



## SUMMATIVE ASSESSMENT

**Academic year:** 2023-2024

**Department:** Electrical and Electronics Engineering

**Department:** Electronics and Telecommunication Technology

**Level 7**

**Semester:** 1

**Module title:** Workplace Environmental Management

**Module code :** CCMEM701

**Credit units:** 3

**Date:** .....

**Duration:** 2 hours

**Maximum marks:** 50

**Reg. No.:** .....

### Instructions:

1. Please remember to write your registration number on this questionnaire.
2. This examination paper comprises **TWO** sections, **A** and **B**
3. Section **A** is **COMPULSORY**
4. Attempt any **TWO (2)** questions of section **B**
5. Cell phones and other Electronic Devices are not allowed in an examination room
6. Start each question on a fresh page
7. Make sure you fill the answer booklet cover page with required information with a legible handwriting
8. Write all answers in the answer booklet provided and don't remove any sheet from it

**EXAMINER:** NSHIMIYIMANA Arcade

**MODERATOR:** NDAGIJIMANA Cyprien

**Section A: Answer all questions**

**(30 marks)**

1. Define the term environment in the context of a workplace. (2 marks)
2. What is the primary goal of environmental management at the workplace? (2 marks)
3. Differentiate between fauna and flora. (2 marks)
4. Explain polluter pays and user pays principles of environmental management. (4 marks)
5. Explain the PDCA cycle of EMS with one example of a case in Rwanda. (6 marks)
6. Write short notes on the components of earth's environment with their relationship. (10 marks)
7. Briefly describe Rwanda's climate. (2 marks)
8. Define the terms "environmental aspects and impacts" with two real life examples. (2 marks)



**Section B: Choose any three questions**

**(20 marks)**

1. You are the manager of a small printing company. Identify two potential environmental concerns in your workplace and propose solutions for each, refer the aspects and impacts. (10 marks)
2. Explain preventive, dispersal, collection and legislative approaches of air pollution control strategies. (10 Marks)
3. Explain some mitigation measures that Rwanda has put forward to ensure safe environment with sustainable development. (10 marks)

***End of the paper.***

***Success!***

# MARKING GUIDE

## SECTION A

1. A work environment is the setting, social aspects, and physical conditions in which an individual performs their job. It has the potential to significantly impact employee morale, workplace relationships, performance, job satisfaction, and employee health.
2. Enabling the workplace to reduce its environmental impacts and increase its operating efficiency to promote the accountability by complying with the requirements of EMS to reduce the chances of fines or prosecution, lead to cost savings, improve your reputation and attract more customers.
3. Flora means all organisms that can synthesize its own food and are mostly immobile, they are mostly plants while fauna is classified as organisms that must acquire food and are generally mobile, they are generally animals.
4. Polluter pays is a principle which ensures that whoever (individual, organizations, projects and others) causing damage, harm, hazards to the environment are hold accountable and responsible for the results or the consequences. This aims at environmental management as well as sustainable development.

The user pays is a principle which ensures that a specific user is responsible for some charges to pay on the consumed services given while utilizing resources and treatment services whenever the resources are consumed and used.

5. The EMS is a structured and modelled tool which is important for sustainable environment. A PDCA cycle helps to recognise, manage and monitor environmental aspects to avoid negative impacts on the environment it involves Planning, Doing, Checking and Acting as explained below: All the activities must be **planned** to follow the guiding principles for sustainable development and protection for future generation, this requires understanding the organization SWOT analysis and the implication off each factor for the target to be achieved by the organization with a distributed responsibilities with much of accountability and compliance with the set rules and regulations. **Doing** puts organization in activities' implementation by preparing recourses to be utilized as well as people to perform activities with necessary knowledge and expertise in accordance with the EMS compliance.

The organization must **check** all the activities planned and their implementation to conduct self-assessment against the goals which were set. Since all the activities planned were documented; at this stage, there should be a review of the compliance for the rules and regulation being internal or external to the organization to propose some informing decisions.

The cycle completes with the **actions** taken by organizations dealing with whatever was reported to be revised. Compliance should be respected as proposed and actions should be taken when non-compliance is observed to maintain the objectives or goals. The cycle starts again and repeats to ensure continuous development of an organization. Thus, this is an EMS.

