

## ① Conditions for optimal depletion of Non-renewable Resources

The supply behaviour of a firm supplying ordinary goods or resource are different from an owner of non-renewable resources. The owner of an ordinary resource fixes its price, in a perfectly competitive market by at the condition where

$$P = MC$$

But in case of an exhaustible resources, as its supply is limited in quantity and is not producible, extraction and sell of a unit today involves an opportunity cost (the value that might have been obtained at some future date), named as user cost. The presence of user cost is central to the economics of non-renewable resources. Therefore, in case of non-renewable resources, here, it is better to use augmented marginal cost (AMC), rather than marginal cost, where

$$AMC = MC + UC$$

(2)

In a competitive market, the resource owner (firm) extract resources <sup>to</sup> at that point where,

$$P = AMC$$

$$\text{or } P = MC + UC \longrightarrow \textcircled{1}$$

This is the first condition of optimal depletion. This can be explained with the help of the following diagram 1.

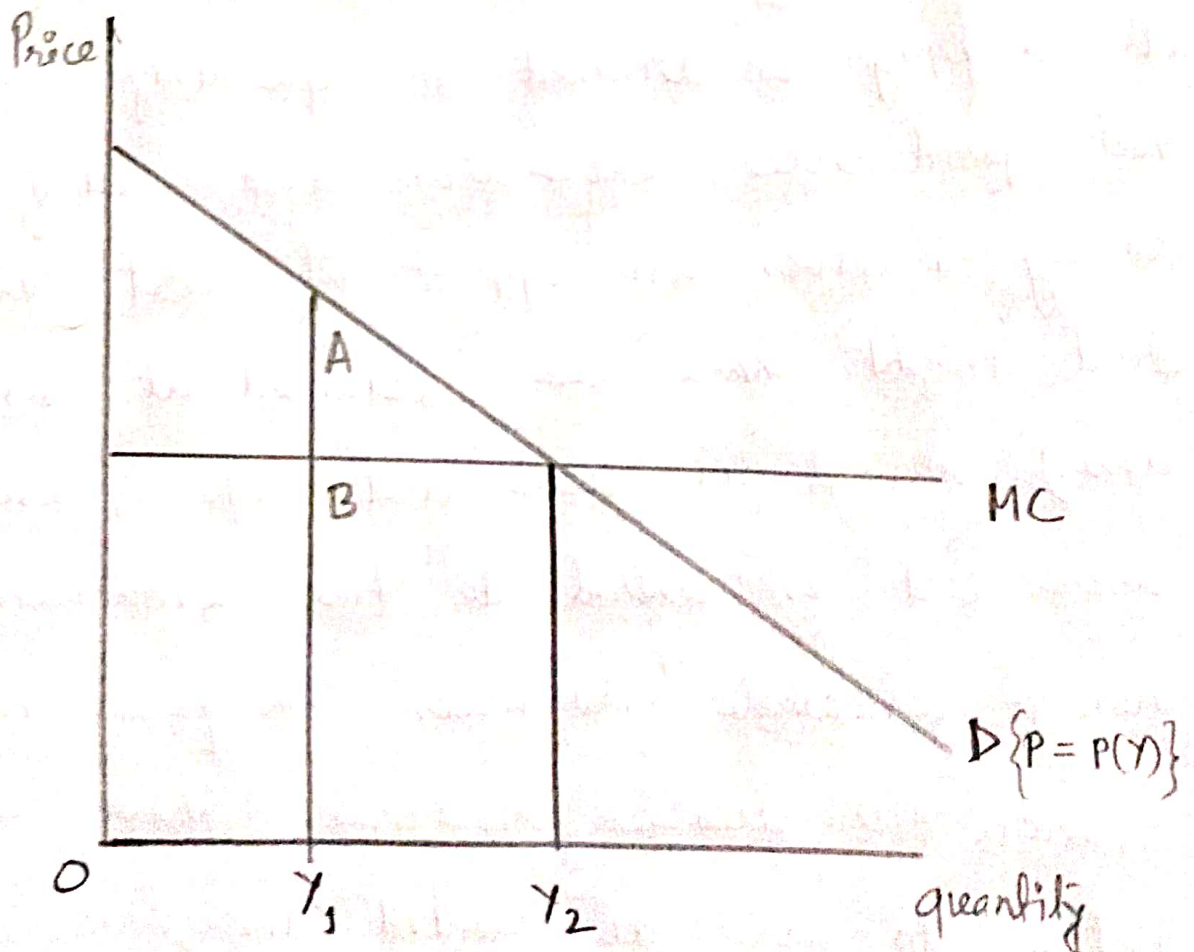


Figure-1



(3)

Given the demand function  $D, \{P = P(Y)\}$ , in the figure 1. it is showed that in case of non-renewable resources, only  $Y_1$  output/resources would be extracted rather than  $Y_2$  (as in case of ordinary goods/resources, where  $P = MC$ ) for allocating extraction efficiently over time. This leaves a positive difference  $AB$  (user cost) between  $P$  and  $MC$ . This implies that the resource owner would extract less resource than ordinary one ( $Y_1 < Y_2$ ), with consideration of user cost for exhaustible resources.  $A_c$

A competitive firm that expect future prices to be sufficiently low to current price may extract and sell more in the current period. But if the future prices are expected to be sufficiently high, the same current price may induce no extraction, whatsoever,