

HOME ASSIGNMENT

3rd SEMESTER

PAPER : ECO-HC-3016

MICRO ECONOMICS

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Date.....

Question 1 Show consumer's equilibrium with the help of indifference curve?

Ans:- Consumer's equilibrium with the help of indifference curve analysis:

A consumer is said to be in equilibrium when he or she is buying such a combination of goods that gives maximum satisfaction with no intention to change it subject to given price and income.

There are certain assumptions to explain the equilibrium of the consumer -

1. The consumer is rational want.
2. Goods are perfectly divisible and homogenous.
3. Prices of the goods are given and constant.
4. He has a fixed amount of income to spend on the two goods.

on the basis of the above assumption, consumer's equilibrium can be explained with the help of indifference curve analysis, which must satisfy two conditions.

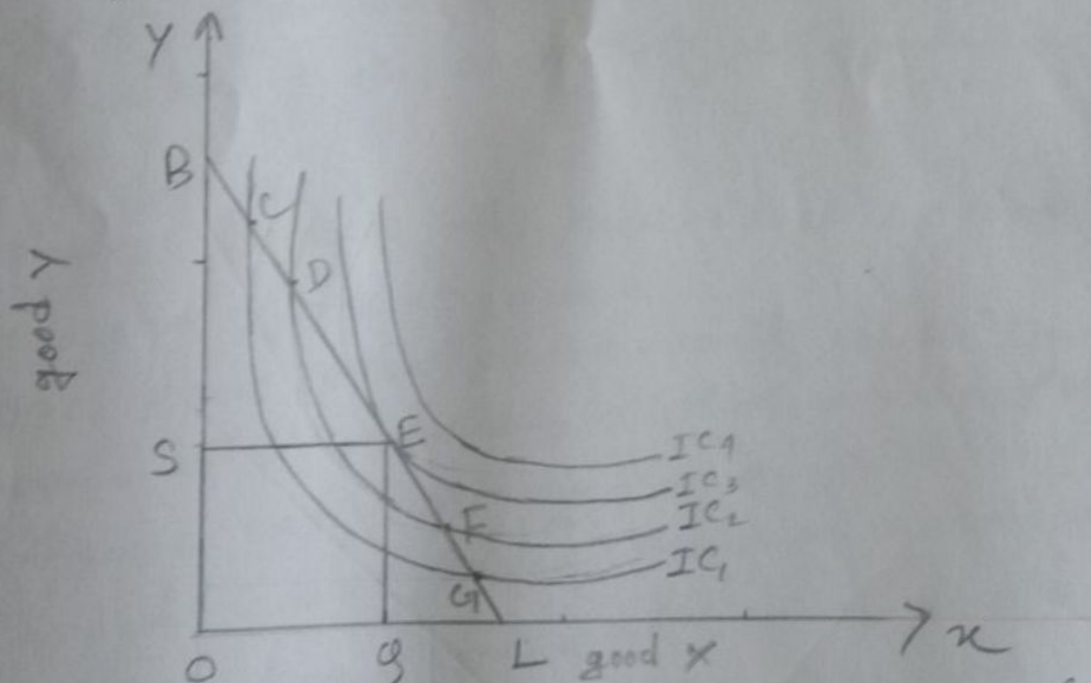
(i) First order condition :- The first order condition of consumer's equilibrium is that the budget line must be tangent to the indifference curve at the point of equilibrium. In other words the slope of indifference curve must be equal to the budget slope of the budget line.

* the budget slope of the budget line.
It means MRS_{xy} must be equal to P_x/P_y

($MRS_{xy} = P_x/P_y$), where MRS_{xy} is the marginal

rate of substitution of good x for good y and P_x/P_y is the ratio of good x and good y .

(ii) The second order condition: The second order condition for consumer's equilibrium is that MRS_{xy} must be diminishing at the point of equilibrium. This implies that the indifference curve is convex to the origin at the point of equilibrium. Here the first order condition is called necessary condition and the second order condition is called sufficient condition. For consumer's equilibrium. Both the condition needs to be satisfied for a consumer to get equilibrium. This can be explain with the help of the following diagram.



