

# Indifference Curve Analysis

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# Introduction

- Indifference curve analysis is a new geometrical way to analyse consumer's behaviour.
- This approach was propounded by Hicks & Allen.
- It measures utility ordinally.
- It explains consumer behaviour in terms of his preferences or rankings for different combinations of two goods, say X and Y.
- An indifference Curve is drawn on the from the indifferent schedule of the consumer.

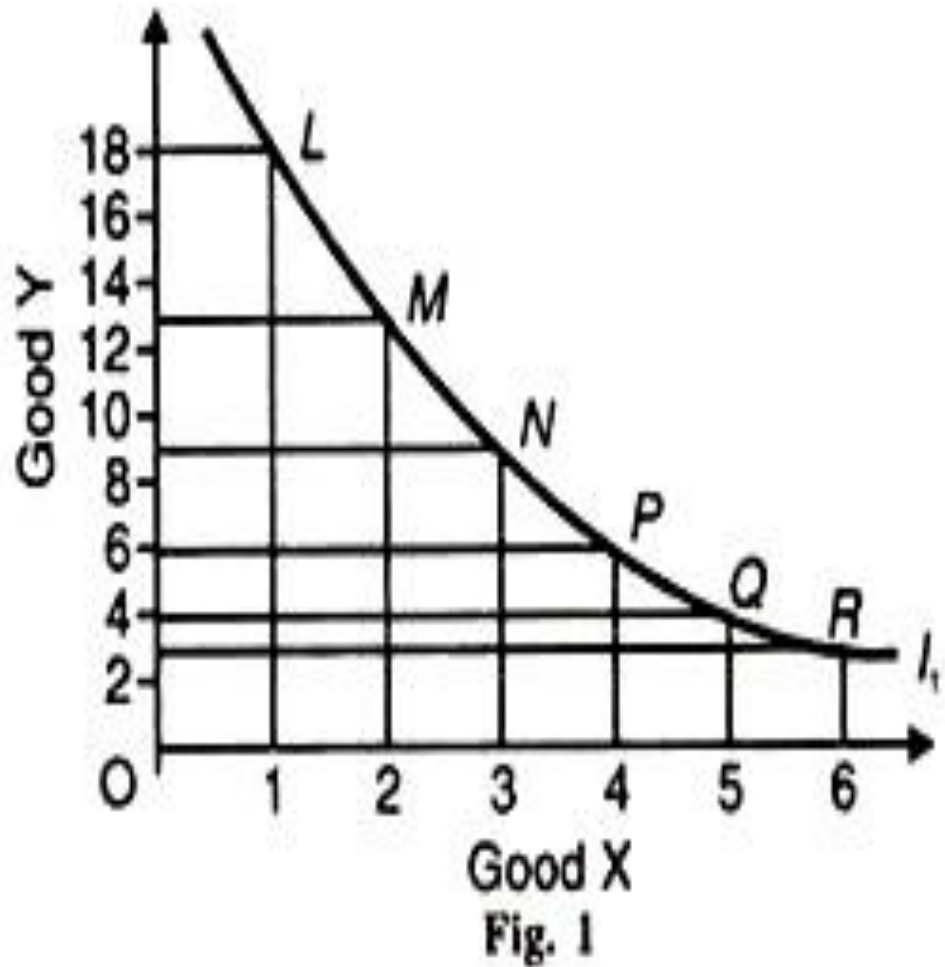
## Indifference schedule

An indifference schedule is a list of combinations of two commodities that yields equal satisfaction.

