UVA WELLASSA UNIVERSITY OF SRI LANKA
FACULTY OF ANIMAL SCIENCE & EXPORT AGRICULTURE

BSc in Export Agriculture
Third Year First Semester Examination – July/ August 2019
Environment and Resource Economics (EAG 331-3)

Section II– Essay Questions

Instructions:
Answer **all** questions in the given booklet.
No. of questions : Four (04)
No. of pages : Three (03)
Time : Two (02) hours
Total marks allocated : 50%

1.

(I) With the use of suitable illustrations describe the following in relation to fishery:

a) Sustainable yield (10 marks)
b) Maximum sustainable yield (10 marks)
c) Maximum economic yield (10 marks)
d) Open access equilibrium level (10 marks)

(II) "Increase in fishing effort always increases the profit in fishery". Comment on this statement. (10 marks)

(III) Consider the two equations given below with respect to fisheries.

Population Equilibrium Equation (PEC) = $x_t = K - (qK/r)E_t$ ------**(1)**

Short Run Yield Equation = $Y_t = qx_tE_t$ ----------**(2)**

a) Identify the terms in the given equations (5 marks)
b) Graphically illustrate the relationship given in the PEC (5 marks)
c) Derive the sustainable yield equation based on the **(1)** and **(2)** equations (5 marks)
d) If the price of fish is P and cost per unit effort is C_E, derive the total sustainable revenue function and total cost function (5 marks)

(IV) The effort catch relationship (production function) of a fishery is given by,

$Y = 270E - 6E^2$

Where Y is the sustainable yield measured in kilograms of fish and E is fishing effort measured in number of fishing trips. Each fishing trip costs Rs.9000.00. Fish sell at Rs.400.00 per kilogram.

Determine the followings;

a) Maximum Sustainable Yield, corresponding level of fishing effort and private profit (15 marks)

b) Maximum Economic Yield, corresponding level of fishing effort (10 marks)

c) Find the open access equilibrium level of effort (05 marks)

2.

(I) What is meant by Economic Efficiency in Pareto Sense? (10 marks)

(II) Using graphical illustrations and mathematical expressions, explain how the followings are achieved.

a) Efficiency in production (30 marks)

b) Efficiency in consumption (30 marks)

c) Efficiency in output mix (30 marks)

3.

(I) Define the following terms;

a) Exhaustible resources (10 marks)

b) Renewable resources (10 marks)

c) Marginal User Cost (10 marks)

(II) What is meant by "**Hotelling's Principle"?** (Hint: you should explain the principle using mathematical expressions and taking three scenarios into account) (20 marks)

(III) Determine the equilibrium conditions for efficient inter-temporal extraction of oil under the following conditions and two cases,

- **Two periods (T_0 and T_1)**
- **Variable resource demand given by the equations**

  $D_0: P_0 = 10 - 0.20Q_0$ – Current Period

  $D_1: P_1 = 30 - 0.50Q_1$ – Future Period

Where P_0 and P_1 are the prices of oil in \$ per billion barrel (bbl) and Q_0 and Q_1 are the quantities demanded in bbl

Case One

Unrestricted supply

Zero marginal extraction cost and Positive marginal extraction cost of 5 \$.

Discount rate is 8%.

Case Two

Restricted supply ($\mathbf{Q_0 + Q_1 = 80}$)

Zero marginal extraction cost.

Discount rate is 8%.

a) Determine Q_0 and Q_1 (efficient extraction rates of oil in the two time periods) (30 marks)

b) Determine Net Social Benefit from the optimum allocation (20 marks)

4. Write explanatory notes on three of the following. Use graphical illustrations where necessary

a) Command Control Methods in Managing Externalities (30 marks)

b) Public Goods (20 marks)

c) Economic principles of Surface water allocation (20 marks)

d) Coase Theorem (30 marks)

[End of the Section II]