YESHWANTRAO CHAPHEKAR COLLEGE, PALGHAR

PRESENTATION

ON

CHAPTER-6.THEORY OF PRODUCTION

PRESENTED BY:

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Theory of Production

▸ The theory of production is concerned with the problem of combining various inputs to produce a certain level of output.

➤ Production is a process that create/adds value or utility.

➤ It is the process in which the inputs are converted into outputs.

➤ Eg- Apple hires labour to use machinery, technology & raw materials in factories to produce its product. The output of a firm can be a final product like a PC ,etc.

| Inputs | • The factors of production such as Land, Labour, Capital, Technology ,etc |
| Outputs | • The goods and service produced such as Soap, Omni Car ,etc |

Production Function

- Production function means the functional relationship between inputs and outputs in the process of production.

- It is a technical relation which connects factors inputs used in the production function and the level of outputs.

Q = f (Land, Labour, Capital, Organization, Technology, etc)

Factors of Production

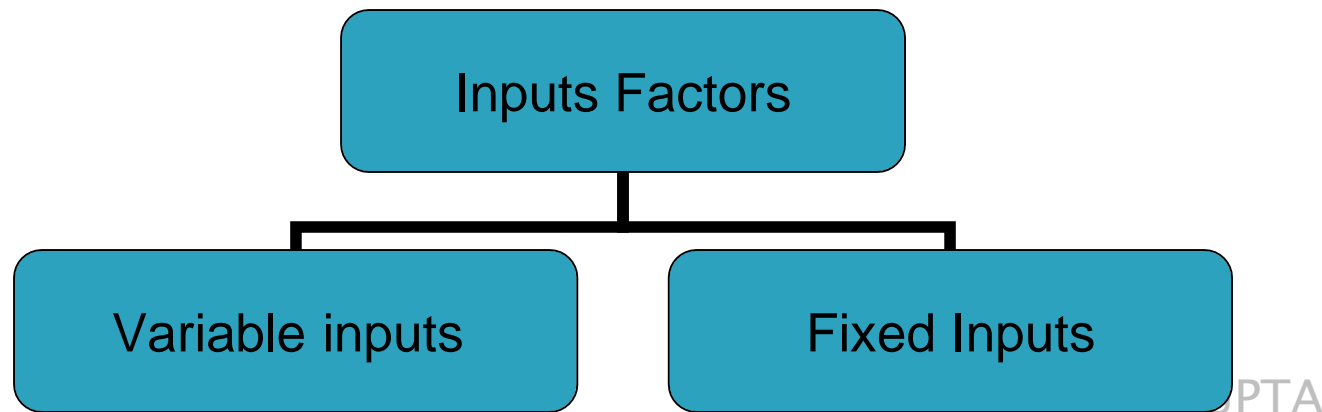| Land	• Natural resources such as surface, mineral , air, rivers, sea, etc • Free gift of nature, fixed
Labour	• It is the measure of work done by human beings. • The skills that worker possess
Capital	• Physical tool and equipment that allows for increased work productivity.
Organization	• Entrepreneur or coordinator of all other factors of production

Inputs : Fixed inputs and Variable inputs

- Inputs are the resources used in production of goods and services.

- Land, Labour, Capital, Organizer, Technology, are the example of inputs

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                    ┌──────────────────┐
                    │  Inputs Factors  │
                    └──────────────────┘
                              │
                ┌─────────────┴─────────────┐
        ┌───────────────┐           ┌───────────────┐
        │ Variable inputs│           │  Fixed Inputs │
        └───────────────┘           └───────────────┘
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Inputs : Fixed inputs and Variable inputs

Fixed inputs

- Remain the same in the short period .
- At any level of out put, the amount is remain the same.
- The cost of these inputs are called Fixed Cost
- Examples:– Building, Land etc
- (In the long run fixed inputs become variable)

Variable inputs

- In the long run all factors of production are varies according to the volume of outputs.
- The cost of variable inputs is called Variable Cost
- Example:- Raw materials, labour, etc

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ISOQUANTS

- According to Ferguson, "An isoquant is a curve showing all possible combinations of inputs physically capable of producing a given level of output"
- Isoquant is derived from Italian word

  Iso- equal   quant- product

- An isoquant is also known as **Product curve** or **iso-product curve**.