Combination	Good x	Good y
L	1	18
M	2	13
N	3	9
O	4	6
Q	5	4
R	6	3

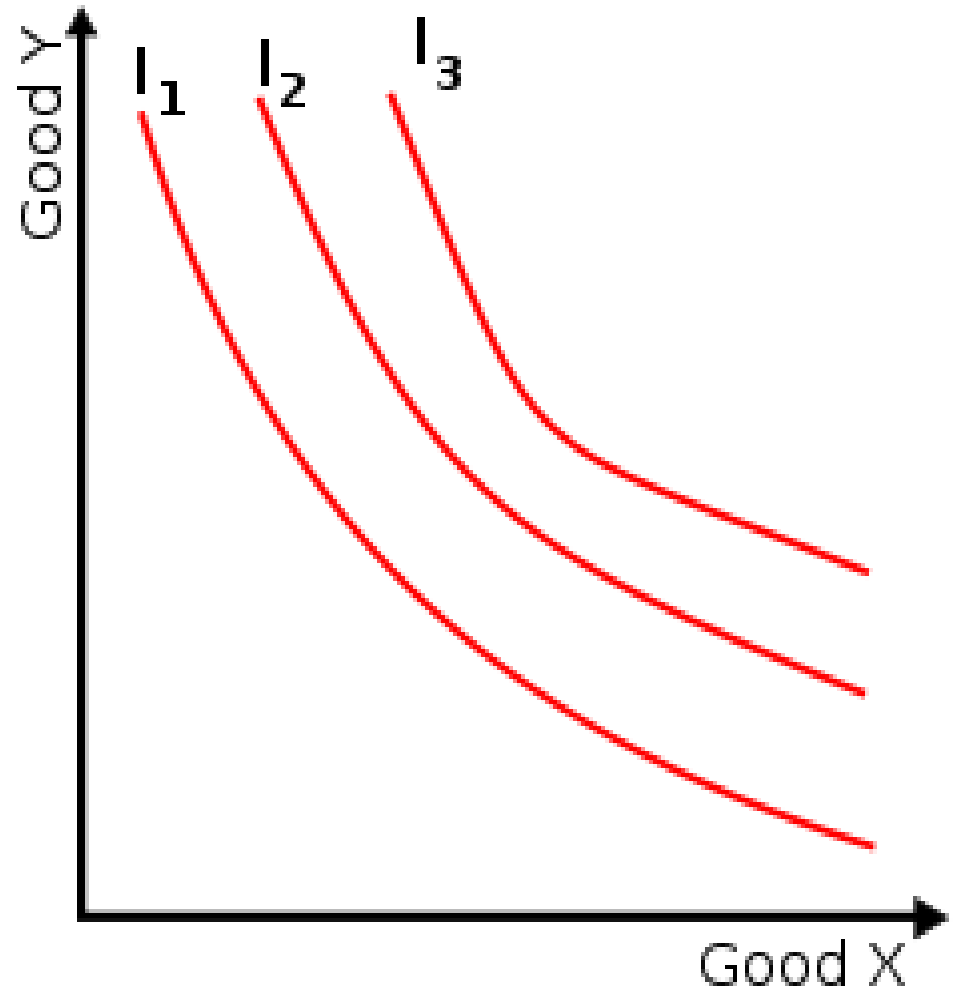
# Indifference Curve

- Indifference Curve is a Diagrammatic Representation of Indifference Schedule.
- $I_1$  is an Indifference curve.
- It is a line that shows all possible combinations of Two Goods between which a person is Indifferent



## Indifference Map

- An Indifference Map is a Group of Indifference Curves each of which represents a given level of Satisfaction.
- If an Indifference curve Shifts to Right, the Level of Satisfaction goes on Increasing.
- From the Point of View of Satisfaction  $I_1 < I_2 < I_3$



## Assumptions of Indifference Curve

1. Consumer acts rationally so as to maximise satisfaction.
2. There are two goods X and Y.
3. Utility is measured ordinally.
4. It is based on the axiom of diminishing marginal rate of substitution.
5. The consumer is consistent in his choice, that is, if in one time he chooses bundle A over B, he will not choose B over A in another time if both bundles are available to him. If  $A > B$ , then  $B > A$
6. Consumer's choices are characterized by Transitivity . It means that if a Consumer prefers A to B & B to C, he must prefer A to C.

# Marginal Rate of Substitution (MRS)

The marginal rate of substitution is the rate of exchange between some units of goods X and Y which are equally preferred. The marginal rate of substitution of X for Y  $(MRS)_{xy}$  is the amount of Y that will be given up for obtaining each additional unit of X. This rate is explained below in the following indifference schedule.

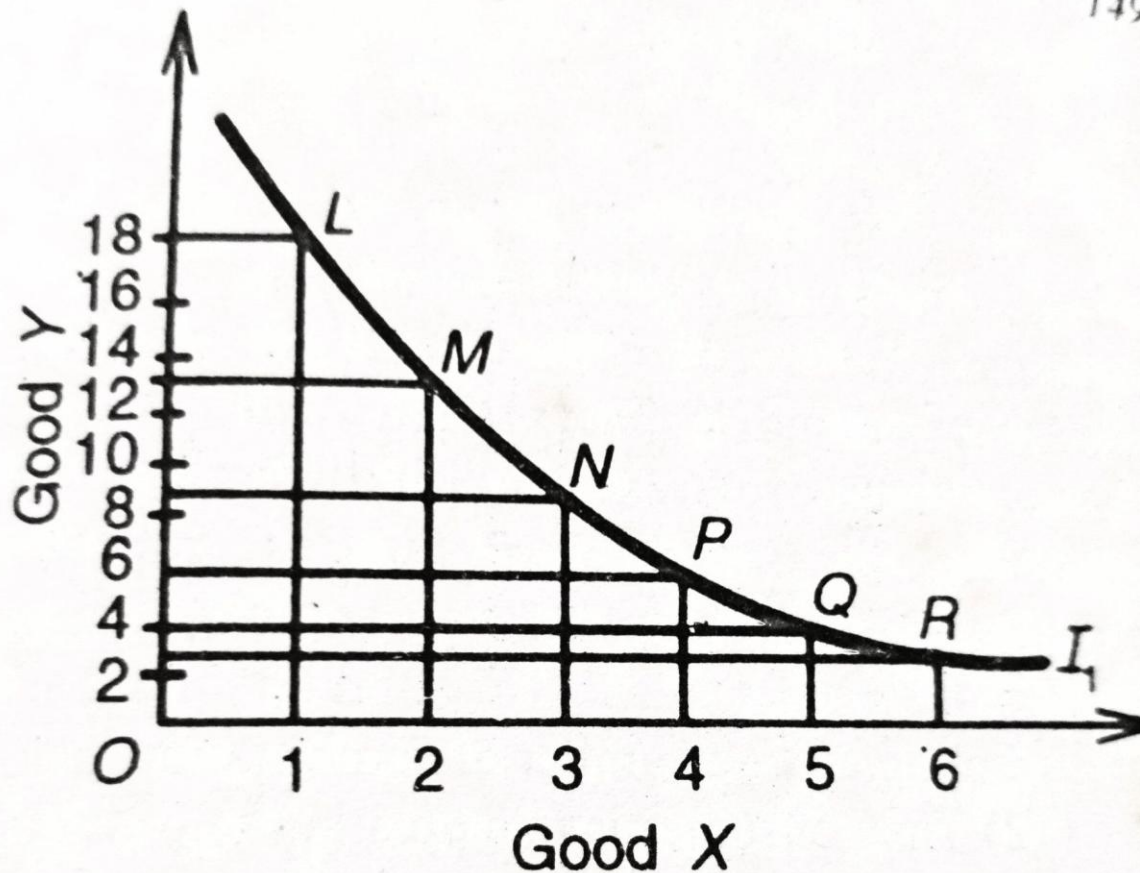
Combination	Good x	Good y	MRS of X for Y
L	1	18	-
M	2	13	5:1
N	3	9	4:1
O	4	6	3:1
P	5	4	2:1
Q	6	3	1:1

To have the combination M and yet to be at the same level of satisfaction, the consumer is prepared to forgo 5 units of Y for obtaining an extra unit of X. The marginal rate of substitution of X for Y is 5:1. The rate of substitution will then be the number of units of Y for which one unit of X is a substitute. As the consumer proceeds to have additional units of X, he is willing to give away less and less units of Y so that the marginal rate of substitution falls from 5:1 to 1:1 in the sixth combination (Col. 4). In Fig. 8.4 above at point M on the indifference curve  $I_1$ , the consumer is willing to give up 5 units of Y to get an additional unit of X. As he moves along the curve from M to R, the consumer acquires more of X and less of Y. The amount of Y he is prepared to give up to get additional units of X becomes smaller and smaller. This behaviour of the consumer is known as the principle of diminishing marginal rate of substitution.



