Answer all 4 questions. Weights given next to each question.

Question 1 (25%)

a. Explain how externalities are caused by a lack of property rights, provide examples.

A standard definition of an externality. For example, an externality is where an economic decision (production, consumption) affects the welfare of another agent (not party to that economic decision).

This is caused by an absence of property rights as the producer/consumer (a) does not have to compensate the other agent for this loss of welfare (negative externality); or (b) is not compensated by the other agent for the increase in welfare they generate (positive externality). The course is almost entirely concerned with negative externalities so a focus only on these is fine.

Any standard example such as the polluting steel firm who influences the downstream fishery, and because there is no property rights over the stream/lake does not have to compensate the fishery for this loss.

b. Demonstrate the effect of a negative production externality (e.g. pollution) on economic welfare.

Use a standard diagramme to show how a negative production externality leads to a deviation of private costs from social costs, and leads to too much production at too low a price (relative to social optimal)

Very good answers then demonstrate how this generates deadweight loss.

c. Illustrate and discuss how assigning property rights can, in principle, solve problems related to negative production externalities.

Discuss the Coase Theorem, and show how assigning rights to (for instance the steel firm – right to pollute) leads to the possibility for negotiating and compensation to return production to the social optimal.

Answers might also discuss limitations to the Coase Theorem (for example, costs of negotiation when the number of agents increase) and that while the allocation of rights has no effect on efficiency it does influence the distribution of surplus.

Question 2 (25%)

a. What is the societally optimal level of pollution? Why is this not usually zero?

Use the standard diagram from class/text book to demonstrate that the optimal level of pollution is when marginal control costs equal marginal damage costs.

This is not typically zero as this implies zero economic activity that generates this pollution.

Very good answers could show/discuss a setting where initial costs of pollution are so high that it is efficient to prohibit this pollution.

b. Using appropriate diagrams show how a reduction in pollution should be optimally shared across two firms with different abatement costs.

Use standard diagramme from class which shows two firms with differing abatement costs (Marginal abatement curves) and demonstrate how a given reduction in pollution should be shared between these two firms.

This should occur where the marginal abatement costs of the two firms are equal.

The key point is that the firm for whom pollution abatement is cheaper, should abate more in equilibrium

    c. Demonstrate how an emissions trading system (cap and trade) can lead to cost minimizing pollution abatement. Does it matter how the allowances are initially allocated?

Using a similar diagramme show how an emissions trading system, set at a given cap, can lead to two firms trading permits until they are at the cost-minimising (i.e. MAC curves intersect) pollution abatement mix.

As above, the key point is the initial allowance is unimportant for efficiency. However, permits are an asset that can be traded and as a result their provision has implications for surplus/wealth.

Question 3 (25%)

    Consider a depletable resource stock of Q=25 to be allocated across two periods.

    The marginal willingness to pay (demand curve) is given by *P=20-0.8Q*

    Where P is the price and Q is the amount extracted.

    The demand curve is identical in both periods

    The marginal cost is constant and equal to 5

    a. Use a discount rate of 0.10 to determine the extraction amount that maximises the present value across both periods. Illustrate and explain graphically.

Use the standard 2 period finite resource diagram from the text / class. Key points (a) price function needs to be changed to a net benefit function (take away the marginal cost), this means that the intercept on the left y-axis should be 15 (b) discounting means that the intercept on right y-axis should be approx 13.6 (c) the curves should intersect to the right of a 50:50 distribution – this is always true under a positive discount rate (d) both lines should meet the x-axis within the box (e) allocation is approx: Q1=12.8 Q3=12.2

    b. What is the market price and marginal user cost in both periods?

Optimal allocation is where discounted marginal net benefits are the same across both periods.

Prices are approx.: P1=9.76 P2=10.24

Marginal user cost subtracts the (constant) marginal extraction cost from both of these.

    c. Is this allocation fair? What could be done to make the allocation fairer?

This is the efficient outcomes, but it is not necessarily fair as the 2nd period has to pay more for a lower quantity (and receives lower surplus ignoring discounting across two periods)

However, if there was a mechanism for redistributing surplus from period 1 to period 2, fairness and efficiency is possible.

Very good answers showed how period 1 could invest some of the their surplus at the market rate in a way that would ensure fairness.

Question 4 (25%)

    a. Why does the presence of a renewable alternative lead to more rapid extraction and use of a depletable resource?

Key point is that the presence of a renewable alternative reduces the opportunity cost (in terms of future generations) of current extraction/use.

There is less need/incentive to delay extraction due to the alternative, hence more rapid extraction occurs.

    b. Why would oil producing countries form cartels and attempt to operate as if they are a monopoly? What affects whether these cartels are stable?

First point is why is it advantageous to act like a monopoly? To allow restriction of supply and increased profits for cartel members.

In discussing cartel stability, a good answer would use a simple game theoretic model (prisoners dilemma) to show how (a) cartels are inherently unstable but (b) how long term relationships and settings where cheating is readily detectable increases the likelihood that a cartel will survive.

    c. Should we put an economic value on the environment? What is the difference between stated and revealed preference approaches to valuation?

Issues in valuation include the trade-off between anthropocentric valuation of the environment and the likelihood of economic decisions being made as if the environment had a value of zero in the absence of economic valuation.

Stated preference approaches involve attempt to elicit valuations from individuals via, for example surveys. Revealed preferences use observed behavior to calculate valuations.

Again, good answers would briefly discuss advantages and disadvantages. Most notably, stated preferences have many issues related to truthful and meaningful valuation – but have the clear advantage of being able to (in principle) capture things such as option values and non-use values which can be very important. Revealed preferences by their very nature typically cannot measure these (only use value).