Various combination of X and Y to produce a given level of output

Factor Combination	Factor X	Factor Y
A	1	12
B	2	08
C	3	05
D	4	03
E	5	02

Each of the factor combinations A,B,C,D and E represents the same level of production Say 100 units.

When we plot them, we get a isoquant curve :
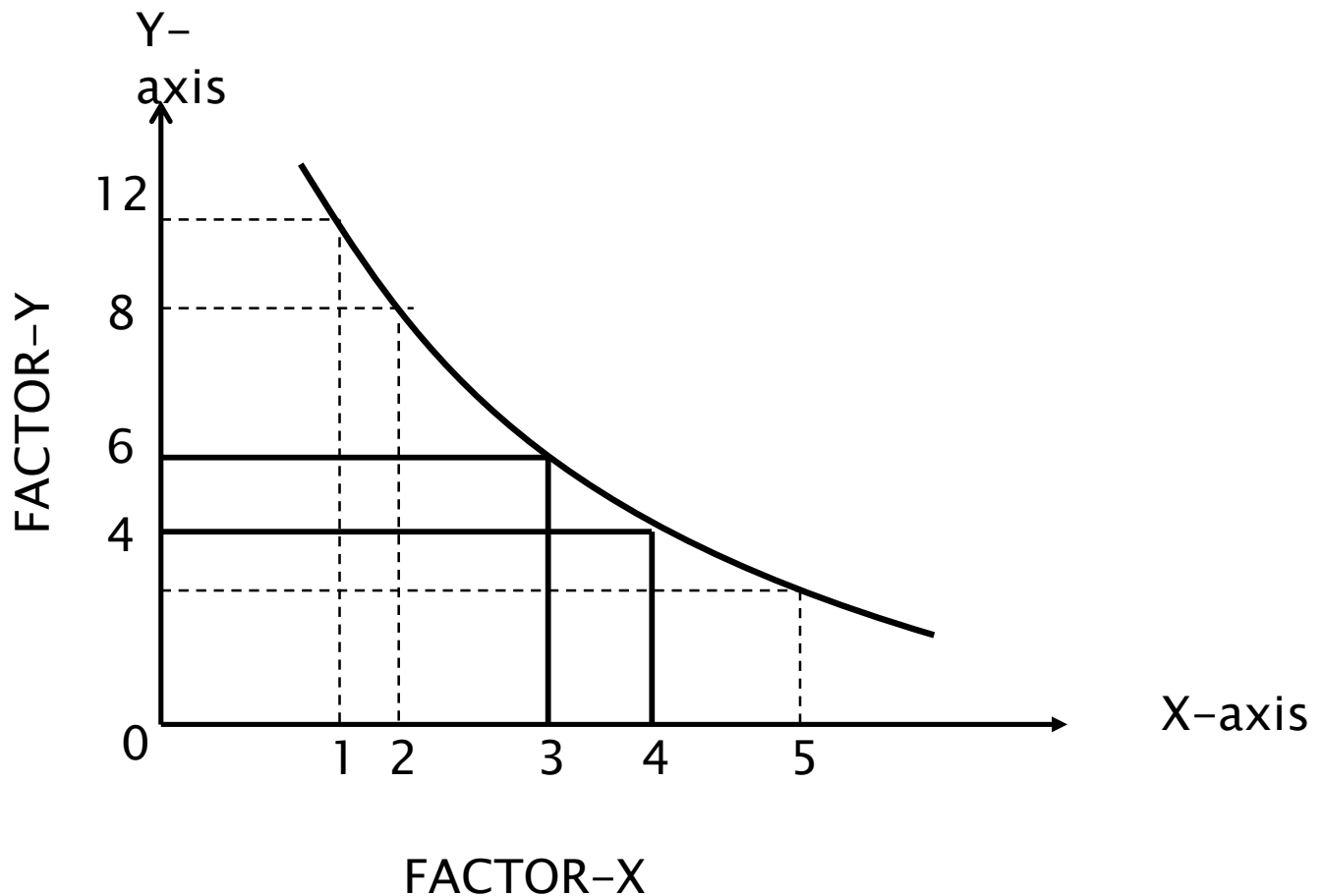

ISOQUANT CURVE

Types of Isoquant

- **Linear Isoquant**

- **Right Angled Isoquant**

- **Kinked Isoquant**

- **Smooth Convex Isoquant**

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Linear Isoquant

➢ In Linear Isoquant there is perfect substitution of Inputs

➢ For Example – 100 units can be produced by using only capital or labour or by number of combination of both capital and labour , say 1 unit of labour and 5 units of capital ,or 2 units of labour and 3 units of capital.