In the above diagram IC_1, IC_2, IC_3, IC_4 are the indifference curve and BL is the budget line. The consumer can purchase any combination S

of goods lies on the budget line. That is he can purchase any combinations at point C, D, E, F, G which are not in the same indifference curve.

The consumer will choose that combination of goods on the budget line which lies on the highest indifference curve. Here the consumer is able to reach the IC_3 and the budget line is tangent at point E on this IC_3 curve. Since the budget line is tangent to IC_3 at point E, so, E is the point of consumer's equilibrium, where the consumer chooses the combination OQ of good X and OS of good Y. Here both the conditions of consumer's equilibrium are satisfied. That is at point E - $MRS_{xy} = \frac{P_x}{P_y}$. And MRS is diminishing at point E because IC_3 is convex to the origin at this equilibrium point.

Question: 2 Discuss the properties of Isoquant or equal product curve.

Ans:- Equal product curve usually possess some properties which are similar to those assumed for indifference curve. Not only this, the properties of isoquant can be proved in the same manner as in case of indifference curve also. On the basis of the pre-stated assumptions of equal product curve or isoquant the following important properties can be deduced.

Property 1.

Equal product curves slope downward from left to the right:

This property implies that an equal product curve has a negative slope. The definition of equal product curve reveals that all the combinations of factors lying on it give the same output. It can be hold true if with an increase in the quantity of one factor the other is reduced so that the gain in output neutralized by the losses. It is possible only when the equal product curve negatively sloped or slopes downward from left to right. If we assume that the shape of equal product curve is a horizontal straight line, a vertical straight line or upward sloping curve, then the output derived from two factors will not remain constant.

In figure a, b, c and d labour measured on x axis and capital on y axis, if we assume that isoquant is a horizontal straight line (panel-a) this would be indicate that the marginal products of labour (MP_L) are zero. on the curve we assume two points A and B, where combination A and B contains same quantity factor K (OK) but the quantity of L at B (OL₁) is greater than A (OL). If the output remain same at A and B in this curve then definitely the marginal products of labour must be equal to zero which is impossible.