The marginal rate of substitution is in fact the slope of the curve at a point on the indifference curve. Thus,  $M.R.S._{xy} = \Delta Y / \Delta X$ , on any point on the indifference curve

MRS Keeps on Declining since Consumer has more & more units of one Good, he gives up Less Units of Other Good

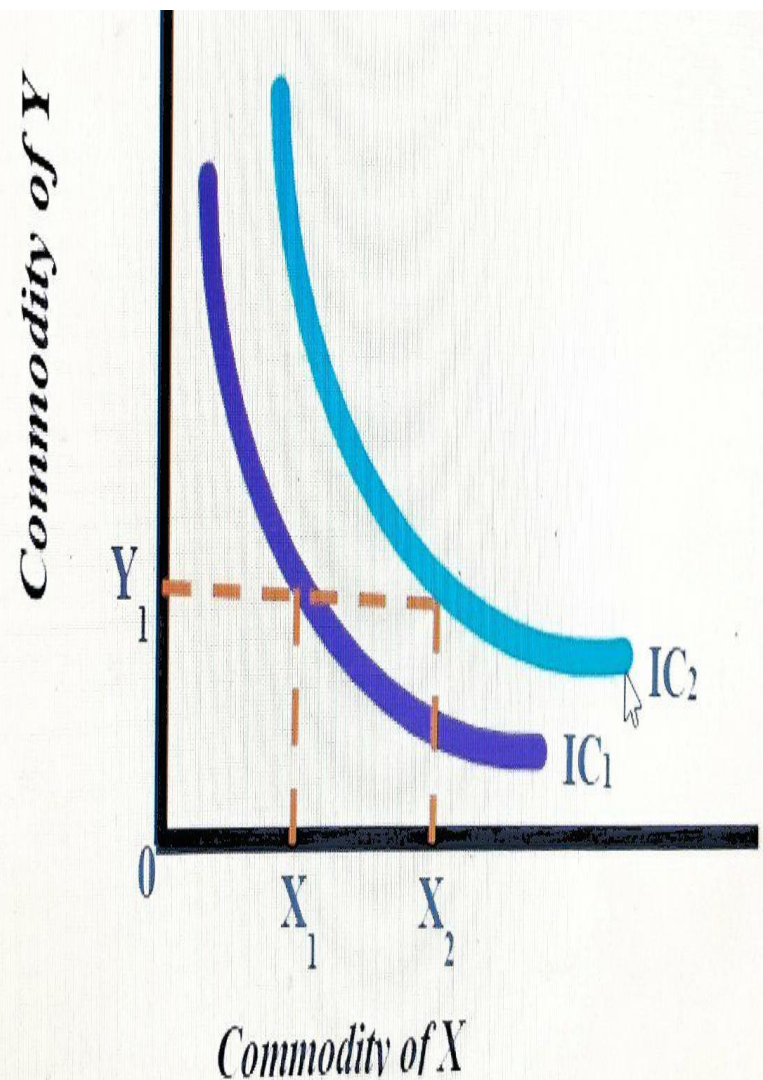


# Properties of Indifference Curve

1. **An Indifference Curve has a negative slope.** It denotes that if the quantity of one commodity (y) decreases, the quantity of the other (X) increases, if the consumer is to stay on the same level of satisfaction. If the quantity of good X is increased in the combination, while the quantity of good Y remains unchanged, the new combination will be preferable to the original one and the two combinations will not therefore lie on the same indifference curve provided more of a commodity gives more satisfaction.

2. A higher indifference Curve to the right of another represents a higher level of satisfaction. Here in the fig,  $IC_2$  gives more level of satisfaction than  $IC_1$

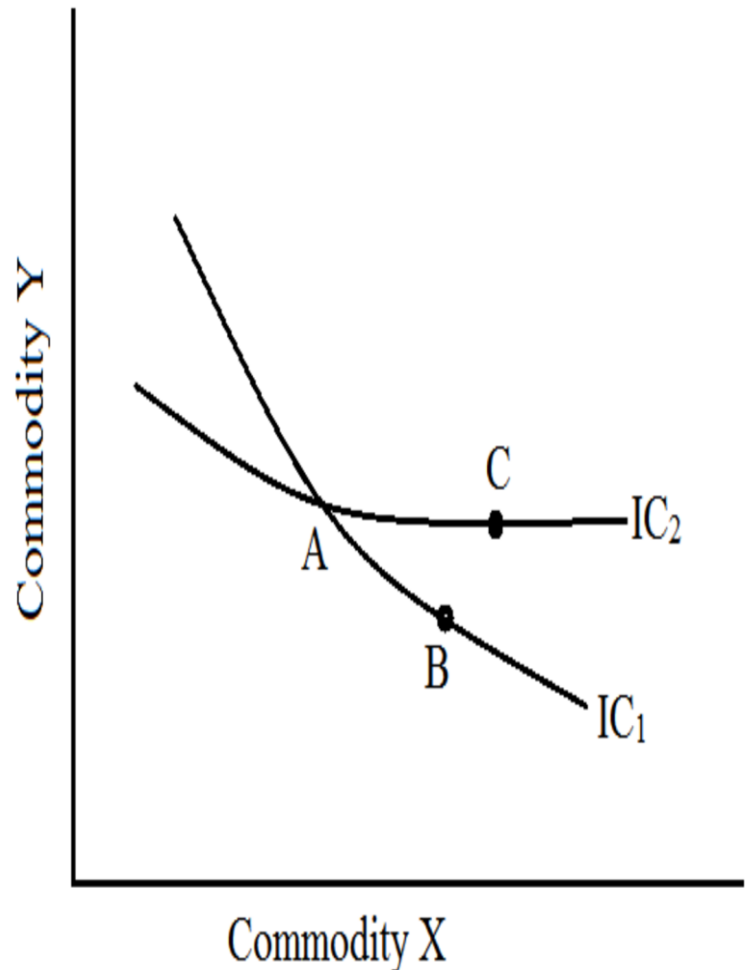
. This is because  $IC_2$  contains more units of at least one commodity