➢ This is unrealistic because capital and labour are not perfectly substitutable.

➢ *Hence , the Isoquants are straight lines.*
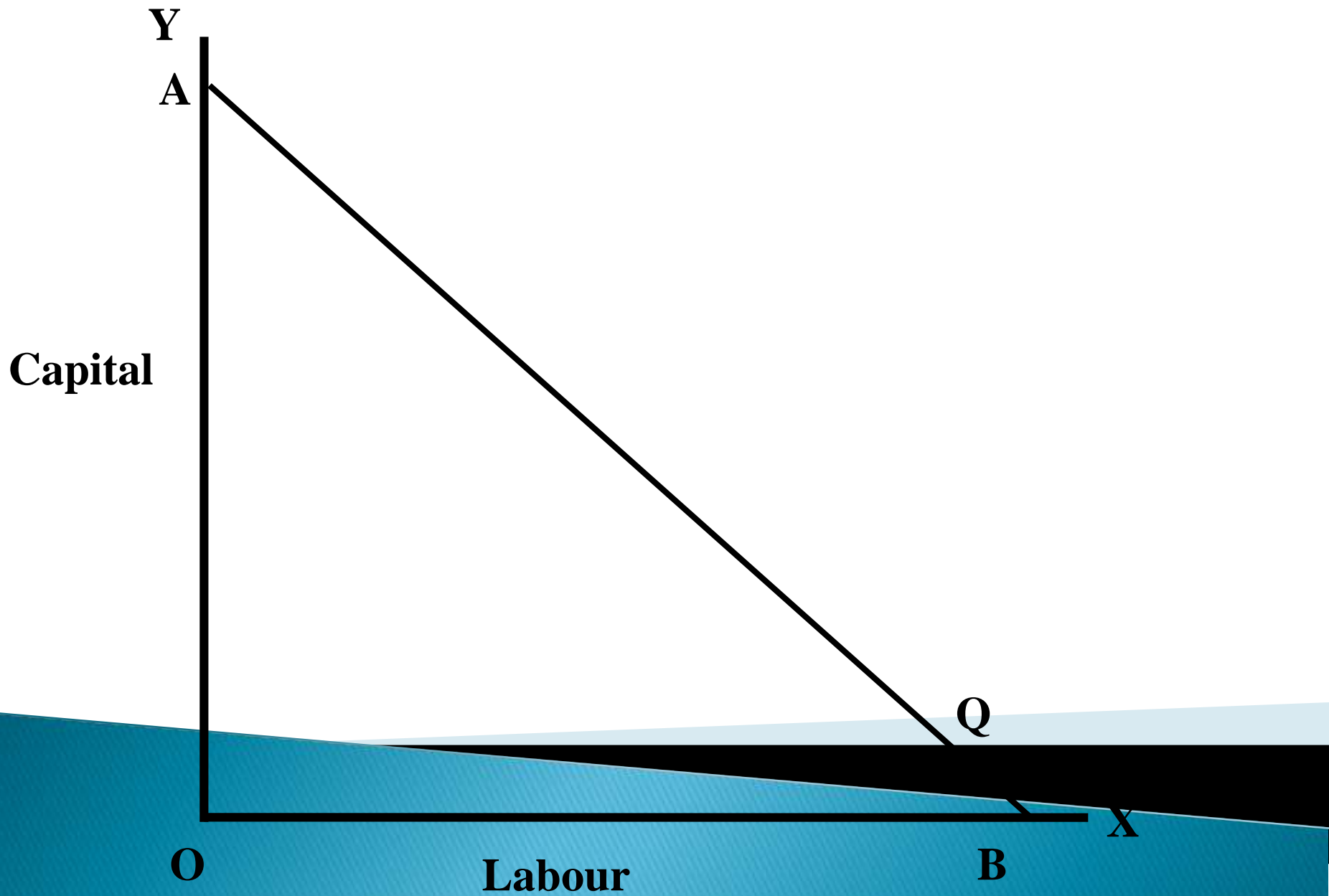
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Right – Angle Isoquant

➤ This assumes zero substitution of the factors of production.

