/or buildings. [2]
- (c) Concerning to pollutants emitted from the automobile internal combustion engine:
- Identify the major components of the pollutants emitted from the exhaust manifold of the engine. Discuss the respective hazard/s associated with each of them. [8]
 - What other pollutants are released into the atmosphere from some other parts of the engine? [2]
 - Using an illustrative diagram, discuss the significance of the air: fuel ratio in determining the relative emission levels of the various components of the exhaust emission. What other factors influence the emission levels and how? [7]
 - Catalytic converters are used to control exhaust emissions into the air. For which kind of petrol are they unsuitable and why? [2]

Question 5 (25 marks)

- (a)
- What is a greenhouse gas? Give four major examples. With appropriate reason, identify the most important among them. [4]
 - What is greenhouse effect? Discuss the mechanism of occurrence, the advantage, and the factors influencing this phenomenon. [6]
- (b) Concerning 'Global Warming' :
- Explain its origin/cause. [1]

- (ii) Identify the factors which are likely to enhance it. [2]
 - (iii) Discuss its consequences on human health, agriculture, sea levels, ecosystems, water resources, weather etc. [8]
- (c) What is 'atmospheric or radiation window'? What is the implication of its occurrence on global warming? [4]

Question 6 (25 marks)

- (a) Discuss the formation of soil and state four of its basic functions. [6]
- (b) The soil consists of organic and inorganic materials:
 - (i) Give the relative percentages by weight of these soil components? [1]
 - (ii) For the component with the higher percentage, classify its particulate composition according to their sizes and explain how their relative percentage compositions affect some soil properties. [5]
- (c) Concerning soil texture:
 - (i) Explain the term 'pore space' [1]
 - (ii) Differentiate between 'open pores' and 'closed pores' [2]
 - (iii) How are soil pore spaces usually increased, and what are the corresponding advantages thereof? [4]
- (d)
 - (i) Identify the major types of soils with respect to soil pH? Indicate their corresponding pH regimes. [3]
 - (ii) The hydrogen ion concentration, $[H^+]$, of a given soil solution is $4.50 \times 10^{-5}M$. Determine its pH. What type of soil is it in terms of acidity/alkalinity? [3]