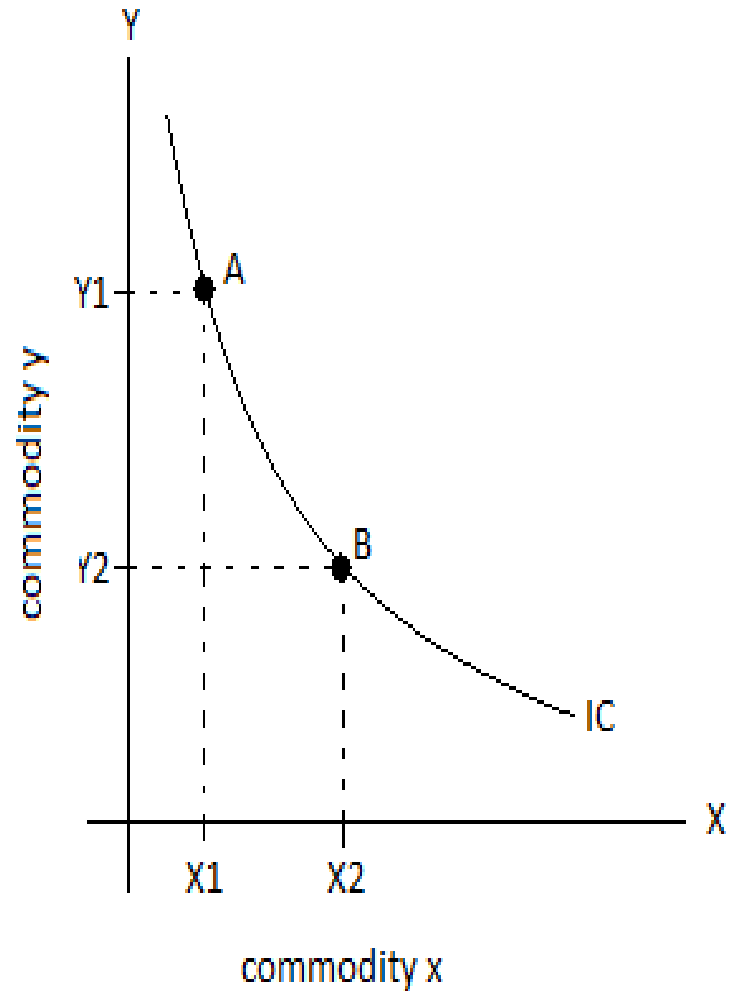
**3. Indifference curves do not intersect.** If they did, the point of intersection would imply two different level of satisfaction, which is impossible. Suppose two ICs intersects at point A, then  $A=C$  (lies on the same  $IC_2$ )

$A=B$  (lies on the same  $IC_1$ )

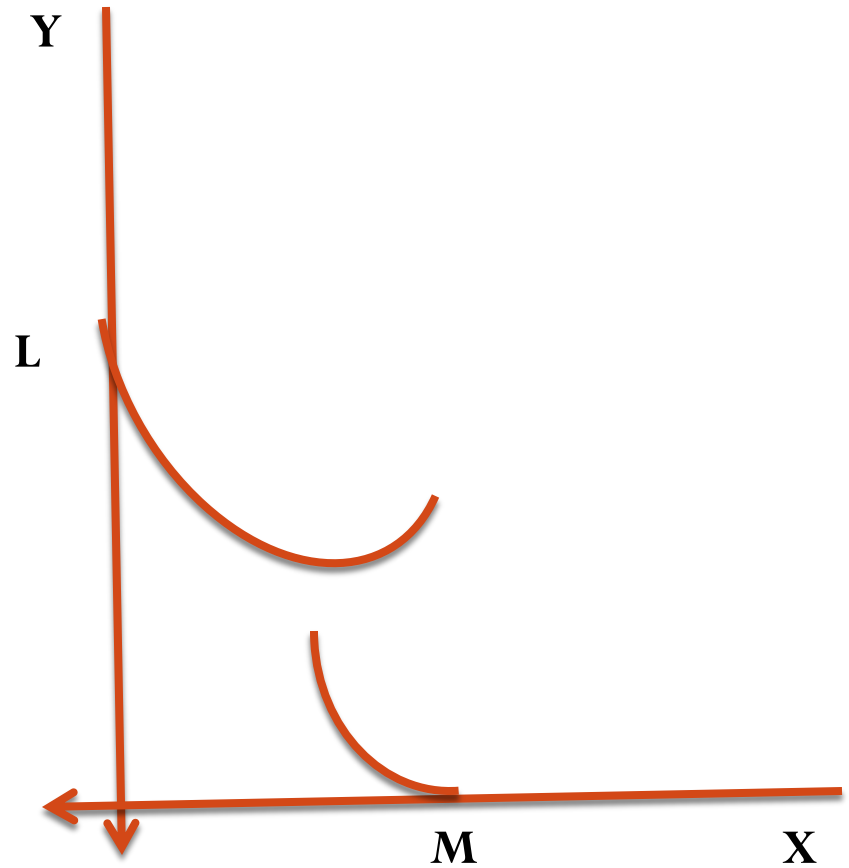
$\therefore B=C$  (because of transitivity assumption). But it is impossible because point C gives higher level of satisfaction than point B.