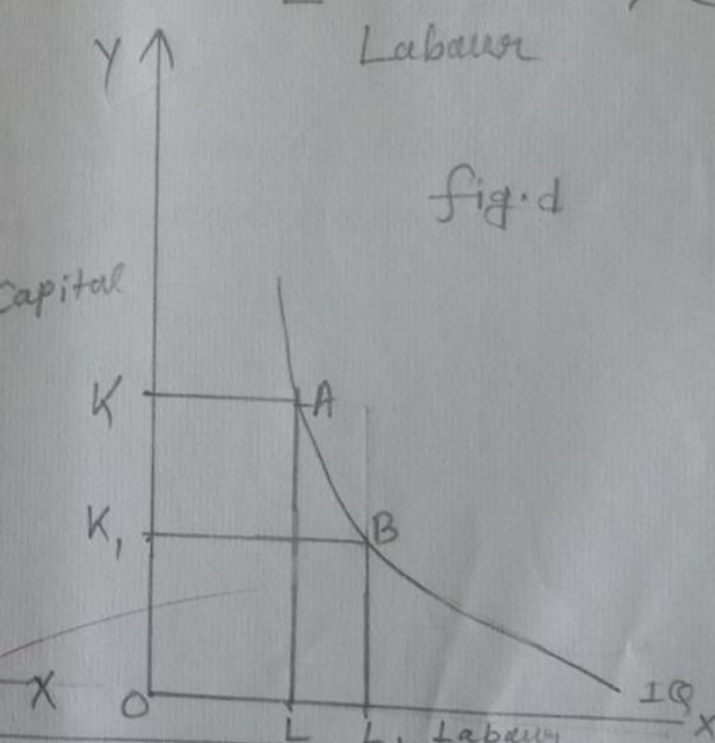
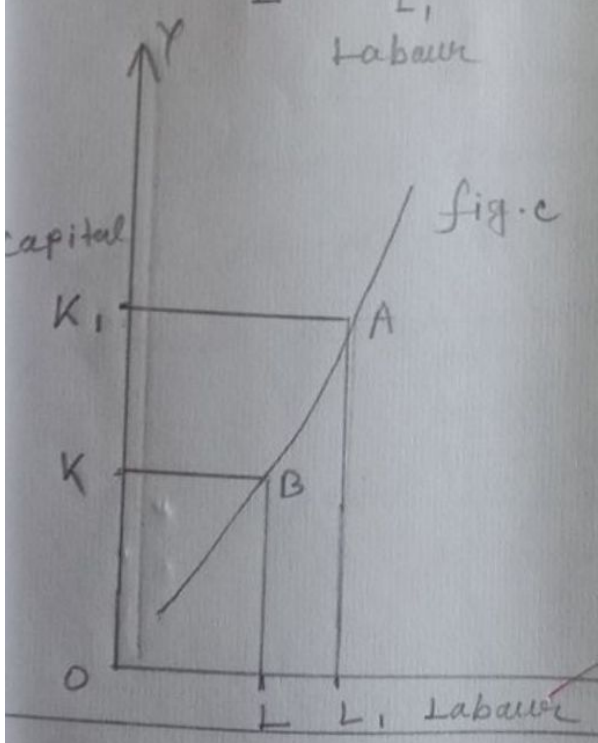
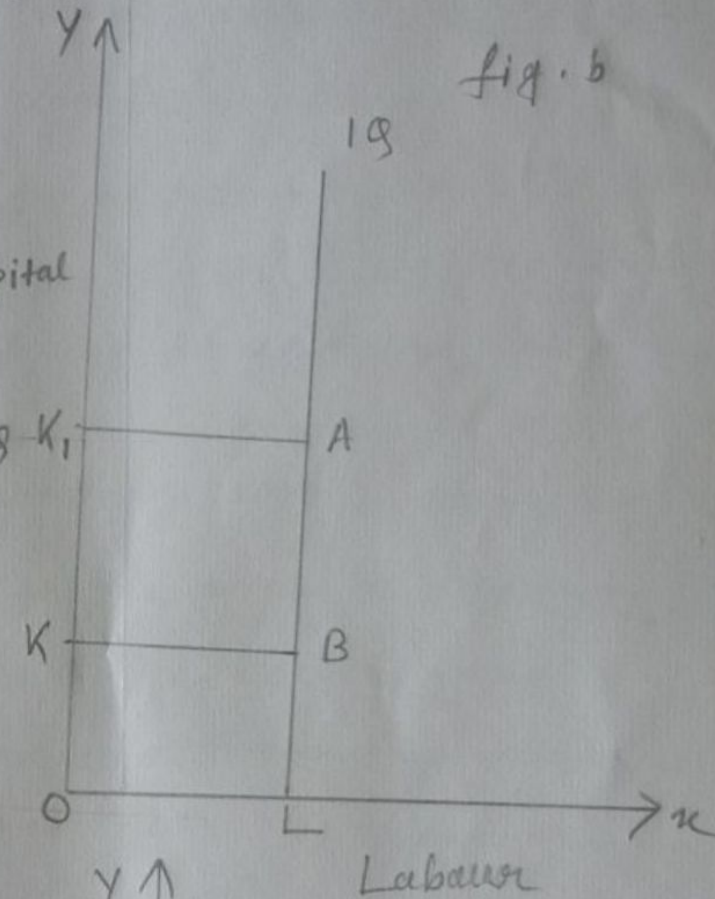
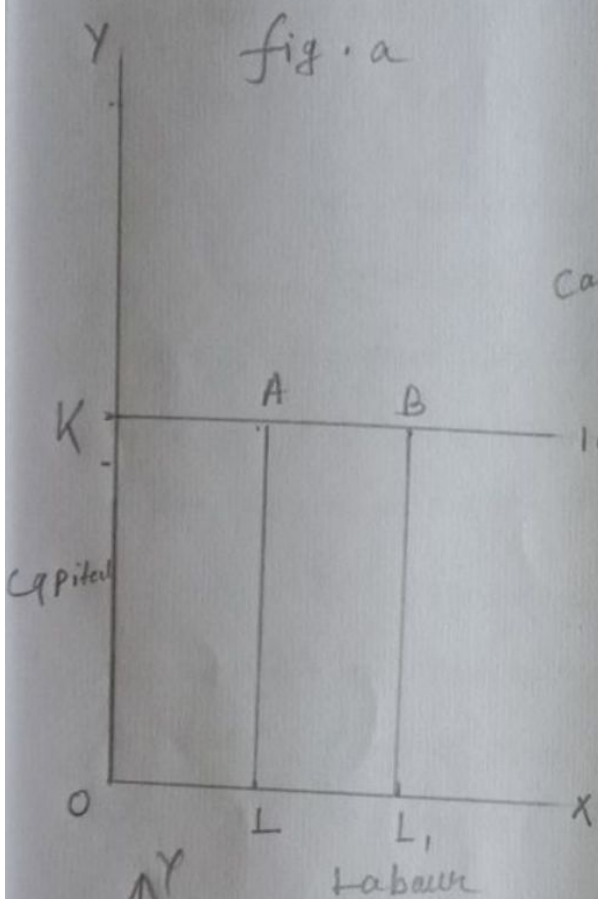
Hence the equal product curve cannot be horizontal straight line.