➤ There is only one method of producing any one commodity.

➤ In this case isoquant takes the right angle.

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▸ In this case, labour and capital are perfect complements, i.e. labour and capital must be used in fixed proportion.

▸ The output can be increased only by increasing both the quantity of labour and capital in the same proportion depicted at the point c.

▸ This isoquant is called as input-output isoquant or Leontief isoquant (inventor)

Y

Capital

C

Q

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O

X
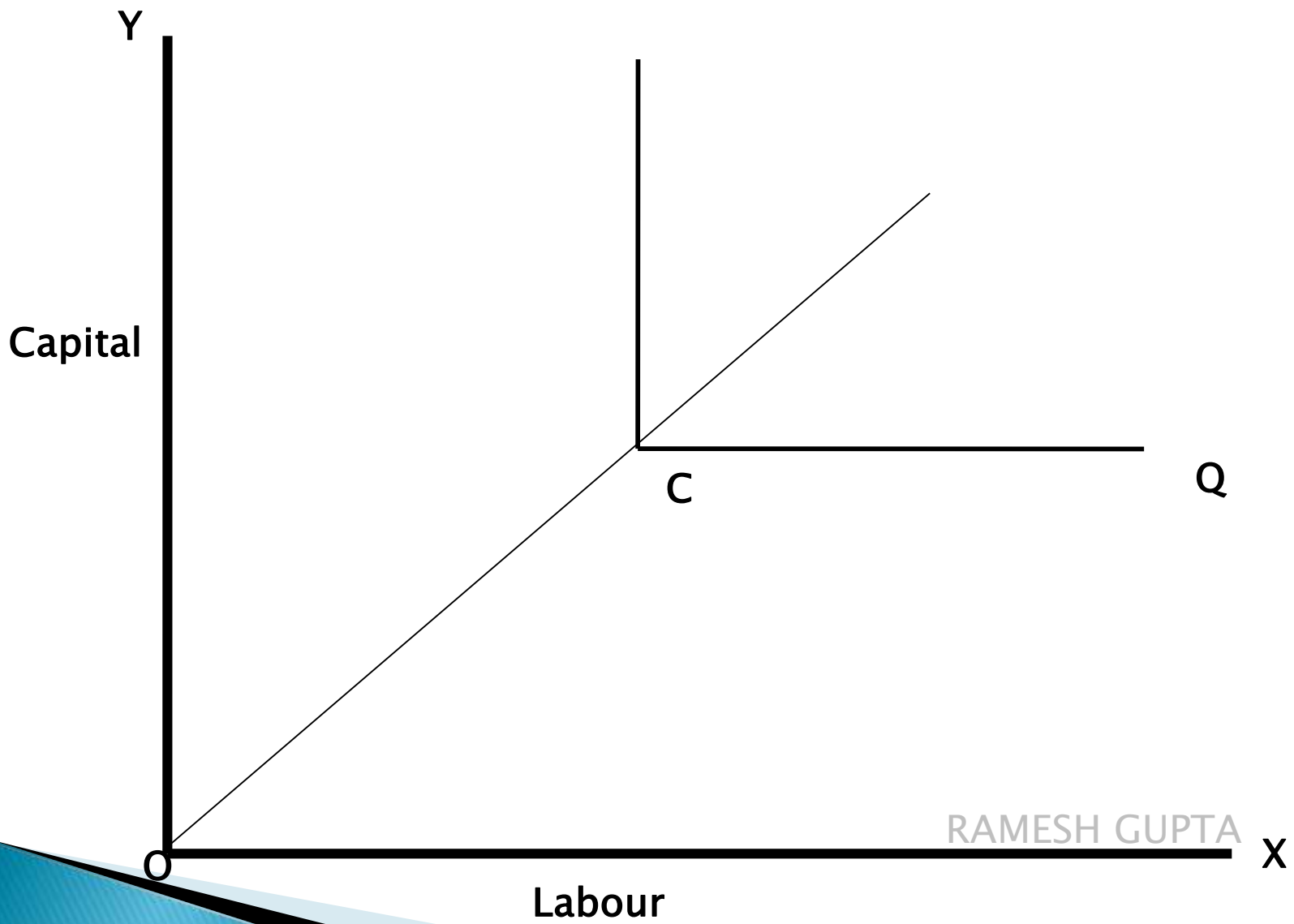
Labour

Kinked Isoquant

- This isoquant assumes only limited substitution of capital and labour.