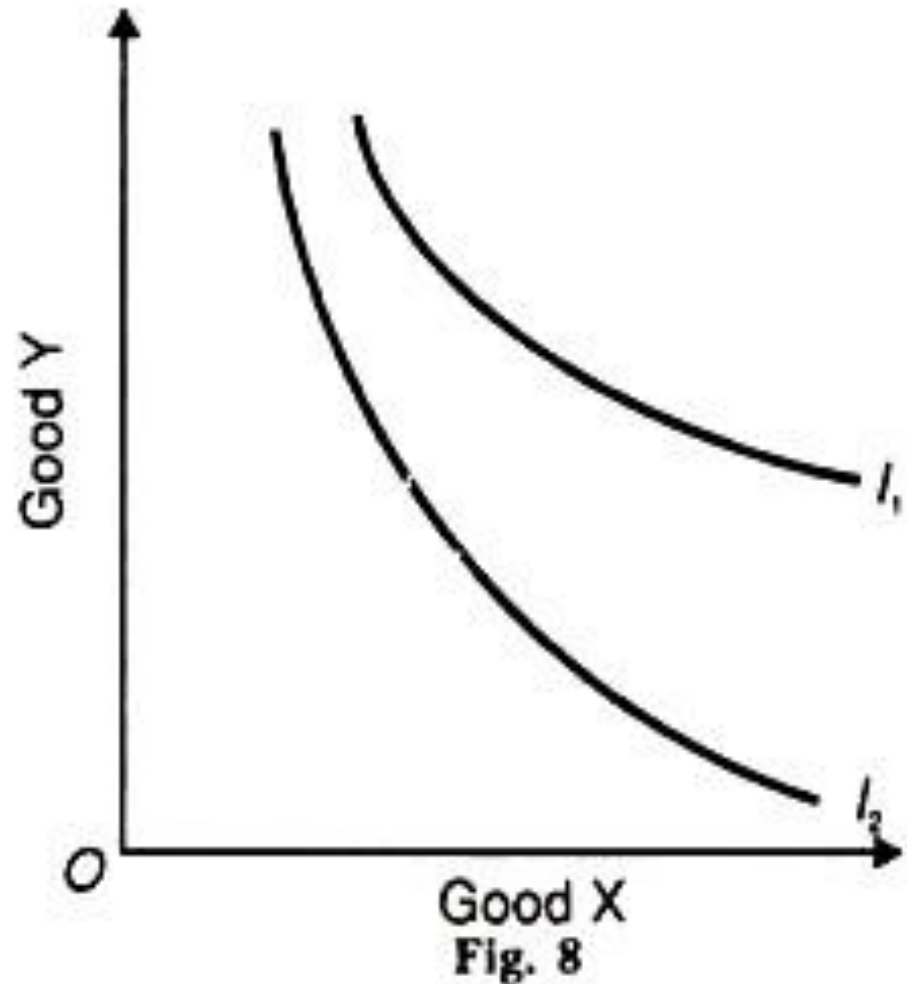
4. Indifference Curves are convex to the point of Origin due to diminishing marginal rate of substitution of commodities. This implies that as the consumer gets more and more of X he is ready to sacrifice less and less of Y.



5. An indifference curve cannot touch either axis. If it touches-X axis as in Fig. at M, the consumer will be having OM quantity of good X and none of Y. Similarly, if it touches Y axis at L, the consumer will have only OL of Y good and none of X. This is against the assumption of consumer consumes combination of two goods

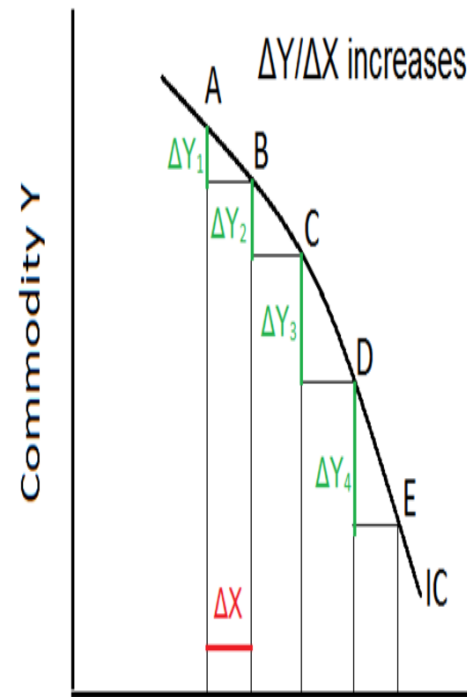


6. Indifference curves are not necessarily parallel to each other. This is because MRS may differ for different indifference curves. If MRS differs the slope of indifference curves also differs.

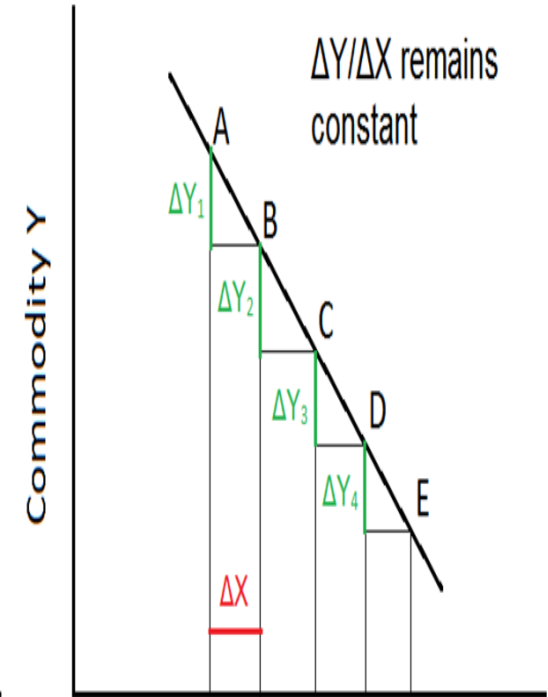


# Exceptions of Indifference Curve

**Exception:1** If MRS of X for Y or Y for X is constant, the indifference Curve will be a straight line sloping downwards to the right at  $45^\circ$  angle to either axis as shown in fig. If MRS of X for Y or Y for X is increases, instead of diminishes, the indifference curve will be a concave curve.