The second panel (b) assumes that the equal product curve as a vertical straight line. This is also impossible because the combination A and B the amount of factor L is same but the quantity of K is much more for combination A than B and hence MP_K is zero, which is impossible. Therefore the possibility of vertical straight line of equal product curve is unacceptable.

Let us discuss the third possibility. As shown in panel (c) of figure (c). we assume the upward sloping shape of equal product curve and two combinations A and B are taken. In this case also the combination A (K, L) has more units of both the factors and hence produces more than combination B (K, L). In such a situation the curve cannot be an equal product curve. Therefore the isoquant or equal product curve cannot slope upward from left to right.

In panel (d) the equal product curve slopes downward from left to right. Let us assume two combinations of output A and B lying on the equal product curve. combination A includes OL_1 of labour and OK_1 of capital. combination B has OL_2 more of capital and LL_1 less of labour

then combination B. The increase in output due to excess of capital is neutralized by loss in output due to less amount labour. In this situation two combinations can give equal production. Therefore isoquant or equal product curve can only take the downward sloping shape from left to right.



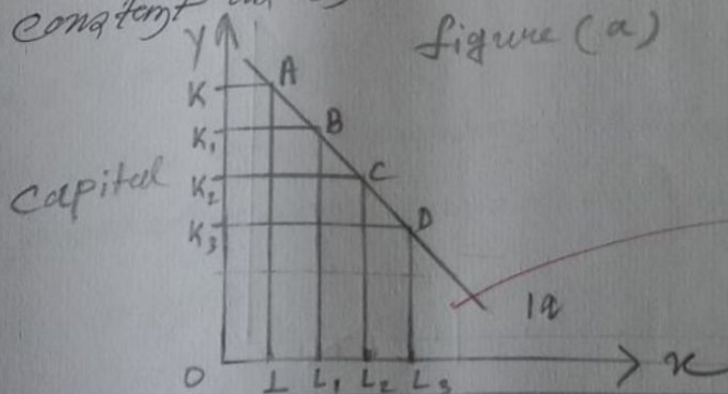
Property 2:

