

**NATIONAL UNIVERSITY OF LESOTHO**

**B.A. SUPPLEMENTARY EXAMINATIONS**

**EC4308: NATURAL RESOURCE ECONOMICS**

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**AUGUST 2023**

**MARKS: 100**

**TIME: 3 HOURS**

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INSTRUCTION

Answer any **four** questions.

### QUESTION 1

- a) Discuss the implications for the harvest rate and possible exhaustion of a renewable resource under circumstances where access to the resource is open and property rights are not well defined. [8]
- b) Which policy will you recommend in (a) and why? [5]
- c) Using a graph, show and explain the effects of an improvement in fishing technology on the net benefits of fishing and the efficient level of fishing effort. Will an improvement in fishing technology tend to make the efficient fishery stock closer to maximum sustainable yield? [12]

### QUESTION 2

- a) Explain, with diagrams, why a monopolistic non-renewable resource market is biased towards conservation and therefore will increase the 'life' of the non-renewable resources. [10]
- b) Discuss, with aid of diagrams, the consequences of the new discovery of North Sea oil for:
- i) The price and output levels for the oil market. [5]
  - ii) The date of exhaustion of oil reserves. [5]
- c) What will be the probable path over time of oil prices if there are frequent discoveries of oil? [5]

### QUESTION 3

Suppose that a price-taking firm is extracting an exhaustible resource subject to increasing costs as the stock of the resource is depleted. That is:

$$\text{Max} \int_0^T \Pi_{j,t} e^{-it} dt \quad \text{Where: } \Pi = P \cdot R_j \quad \text{Subject to: } \int_0^T (\Sigma R_{j,t}) dt = \dot{S}$$

The firm wants to maximize its profits over 0 to T period (the interest rate is  $i$  which is identical to the social optimal discount rate) and the mine is worth nothing after the firm ceases operations.

- a) Demonstrate an appropriate solution to the above depletion model. Explain how each phase can be a solution. [13]
- b) Show the effect of an increasing known stock size and increasing backstop technology in (a). [12]

### QUESTION 4

- a) Suppose a wealth maximizing forest firm maximizes the present value of profits for any rotation length,  $T$ , given the values of the net price of timber,  $p$ , the total planting cost,  $k$ , the private consumption discount rate,  $i$ , and the timber growth function. Derive the present value of profits for the infinite rotation forestry models and compare your results with a single rotation forestry model. Explain your results. [15]
- b) Is it reasonable for individuals living in Lesotho urban areas today, to advise others to conserve forests given that the districts in which they live effectively completed the felling of their natural forests centuries ago? Discuss. [10]

### **QUESTION 5**

State whether the following statement is True or False. Support your answer.

- a) Economic activity and many jobs depend on the extraction of natural resources in Lesotho. [5]
- b) Environmental degradation, which is a result of natural resources extraction, enhances inequality in Lesotho. [5]
- c) Present and future environmental degradation, which is a result of natural resources extraction, will define the future of work and social justice. [5]
- d) Natural resources efficient economy implies an important reallocation of labour. [5]
- e) Natural resources sustainability will also touch other sectors, driving the future of work across the economy. [5]