0 Commodity X  
(a)

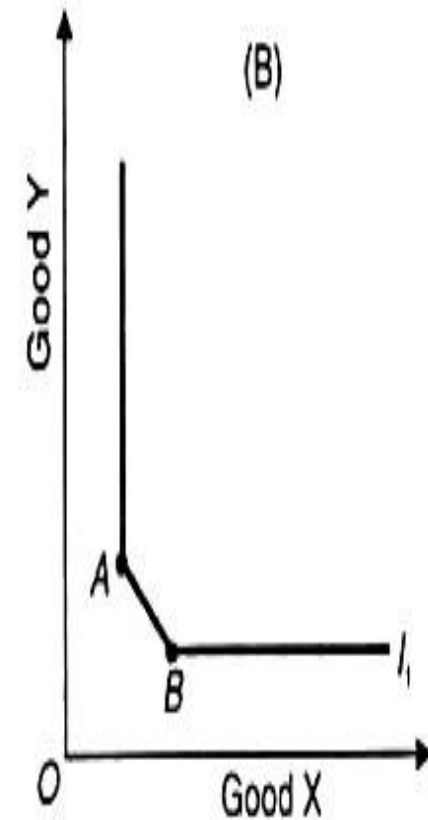
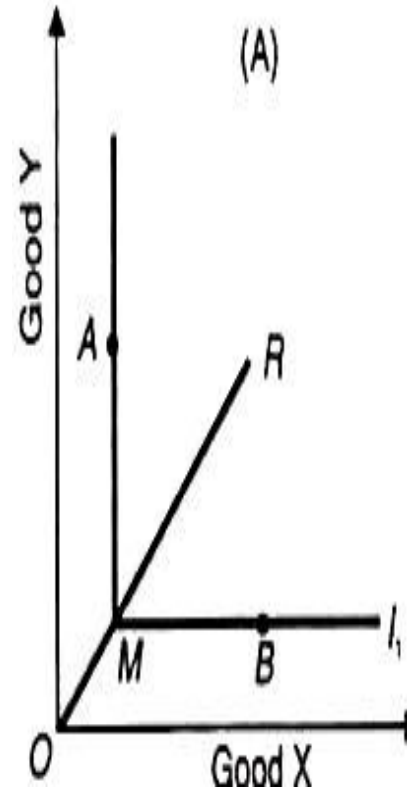


0 Commodity X  
(b)

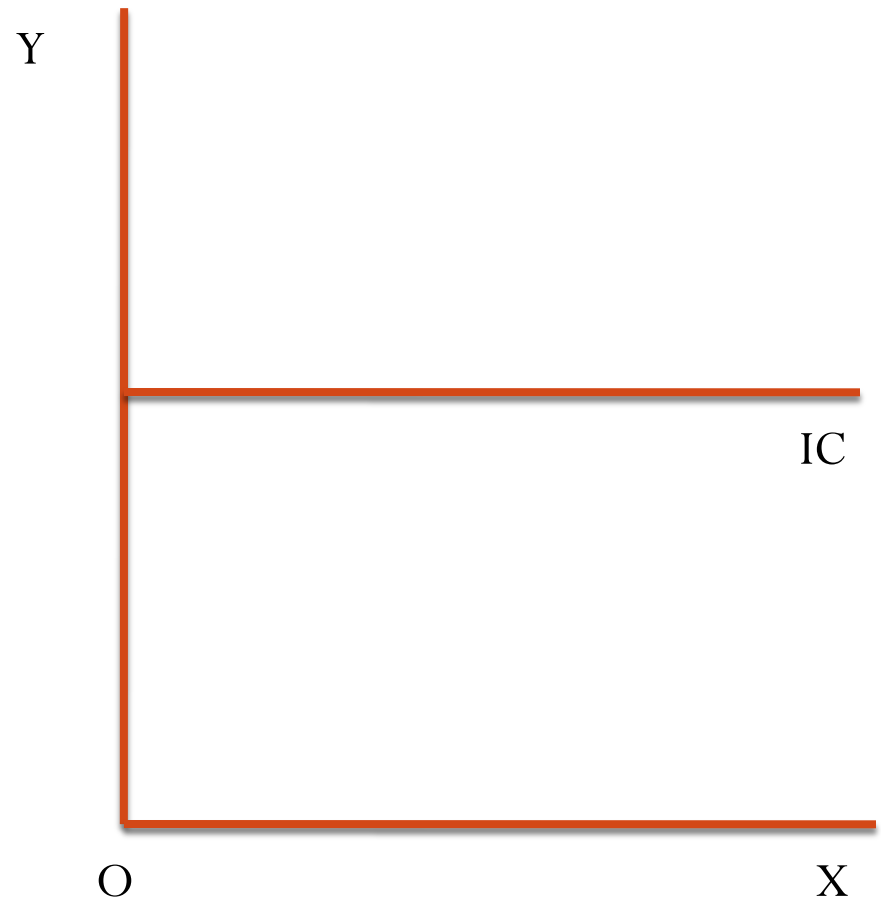


## Exception:2 Perfect Complementary Goods have L-shaped Indifference Curves

Indifference curve of perfect complements, as shown in Fig. A is L-shaped (Right Angle). Perfect complementary goods are those which are used simultaneously in the definite ratio for instance, right shoe and left shoe are perfect complement because one is useless without the other. When consumer has its minimum number then there is no rate at which one shoe be substituted for another. In case of ordinary complementaries which have a low rate of substitution on or near the curvature of the curve as shown in fig B