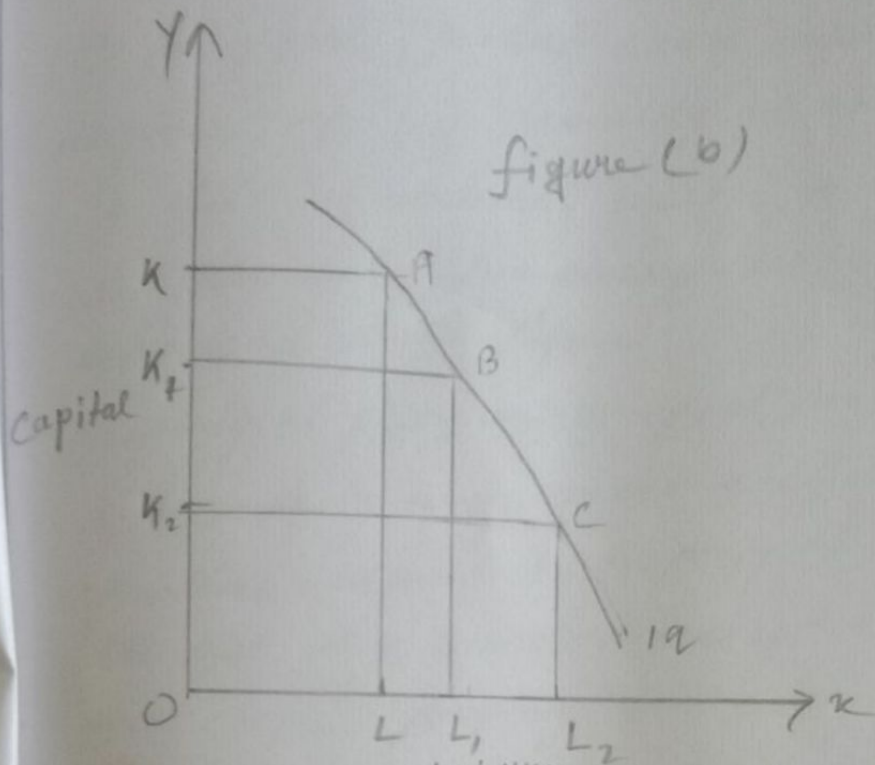
ISOQUANTS are convex to the origin:

Another important property of equal product curve is that they are generally convex to the origin.

This property follows from the assumption that marginal rate of technical substitution of labour for capital ($MRTS_{LK}$) diminishes as more units of capital are substituted for labour. Normally there are three possible shapes for an equal product curve, negatively sloping straight line, concave to the origin and convex to the origin. If equal product curve is a negatively sloping straight line or it is concave to the origin the $MRTS_{LK}$ is constant or increasing. Only a convex equal product curve can mean a diminishing marginal rate of technical substitution which can be proved with following.

(i) ISOQUANTS cannot be a straight line: In case of a straight line equal product curve the $MRTS_{LK}$ remain constant as shown in fig a.