- There are only a few process for producing any one commodity.

- This is more realistic type of isoquant because engineers, managers and production executives consider the production process as a discrete rather than continuous process.

Continue....

▸ Where A1, A2, A3 and A4 show the production process and Q is the Kinked isoquant.

▸ In this case the substitution of factors is possible only at the Kinks, i.e. at points A,B,C and D.
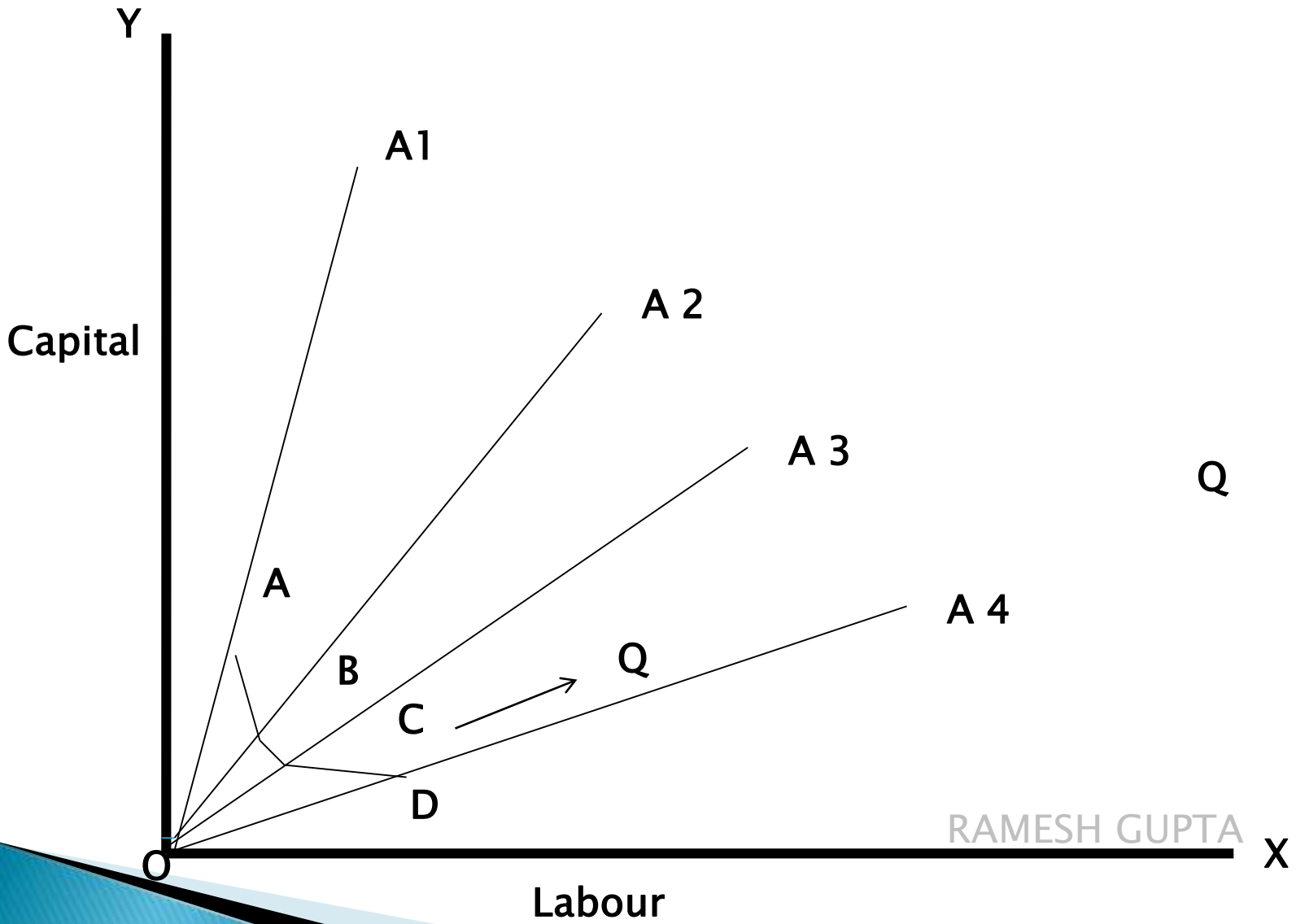
Smooth Convex Isoquant