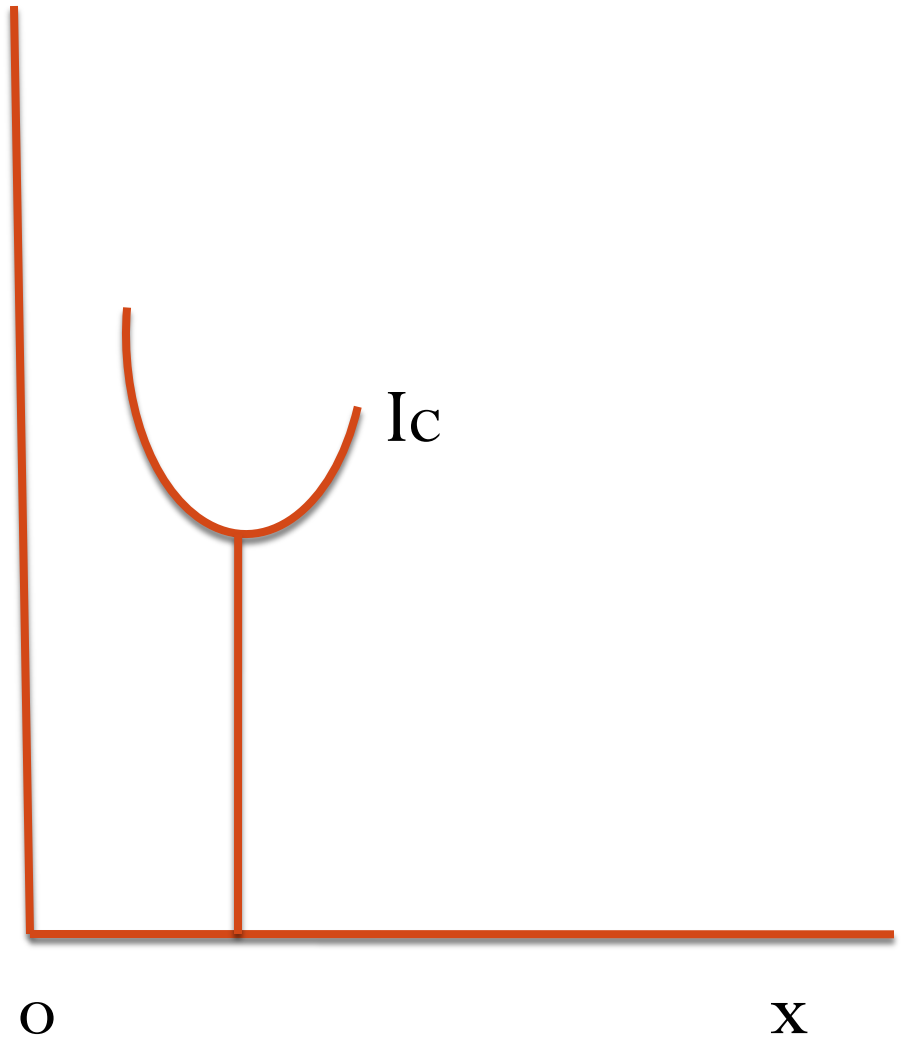


**Exception 3:** Horizontal Indifference Curve – Goods that give zero satisfaction: When any product yields zero satisfaction then the consumer will not want to sacrifice even the last quantity of the other product to get a single unit of that product. For instance, indifference curve of cigarettes for a non-smoker, as shown in Fig., will be a straight line. Indifference curve of that product which yields zero satisfaction, will be parallel to OX (at which product yielding zero satisfaction is shown).



### Exception 4: U-Shaped

Indifference Curve Goods  $y$  that give Negative utility: If consumption of any product will result in negative utility after a certain limit, then its indifference curve, as shown in Fig. will be U shaped. For instance, at point Q, the consumer gets the quantity of goods which are needed. After point Q, slope of indifference curve becomes positive.



