



**NAMIBIA UNIVERSITY**  
**OF SCIENCE AND TECHNOLOGY**

**FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES**  
**SCHOOL OF AGRICULTURE AND NATURAL RESOURCES SCIENCES**  
**DEPARTMENT OF AGRICULTURAL SCIENCES AND AGRIBUSINESS**

<b>QUALIFICATIONS:</b> BACHELOR OF SCIENCE IN AGRICULTURE	
<b>QUALIFICATIONS CODE:</b> 07BAGA	<b>LEVEL:</b> 7
<b>COURSE CODE:</b> ENR721S	<b>COURSE NAME:</b> Environmental and Natural Resources Economics
<b>DATE:</b> NOVEMBER 2024	<b>PAPER:</b> 1
<b>DURATION:</b> 3 HOURS	<b>MARKS:</b> 100

<b>FIRST OPPORTUNITY EXAMINATION QUESTION PAPER</b>	
<b>EXAMINER:</b>	DR. TEOFILUS SHIIMI
<b>MODERATOR:</b>	DR. SEAN KALUNDU

<b>INSTRUCTIONS</b>
<ol style="list-style-type: none"><li>1. Answer all the questions.</li><li>2. Write neatly and clearly.</li><li>3. Mark all answers clearly with their respective question numbers.</li><li>4. All written work <b>MUST</b> be done in blue or black ink.</li><li>5. No books, notes and other additional aids are allowed.</li></ol>

**PERMISSIBLE MATERIALS**

1. Calculator
2. Examination paper
3. Examination script

**THIS QUESTION PAPER CONSISTS OF 2 PAGES**  
**(Excluding This Front Page)**

### Question 1

- a. Suppose you have been requested to give a presentation to high school pupils on the relationship between the environment and economic system within the framework of the Material Balance Model. State and explain three talking points that would guide your presentation. [6]
- b. Use appropriate examples to describe a positive and negative environmental externality. [4]
- c. Briefly explain instruments used under command-and-control when environmental policies are considered for implementation. [6]
- d. Explain the difference between a public good and a private good. [4]

**Sub-Total: 20 Marks**

### Question 2

- a. Using the command-and-control policy approach suggest three action you will introduce in your community to reduce the pace of deforestation? [3]
- b. Discuss three main root causes of environmental degradation in your area. [3]
- c. Briefly explain the two main approaches that governments used to control and manage environmental problems. [4]
- d. Clearly define the following terminology. [10]

- (i) Environmental economics
- (ii) Natural resource economics
- (iii) Natural resources
- (iv) Sustainable Development
- (v) Global pollution

**Sub-Total: 20 Marks**

### Question 3

- a. Suppose the following are demand and supply functions for water from a natural spring:

$$p = 100 - 0.001Q_d$$

$$p = 10 + 0.002Q_s$$

Where P is the price per litre and Q is the quantity in thousand litres per year.

- i. What is the choke price and minimum selling price for natural spring water? [2]
- ii. Estimate the equilibrium quantity and price for natural spring water [2]
- iii. Suppose government wants to introduce a policy to prevent the overexploitation of natural spring water. Suppose further that the policy will limit the volume of natural spring water is extracted and sold to 20 000 thousand litres per year.
  1. Estimate the demand price of water per litre when water is restricted at 20,000 litres per year [2]
  2. Estimate the supply price of water per litre when water is restricted at 20,000 litres per year [2]
  3. With the aid of a market model, estimate the welfare effects of the policy. (Hint: estimate the dead weight loss associated with the policy.) [9]

- i. Explain the implications caused by the implementation of the policy to the society's demand of water? [3]

**Sub-Total: 20 Marks**

#### Question 4

- a. Suppose an abattoir is releasing pollution into a nearby aquifer, and the associated health and ecological damages are not considered in the private market for meat. Suppose further that the market for meat can be defined by the following marginal functions:

$$MPB = 150 - 0.05Q \quad MPC = 30 + 0.03Q \quad MEC = 0.02Q$$

Where Q is the quantity of meat demanded and supplied in thousands of kilograms and MPB, MPC, MEC are the marginal private benefits, marginal private costs, and marginal external cost, respectively. The MPB, MPC, and MEC are all in thousands of Namibian dollars.

- i. Estimate the quantity and price when the market is in competitive equilibrium. [2]
- ii. Estimate the quantity and price when the market is in efficient equilibrium. (2)
- b. Assume that two power plants, Firm 1 and Firm 2, release sulfur dioxide (SO<sub>2</sub>) in a small urban community that exceeds the emissions standard. To meet the standard, 30 units of SO<sub>2</sub> must be abated in total. The two firms face the following costs:

$$MAC_1 = 16 + 0.5A_1 \quad MAC_2 = 10 + 2.5A_2,$$

Where costs are measured in thousands of dollars.

- i. Prove that a uniform standard will not meet the cost-effectiveness criterion. [4]
- ii. Determine how much the society will abate in total when the uniform standard is used. [4]
- iii. Determine how the abatement levels should be reallocated across the two firms to minimize costs. [6]
- iv. Determine how much the society will abate in total after reallocating the units at equimarginal principle of optimality [2]

**Sub-Total: 20 Marks**

#### Question 5

- a. Discuss four types of market instruments that are used by different governments to control pollution. [8]
- b. Mention three evaluation measures of the exposure assessment with special consideration to human health risk assessment. [3]
- c. Discuss three risk management strategies that you consider when executing the environmental policy. [3]
- d. Mention and discuss the three scientific methods used to identify an environmental health hazard [6]

**Sub-Total: 20 Marks**

**End!**