



**HEBERT CHITEPO SCHOOL OF LAW AND BUSINESS SCIENCES**

**DEPARTMENT OF ECONOMICS AND FINANCE**

**MASTRR OF COMMERCE DEGREE**

**LEVEL 1**

**SEMESTER 2**

**MODULE CODE**

**MED527**

**MODULE NARRATION**

**NATURAL RESOURCES AND ECONOMIC  
DEVELOPMENT**

**DATE**

**2024**

**DURATION**

**3 HOURS**

GREAT ZIMBABWE UNIVERSITY  
RECEIVED  
-- NOV 2024  
EXAMINATIONS OFFICE

**INSTRUCTIONS TO CANDIDATES:**

1. Answer any four questions
2. All questions carry equal marks
3. Start each answer on a fresh page
4. Show all workings, where applicable

### QUESTION 1

- (a) Describe the major characteristics of non-renewable resources. [4 marks]
- (b) Discuss the critical issues in the optimal utilization of non-renewable resources. [21 marks]

[Total 25 marks]

### QUESTION 2

- (a) Discuss with illustrations the link between natural resources and economic development. [15 marks]
- (b) Using appropriate examples, examine how natural resources are classified. [10 marks]

[Total 25 marks]

### QUESTION 3

Evaluate the following theories of natural resources:

- (a) Agriculture and soft commodities. [6 marks]
- (b) Industrialisation and manufacturing. [7 marks]
- (c) The resource curse thesis. [12 marks]

[Total 25 marks]

### QUESTION 4

Suppose the relevant details of a non-renewable copper are as follows:

$X_0 = 10$  tonnes: extractive quantity or initial reserves.

$Q_t = q_0, q_1$ : quantity extracted in periods 0 and 1 respectively.

$P_t = 20 - q_t$ : demand for copper output in period  $t$ .

$MC = \$5$  per tonne: constant marginal cost of extraction.

$r = 0.10$ : discount rate.

$t = 0, 1$ : set of time period periods for extracting coal; assumed to be two periods.

$X_T = X_2 = 0$ : final function.

- (a) Explain the net social benefit from extracting coal and then set up the maximizing problem for periods 0 and 1. State the Lagrangean function and obtain the first order necessary condition for this problem. [10 marks]
- (b) Solve for the optimal values of  $q_0, q_1, P_0$ , and  $P_1$  as well as the royalties in periods 0 and 1. [6 marks]
- (c) From the optimal values in (b) above, demonstrate that a condition for optimal depletion, in this case, is that the present value of the royalty must be the same in both periods 0 and 1. [5 marks]
- (d) From the results above, demonstrate that another condition for optimal depletion is that the price of coal is equal to the marginal cost of extraction plus royalty. [4 marks]

[Total 25 marks]

### QUESTION 5

- (a) Given that  $V(t) - C$  describes the net value of the forest stand.
- (i) Formulate the objective function [2 marks]
  - (ii) Find the optimal condition for cutting trees [5 marks]
  - (iii) Interpret the Faustmann's formula for single rotation. [3 marks]
- (b) Given the present value of the forest stand as  $PV = \sum_{t=1}^{\infty} e^{-k\delta T} [V_{(T)} - C]$
- (i) Formulate the objective function. [2 marks]
  - (ii) Derive the Faustmann's formula for multiple rotation. [8 marks]
  - (iii) Interpret the Faustmann's formula for multiple rotation. [5 marks]
- [Total 25 marks]**

**END OF EXAMINATION**