# Budget Line

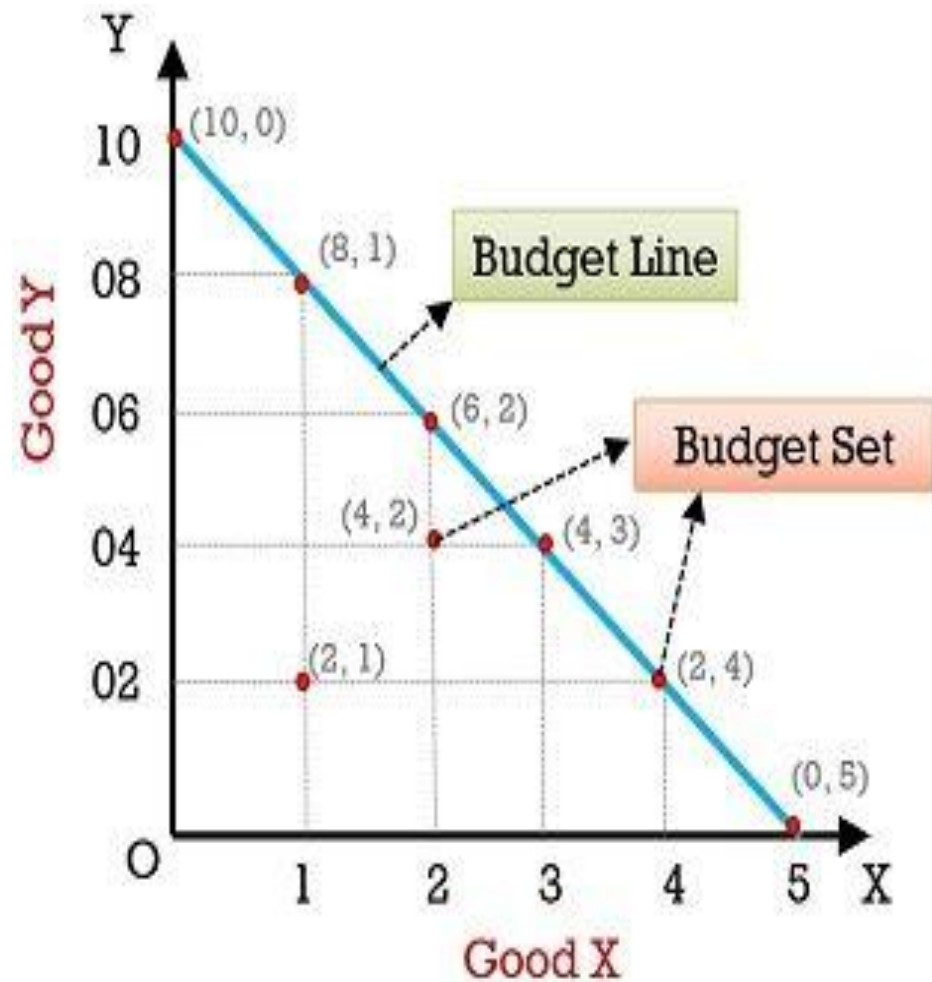
A budget line is a line which shows all combinations of two goods that a consumer can afford with a given income and prices of commodities. It is also known as price line, consumption possibility line, and line of attainable combinations.

## **Example of Budget Line**

Suppose a consumer has an income of Rs.50, and it will be used to buy commodities X and Y. To derive maximum utility from the said income, only the following options are available.

Combination	Goods X (Rs 10 each)	Goods Y (Rs 5 each)	Income (budget allocation)
A	0	10	$(10 \times 0) + (5 \times 10) = 50$
B	1	8	$(10 \times 1) + (5 \times 8) = 50$
C	2	6	$(10 \times 2) + (5 \times 6) = 50$
D	3	4	$(10 \times 3) + (5 \times 4) = 50$
E	4	2	$(10 \times 4) + (5 \times 2) = 50$
F	5	0	$(10 \times 5) + (5 \times 0) = 50$

The required budget line is obtained by plotting the above budget against the following graph. In the graph, the X-axis represents commodity X, and Y-axis represents commodity Y.



## Features of Budget Line

- **Negative slope:** It has a negative slope.
- **Straight line:** It indicates a continuous market rate of exchange in individual combinations.
- **Real income line:** It denotes the income and the spending amount of a customer.
- **Tangent to indifference curve:** It is the point when the indifference curve meets the budget line. This point is known as the consumer's equilibrium.

# Consumer's Equilibrium

A consumer is in equilibrium when he maximizes his utility with his given income and the market prices. Two conditions must be fulfilled for the consumer to be in equilibrium.

1.  $MRS_{xy} = MU_x / MU_y = P_x / P_y$ . It means MRS be equal to the ratio of commodity prices.

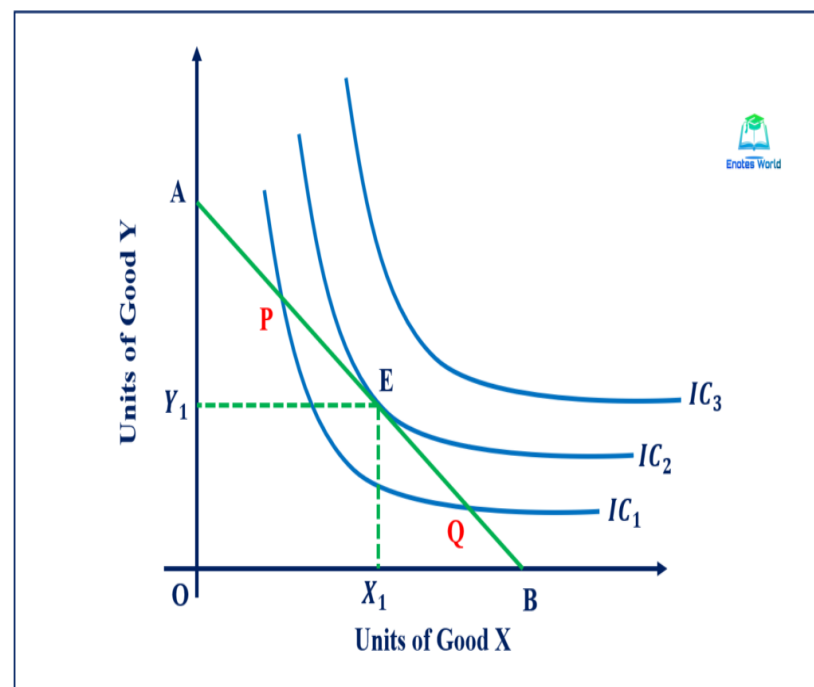
This is a necessary but not sufficient condition for equilibrium.

2. **The indifference curves be convex to the origin.** This condition is fulfilled by the axiom of diminishing  $MRS_{xy}$  which states that the slope of the indifference curve decreases as we move along the curve from the downwards to the right.



# Graphical Presentation

Given the indifference map of the consumer and his budget line, the equilibrium is defined by the point of tangency of the budget line with the highest possible indifference curve (point E in the fig.)



At the point of tangency the slope of the budget line ( $P_x/P_y$ ) and  $MRS_{xy} = MU_x/MU_y$  are equal. The first order condition is fulfilled by the point of tangency of the two relevant curves. The second order condition is implied by the convex shape of the indifference curves.

**THANK YOU  
AND  
WISH YOU A HAPPY  
LEARNING**