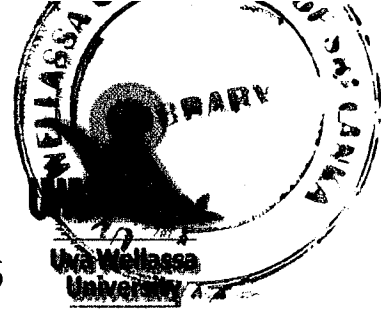


Uva Wellassa University
Faculty of Animal Science and Export Agriculture
BSc in Export Agriculture



End Semester Examination January/ February 2016
Year III Semester II

Theories of Agricultural Resource Management (EAG 323-3)

Instructions

Answer all questions

No. of questions : Five (05)
No. of pages : Four (04)
Time : Three hours (03hrs)
Total marks allocated : 100%

- 1.
- a. What is meant by a public good? (10 marks)
 - b. Briefly explain;
 - i. how a public good differs from a private good (20 marks)
 - ii. how it becomes a market failure. (10 marks)(Use suitable illustrations where necessary).
 - c. What is meant by free rider problem in relation to public goods? (10 marks)
 - d. How do you use the game theory to explain the nature of public goods and the allocation of them? (20 marks)
 - e. Given below are two hypothetical demand functions for air quality measured as a percentage of Sulfur Dioxide (SO₂) abatement per year.

$$P_1 = 10 - 0.1Q_1^d$$

$$P_2 = 15 - 0.2Q_2^d$$

P₁ and P₂ are prices that two consumers are willing to pay for air quality

Q₁^d and Q₂^d show selections of possible abatement levels to be provided to consumers

- i. Sketch the demand functions (10 marks)
- ii. Derive the market demand for air quality and sketch it. (10 marks)
- iii. If the market supply of air quality is given by $P = 4 + 0.75Q^s$, calculate equilibrium price and quantity of air quality and comment on the equilibrium quantity of air quality. (10 marks)

2.

a. Write explanatory notes on the followings in relation to bio-economics of fisheries. Use illustrations where necessary

- i. Stock Accounting Identity (10 marks)
- ii. Sustainable Yield (10 marks)
- iii. Maximum Sustainable Yield (MSY) (10 marks)
- iv. Maximum Economic Yield (MEY) (10 marks)
- v. Open Access Equilibrium (10 marks)

b. Suppose that the biological mechanics of fisheries is given by;

$$F(X) = 180X - 0.04X^2$$

Where X is the stock of fish in metric tons and $F(X)$ is the annual growth rate of the stock.

- i. What is the stock at carrying capacity? (06 marks)
- ii. What is the stock at MSY? (04 marks)
- iii. What is the MSY? (04 marks)

c. The catch effort relationship of fisheries is given by:

$$Y = 80E - 2E^2$$

Where Y is sustainable yield measured in kilograms and E is the fishing effort measured in number of fishing trips. Each fishing trip cost Rs.500.00. Fish sells at Rs.50.00 per kilogram. Determine the following;

- i. MSY, corresponding level of fishing effort and private profit (12 marks)
- ii. MEY, corresponding level of effort and profit (12 marks)
- iii. Open access equilibrium level of effort, yield and profits (12 marks)

3.

a. Differentiate between the following. Use graphs, figures etc. where necessary to support your answer

- i. Marginal Private Cost and Marginal Social Cost (10 marks)
- ii. Marginal Private Benefits and Marginal Social Benefits (10 marks)
- iii. Marginal External Cost (MEC) and Marginal Cost of Enforcement (MCE) (10 marks)
- iv. Emission charges and product charges in internalizing the externalities due to environmental pollution (10 marks)

- b. Pollution permit trading system is an efficient market based method to set prices for polluting and abatement activities. Comment on this statement with a suitable example. (20 marks)
- c. According to Coase, "If private parties can bargain without cost over the allocation of resources, then the private market will always solve the problem of externalities and allocate resource efficiently". Briefly explain how effective the private market in dealing with externalities is. (20 marks)
- d. Assume there are two firms, each emitting 10 units of pollutants into the environment, for a total of 20 units in their region. The government sets an aggregate abatement standard of 10 units. The polluters cost functions are as follows:

Polluter 1: $TAC_1 = 1.25(A_1)^2$,

$MAC_1 = 2.5A_1$,

Polluter 2: $TAC_2 = 0.3125(A_2)^2$,

$MAC_2 = 0.625A_2$,

where

TAC – Total Abatement cost, *MAC* – Marginal Abatement Cost

A – Abatement level

- i. What is meant by cost effective abatement criterion? (10 marks)
- ii. How do you use the above criterion to find out the cost effective solution using the given Two-Polluter Model in implementing environmental policies? (10 marks)
4. Write short notes on the followings. Use graphs, figures etc. where necessary to support your answer
- a. Hotelling's Principle in exhaustible resource management (20 marks)
- b. Producers try either to maximize the profit or minimize the cost (20 marks)
- c. Static and Dynamic efficiency in the allocation of resources (20 marks)
- d. Substitution and income effect of labor supply (20 marks)
- e. Requirements for achieving Pareto Efficiency in resource allocation (20 marks)



5.

- a. An efficient allocation of surface water must strike a balance among competing users. Comment on this using suitable sketches/ illustrations.

(40 marks)

- b. Consider the two period model given below. Instead of oil, suppose we are concerned with allocating a limited supply of water over two time periods. Assume that the inverse demand equations for water in the two periods are given by:

$$MB_1 = 150 - 2q_1$$

$$MB_2 = 450 - q_2$$

Where q_1 denotes the amount of water consumed in period 1 and q_2 denotes the amount consumed in period 2

The marginal cost of extracting and providing the water is given by:

$$MC_1 = 50$$

$$MC_2 = 50$$

If there is a total of 300 units of water available for the two periods and the discount rate is 33% (i.e., $r=0.33$)

- i. How much water would each time period wish to allocate considering statically efficient amount of water to consume in each period?

(30 marks)

- ii. How much water would be allocated to the first period and how much water would be allocated to the second period in a dynamically efficient allocation? Does the quantity used go up or down over time? Why?

(30 marks)