An example of Rwanda: Tea plantation or textile factory.

A tea plantation in Rwanda **Plans** to reduce agrochemical use and implement sustainable farming practices, **Does** train farmers in organic farming techniques and purchase eco-friendly pesticides, **Checks** soil health and analyses the impact on tea quality, **Acts** by adjusting organic farming practices based on results and set new goals for reducing agrochemical dependence.

A textile factory in Rwanda **Plans** to minimize water pollution from dyeing processes and comply with national wastewater discharge standards, **Does** invest in water treatment technologies and implement cleaner production methods, **Checks** wastewater quality and conduct environmental audits, **Acts** by upgrading treatment technologies if needed and explore additional water conservation practices.

6. The components of earth's environment are Atmosphere, Hydrosphere, Lithosphere and Biosphere.

**The atmosphere** is a dynamic layer of gases that envelops Earth, a very useful component of our planet's environment. Its composition, primarily nitrogen (78%) and oxygen (21%), with traces of other gases like argon, carbon dioxide, neon, and water vapor, which creates a life-sustaining blanket around Earth. This composition is not only essential for respiration and photosynthesis but also plays a crucial role in regulation of temperatures as well as the protecting life from harmful solar radiation and meteoroids. The atmosphere's ability to absorb and release heat helps maintain Earth's climate, making it suitable for a diverse range of organisms.

**The hydrosphere** is the water component of Earth, encompassing all water on or near the surface of the planet. It consists of two main types of water bodies: saltwater and freshwater. Saltwater (Oceans): Oceans make up most of the Earth's hydrosphere, covering approximately 71% of the planet's surface. The composition of ocean water is primarily saltwater, with an average salinity of about 3.5%. It is essential for marine life and plays a crucial role in regulating Earth's climate and weather patterns. Freshwater (Lakes, Rivers, Glaciers): found in various forms, including lakes, rivers, groundwater, and glaciers. It is vital for terrestrial life, providing drinking water, irrigation for agriculture, and habitat for numerous species. Groundwater, found underground in aquifers, is a significant source of freshwater for many regions around the world. Glaciers and ice caps store a significant amount of Earth's freshwater, particularly polar regions, and play a crucial role in regulating sea levels.

The land makes the **Lithosphere** an important part of the earth's four spheres as it assists human life by providing forests, grasslands, minerals, natural resources, among others. Within the Lithosphere, we experience the movement of tectonic plates, volcanoes, earthquakes. Tectonic activity, such as earthquakes and tsunamis are the main activities found within Lithosphere. Earth's lithosphere composition varies depending on whether it lies under oceans or on land.

The earth's crust is made up of several layers of rocks and hence is not a homogeneous substance. Sedimentary rocks are on the top, Metamorphic rocks are in the middle, and at the bottom, Basaltic rocks are at the bottom constituting the earth's crust. The Earth's crust also consists of various large dynamic tectonic plates which keep moving slowly but continuously at an average rate of around 10 cm.

**Biosphere** refers to all the regions on Earth where life exists. The ecosystems that support life could be in soil, air, water or land. Biosphere refers to the total sum of all living matter, the biomass or biota. It extends from the polar ice caps to the equator, with each region holding some form of life suitable to the conditions there. In this sphere we find all biological elements of the earth also called Ecosphere. Biodiversity is defined under biosphere to mean the existence of the diverse number of species of plants and animals in the environment. It is estimated several species above 30 million. The biosphere is a narrow zone on the surface of the earth where soil, water and air combine to sustain life. Life can only occur in this zone. From fungi and bacteria to large animals, there are several different types of life. The biosphere is characterized as an area that contains all living organisms and the products of their activities. As a result, it plays a critical role in the maintenance of ecosystems for the existence of species and their reciprocal interactions and very critical for climate regulation.

**Interactions Between Spheres:** The interoperability of Earth's spheres is a remarkable dance of interconnected processes. The lithosphere; solid ground beneath our feet, interacting with the hydrosphere; the vast expanse of water covering our planet. Rivers carve through mountains, shaping valleys and canyons. Sediments from eroded rocks find their way into oceans, where they influence marine ecosystems. The atmosphere; balance of gases, plays a crucial role in the interplay. Winds carry moisture from oceans to land, creating weather patterns that impact both the lithosphere and the biosphere. Volcanic eruptions release gases into the atmosphere, affecting climate and life. These interactions are not isolated; they weave together, shaping Earth's dynamic processes.

