Examination paper for SØK1101
Environmental and Resource Economics

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Date Signature
Answer all 4 questions. All questions are worth the same amount of marks.

**Question 1.**
Consider a two-period model with a depletable resource.
The demand function for both periods is \( P = 15 - 0.5Q \), where \( P \) and \( Q \) are price and quantity of the resource.
There are only 20 units of the resource available in total.
The Marginal cost of extraction is $4 per unit.
The discount rate is 5% (0.05).

a. Calculate the equilibrium price and quantity for both period 1 and period 2 and show this diagrammatically.

b. What is meant by the term marginal user cost? Why is this different to the marginal cost of extraction? What is the marginal user cost in period 1 and period 2?

c. Is this allocation of the depletable resource across the two periods fair?

**Question 2**
a. Define what is meant by a public good? Why does the market not provide efficient levels of public goods? Provide examples of public goods.

b. Demonstrate how negative production externalities reduce total economic surplus.

c. Imagine a case with one firm who is a polluter, and one firm is affected by the pollution. How can assigning property rights solve the externality problem? Does it matter which firm gains these property rights?

**Question 3**
a. What do we mean by the optimal level of pollution? Why is the optimal amount of pollution typically not zero?

Two firms have marginal costs of pollution abatement of \( MC_1 = 100q_1 \) and \( MC_2 = 50q_1 \)

Without any government intervention, both produce 10 units of emissions (total emissions are 20 units)
b. Compute the cost effective allocation of pollution abatement if a total abatement (reduction in pollution) of 10 units is required.

c. What emissions charge (charge per unit of emissions) would need to be imposed to reach this abatement objective?

Question 4

a. In natural resource settings such as fisheries, demonstrate and discuss what is meant by maximum sustainable yield.

b. How is this different to the economic concept of efficient sustainable yield?

c. What are open-access resources and why does this lead to inefficient rates of harvesting?