Production

Least-Cost Combination of Factor

(Producer's Equilibrium in Regard to Choice of Inputs)

Producer's Equilibrium in Regard to Choice of Inputs

- An equal product map or isoquant map represents the various factor combinations which can yield various levels of output. On the other hand, a family of iso-cost lines represents the various levels of total cost or outlay, given the prices of two factors.

- In order to maximise total profits, the entrepreneur may desire to minimize his cost for producing a given level of output, or he may desire to maximize his output level for a given cost or outlay.

Producer's Equilibrium in Regard to Choice of Inputs

■ In both the cases profit will be maximized if following two conditions are fulfilled:

i. At the point of tangency (e) the slope of the iso-cost line (w/r) is tangent to the slope of isoquant (MP_L/MP_k).

i.e. slope of the iso-cost line = slope of isoquant

$$or \quad \frac{w}{r} = \frac{MP_L}{MP_K} = \frac{\partial X/\partial L}{\partial X/\partial K} = MRS_{L,K}$$

ii. At the point of tangency the isoquant must be convex to the origin. If the isoquant is not convex, the point of tangency does not define an equilibrium position.

Producer's Equilibrium in Regard to Choice of Inputs

- **Case I: Minimisation of cost for a given level of output:**

- Let us suppose the entrepreneur has already decided about the level of output to be produced. To produce the given level of output, the entrepreneur will choose that combinations of factors which minimizes cost of production, for only in this way he will be maximizing his profits.

- This will be the least-cost combination factors which can be understood from following figure. Suppose the entrepreneur has decided to produce 500 units of output which is represented the equal product curve P_1. The 500 units of output can be produced by any factor combination such as R, S, e, T, U, etc. lying on the equal product curve P_1. Now, a glance at the figure will reveal that for producing the given level of output (500 units) The cost will be minimum at point e at which the iso-cost line CD is tangent to the given equal product curve P_1.

Producer's Equilibrium in Regard to Choice of Inputs

- **Figure:** Firm's equilibrium subject to output constraint
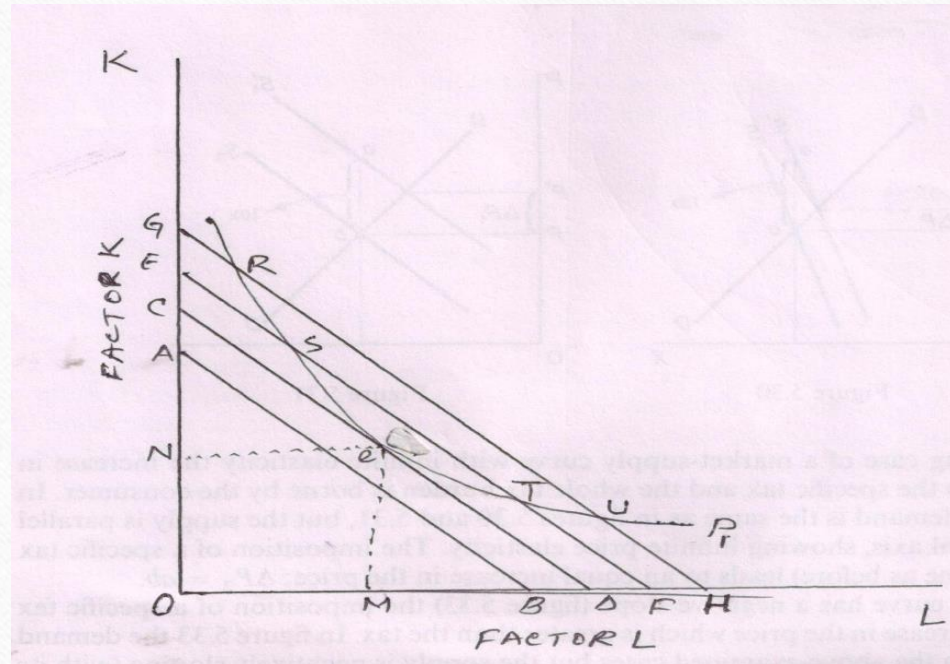
Producer's Equilibrium in Regard to Choice of Inputs

- Other points on isoquant P_1, such as R,S,T,U, lie on higher iso-cost lines than CD and which will therefore mean greater total cost or outlay for producing a given output. Factor combination '**e**' is therefore an optimum combination for him.

- Hence, we conclude that the entrepreneur will choose factor combination e (that is, OM units of factor L and ON units of factor K) to produce 500 units of output.

- When the entrepreneur reaches point **e**, the marginal rate of technical substitution of L for K is here equal to the price ratio of the factors, since the slopes of the equal product curve and iso-cost line CD are equal to each other.

- But this condition is not fulfilled at other points like R,S,T,U.

Producer's Equilibrium in Regard to Choice of Inputs

- Thus, at this equilibrium point **e**,

- $MRTS_{LK} = \dfrac{MP_L}{MP_K} = \dfrac{P_L}{P_K}$

- $\left\{ \begin{array}{c} \textit{Where } P_L \textit{ stands for the price of} \\ \textit{factor L and } P_K \textit{ for the price of facrtor K} \end{array} \right\}$

- To Be Continued -------