**Life's influence on Earth's Spheres:** The biosphere, teeming with life, profoundly influences other spheres. Plants, through photosynthesis, absorb carbon dioxide from the atmosphere, releasing oxygen. Forests stabilize soil, preventing erosion. Animals migrate across continents, connecting ecosystems. Microorganisms break down organic matter, enriching soil. The

lithosphere provides habitats for diverse organisms. Mountain's harbours unique flora and fauna, while fertile plains sustain agriculture. The hydrosphere supports aquatic life in all forms. All these interactions create a delicate balance. Understanding this interoperability is essential for environmental stewardship and ensuring a harmonious coexistence between Earth's spheres.

7. The climate is defined as the average weather conditions of an area in terms of temperature, atmospheric pressure, wind direction and wind speed, moisture, cloudiness and precipitation. Due to its high altitude, Rwanda enjoys a tropical temperate climate. The average annual temperature ranges between 16 and 20° C, without significant variations. Winds are blowing with a speed of 1-3 m/s. Rwanda's climate varies with altitude, resulting in different climate zones across the country. The lower-lying areas have a warmer climate, while the higher altitudes are cooler.

The mountainous regions, such as the Virunga Mountains in the northwest, experience cooler temperatures and more rainfall. Climate change is a major driver of environmental change and poses a serious challenge to future economic development. Rwanda has a unique climate influenced by its elevation and geographical position. The country's climate is generally temperate, characterized by mild temperatures and two distinct rainy seasons alternating with two dry seasons

8. Environmental aspects are changes or interactions caused by human activities that affect the environment. Some examples are air emission, water discharge, soil contamination, habitat disruption, etc.

Environmental Impact is any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's Environmental Aspects. So, Aspects-inputs-causes and Impact-outputs-effects. Some examples are air pollution, water pollution, land pollution,

## **SECTION B**

### **1.**

Paper Production and Deforestation:

Environmental Aspect: The process of paper production involves cutting down trees (deforestation).

Impact: Deforestation leads to habitat loss, soil erosion, and increased greenhouse gas emissions.

Solution: Recycled Paper: opt for recycled paper to reduce the demand for virgin pulp.

Energy Consumption in Printing:

Environmental Aspect: Printing processes consume significant energy due to machinery and equipment.

Impact: High energy use contributes to greenhouse gas emissions and climate change.

Solution: Energy-Efficient Equipment: Invest in energy-efficient printers and machinery. Regular maintenance ensures optimal performance, Renewable Energy: Transition to renewable energy sources (solar, wind) for powering the facility.

Possible alternatives are energy efficiency, education, posting eco-friendly posters for clients's awareness, etc.

2.

The preventive approach emphasizes on the use of non-conventional source of energy in industries to upgrade to the emission minimization stage. It stresses on continuous maintenance of vehicles and roads as well as efficient transportation system enhancement, this is in relation with the green transportation for eco-friendly modes like free public transport and reduction of private cars.

It also eradicates the reduction of garbage burning and shifting cultivation areas making sure the practice of afforestation is put in place.

The dispersal approach informs about the raising of heights of smokestacks in industries to release pollutants into high atmosphere.

Collection approach reveals the design of equipment and machine able to trap pollutants before they escape into atmosphere but also practicing re-designing by including converters which change pollutants into harmless substances.

Legislative approach involves governments to set laws, policies, standards and norms to be followed by all individuals worldwide to control air pollution ensuring good air quality.

3.

Rwanda adopted a national human settlement policy aimed at establishing an improved rural human settlement model, grouping in IMIDUGUDU, also adopted the use of alternative sources of energy (biogas, solar energy, methane gas hydroelectricity,...), fuels with less impacts like that from plants, reduce the number of people involved in agriculture by creating more other jobs and make agriculture more modern with land consolidation and regionalization of crops, improve techniques for erosion control.

There is also increase research in the fields of agriculture and Environmental protection and management, improve capacity building in those above fields among others.

**End!**