▶ This type of isoquant assumes continuous substitution of capital and labour over a certain range, beyond which factors cannot substitute each other.

▶ It is assumed that the different combinations of labour and capital produces the same level of output, that is , 20 units.

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▸ The combinations are such that if one factor is increased the other factor is decreased and vice versa. All these combinations are technically efficient.

Various combination of labour and capital to produce 20 units of output

Factor Combination	Labour	Capital
A	1	15
B	2	11
C	3	8
D	4	6

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Properties of Isoquants

- **<u>Isoquants slope downwards to the right:</u>**

- In order to keep the output constant, when the quantity of one factor is increased the quantity of other factor must be reduced.

- In this case the same output could be obtained at less cost by reducing the quantity of one of the factors.

- Thus isoquants slope downward from left to right.

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Properties of Isoquants

- **<u>Isoquants do not intersect:</u>**

- Isoquant do no intersect or touch each other.

- It is because they represent different level of output.

Properties of Isoquants

- ## **<u>Isoquants cannot touch either axis:</u>**

- If an isoquant touches any axis, it would mean that the output can be produced with the help of one factor.

- It is unrealistic because output cannot be produced only by labour or capital alone.

Properties of Isoquants

- **<u>Isoquants are convex to the origin:</u>**

- we have to understand the concept of diminishing marginal rate of technical substitution (MRTS), because convexity of an isoquant implies that the MRTS diminishes along the isoquant.

- The marginal rate of technical substitution between L and K is defined as the quantity of K which can be given up in exchange for an additional unit of L.

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- **It can be expressed as:**

- $MRTS_{LK} = \Delta K / \Delta L$

- Where ΔK is the change in capital and ΔL is the change in labour.