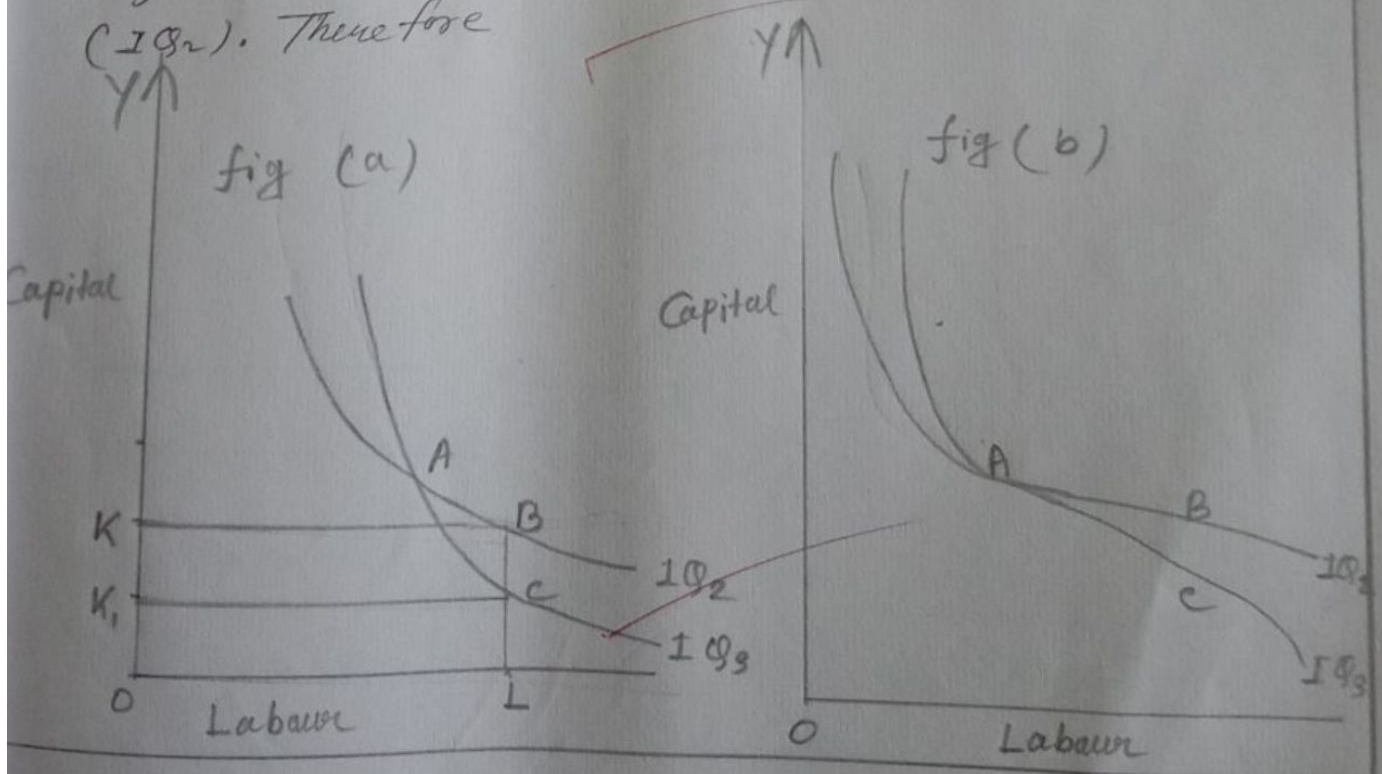
In fig a $kk_1 = k_1k_2 = k_2k_3$ which represents the change in quantity of capital due to change in one unit of labour ($LL_1 = L_1L_2 = L_2L_3$). This clearly shows that in order to have one unit of labour, every time the replacement of capital is equal in quantity, therefore $MRTSLK$ remains constant at all points A, B, C and D. Therefore equal product curve cannot be a straight line.

(ii) Equal product curve cannot be concave to the origin :- An equal product curve cannot be concave to the origin because it indicates an increasing, which $MRTSLK$ as shown in figure (b). Here an increase in one unit of labour ($LL_1 = L_1L_2$) replacement of capital unit (kk_1, k_1k_2) is increasing, which indicates an increasing $MRTSLK$. Therefore equal product curve cannot be concave curve towards origin.

(iii) An equal product curve must be convex to the origin: The last possibility of equal product curve is that it must be convex to the origin that $MRTS_{LK}$ will diminish. ~~Diminishing $MRTS_{LK}$ is already discussed with figure.~~

Property 3. Isoquant or equal product curve cannot intersect or even meet each other:

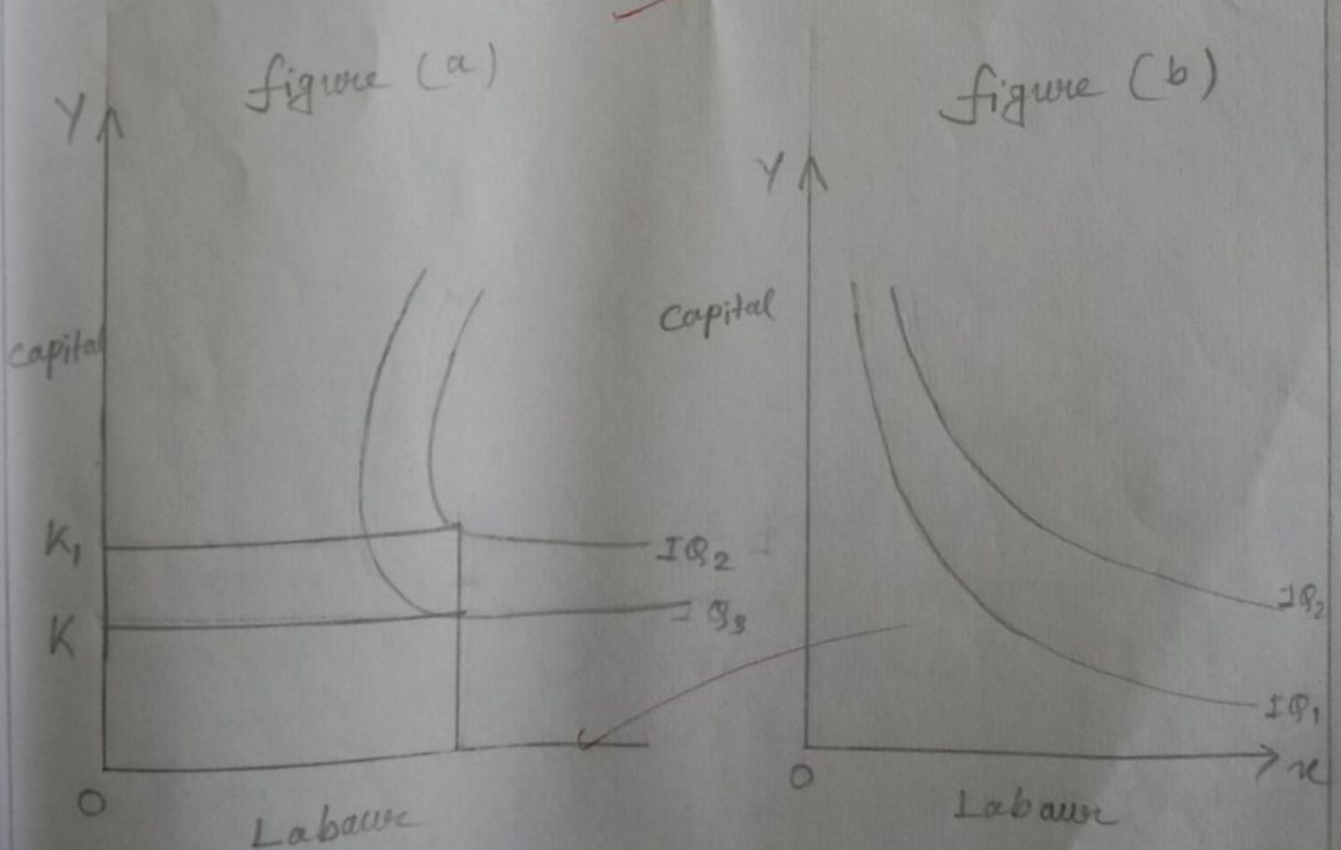
Another important property of equal product curve is that they cannot intersect each other or even meet. This property can easily be proved by first intersecting two equal product curves and then proving the self-contradictory result derived. In fig a two equal product curve IQ_1 and IQ_2 intersect at point A. Another two points B and C are drawn on IQ_2 and IQ_1 . Now it is clear that output at point A and B are same, ($A=B$) because they are on same isoquant i.e. (IQ_2). on the same ground output at A and C are equal (they are on isoquant, (IQ_1)). Therefore



output at point A = output at B and output at point A = output at point c, therefore output at B = output at c, but it is impossible because at point B amount of capital is more than point c where $OK > OK_c$, with same amount of labour (OL). Hence two indifference curves cannot intersect each other. They even cannot meet each other, which can be explained with the help of figure (b) by adopting the same process.