- Equation (1) states that for an increase in the use of labour, fewer (less) units of capital will be used. In other words, a declining MRTS refers to the falling marginal product of labour in relation to capital.
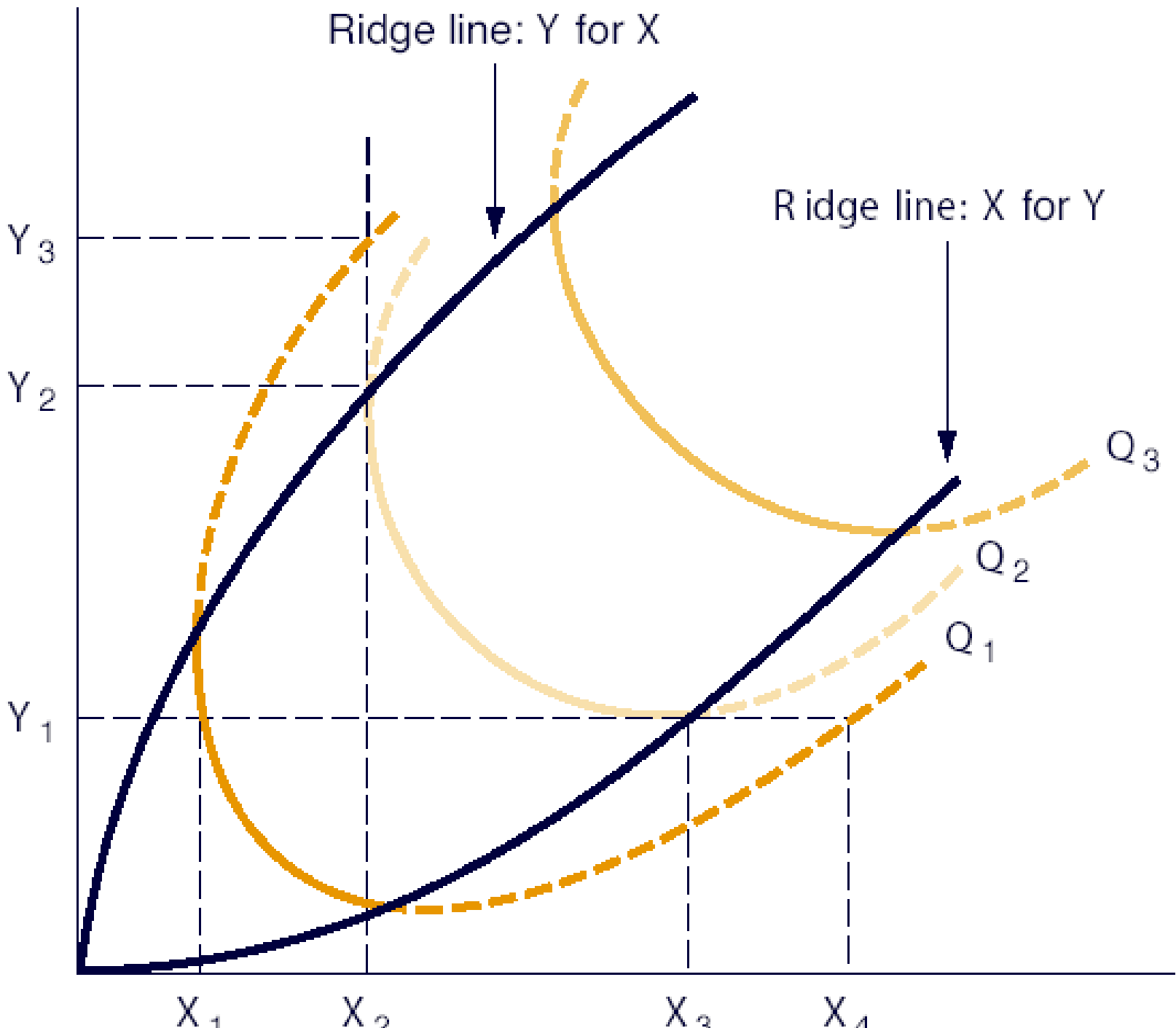
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- To put it differently, as more units of labour are used, and as certain units of capital are given up, the marginal productivity of labour in relation to capital will decline.

- Thus it may be observed that due to falling MRTS, the isoquant is always convex to the origin.

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RIDGE LINES

- The firms will produce only in those segments of isoquants which are convex to the origin and lie between the ridge lines.

- The upper ridge line implies zero MP (no substitution) of capital and the lower ridge line implies zero MP (no substitution) of labour.

- Production techniques are only efficient inside the ridge lines.

- The marginal products of factors are zero or negative and the method of production are inefficient outside the ridge lines.

Ridge line: Y for X

Ridge line: X for Y

Q_3

Q_2

Q_1

Y_3

Y_2

Y_1

X_1 X_2 X_3 X_4

Continued......

- The curves Q1, Q2 and Q3 are the oval shaped isoquants.

- The curves OA and OB are the ridge lines on the oval shaped isoquants.

- The points C, D, E and F, G, H between the ridge lines are economically feasible units of capital and labour which can be employed to produce 100, 200 and 300 units of the output.

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- For Eg- OT units of labour and ST units of the capital can produce 100 units of the output.

- The same output can be produced by using the same quantity of labour OT and less quantity of capital CT.

- Only an irrational producer will produce along the isoquant outside the ridge line.

LEAST COST COMBINATION OF INPUTS

▸ The firm will have to choose that combination of factors which will cost it the least.

▸ In this way the firm can maximise its profits.

▸ The choice of any particular method is based on the prices of factors of production at a particular time.

▸ The firm can maximise its profits either by maximising the level of output or by minimising the cost of producing a given output.

FINDING THE TOTAL COST OF FACTOR COMBINATIONS

- In this we try to find the total cost of each factor combination and choose the one which has the least cost.

- The cost of each factor combination is found by multiplying the price of each factor by its quantity and then summing it for all inputs.

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