property 4: A higher equal product curve represents a higher level of output:-

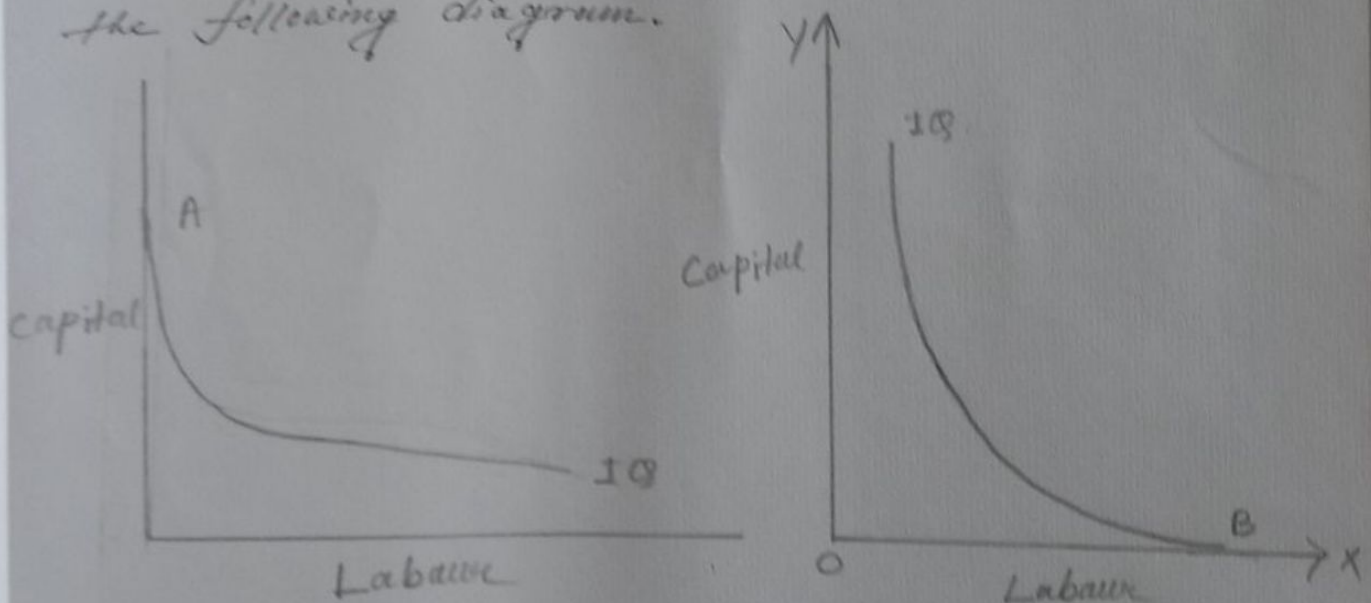
As shown in figure (a) IQ_2 lies on a higher level than IQ_1 . It is clear that the point A (OL, OK_1) on IQ_2 represents a higher level of output than point B (OL, OK) on IQ_1 . Therefore a higher level of equal product curve represents higher level of output.



property 5: Equal product curves need not be parallel to each other:

It is well known that the slope of an indifference curve depends on the MRTS between two factors. Higher the MRTS higher will be the slope of equal product curves. As shown in figure (b) in case of IS_1 , $MRTS_{LK}$ is more than $MRTS_{LK}$ of IS_2 .

property 6: Equal product curve cannot touch either x-axis or y-axis. If it touches x-axis or y-axis as shown in figure (a), it means that the producer doesn't use a combination of two inputs but only one of two. This is against the basic features of isoquant. This property can be explained with the following diagram.



As shown in figure a IS touch y axis at point A and at (b) IS touch x axis at point B. This implies that at point A the producer uses only one factor (capital) and at B, on panel (b) he employed only labour, such combinations

having zero quantity of one factor of production cannot be a perfect combination, therefore equal product curve cannot touch either x or y axis.

