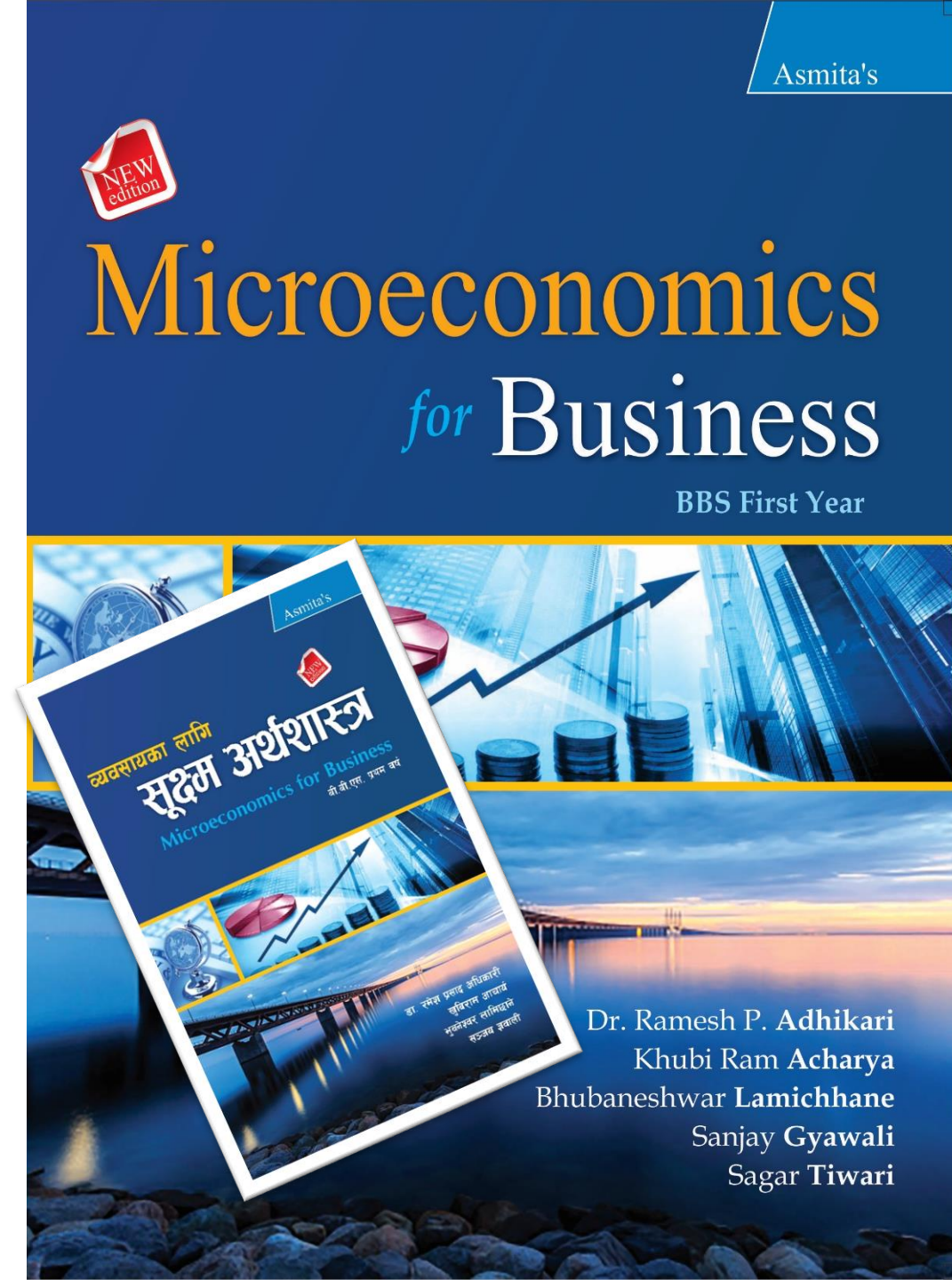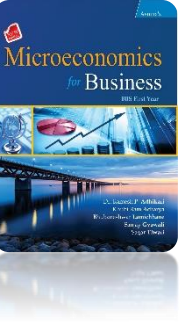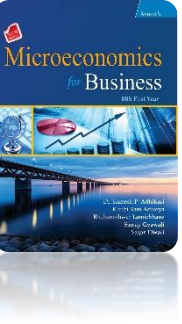# Theory of Factor Pricing

Unit 8

Learning Objectives

On completion of this unit, students will be able to:

- explain the concept of rent and its types
- explain the modern theory of rent
- explain the concept of wages and its types
- describe the marginal productivity theory of wages, concept of collective bargaining and minimum wages fixation
- explain the concept of interest and its types
- explain the loanable fund theory and liquidity preference theory of interest
- describe the concept of profit and its types
- distinguish between economic and business profit
- explain the dynamic theory of profit and innovation theory of profit.

Introduction

- Factor pricing deals with the theory of factor price determination. The term factor refers to factors of production.

- Traditionally, there are four factors of production. They are land, labour, capital and organization.

- These factors of production are to be employed for the production of goods and services.

- These factors of production get reward in the form of wage, rent, interest and profit receptively for their contribution in the production of goods and services.

- Economists have developed various theories for the determination of price of each factor of production. These theories are called theories of factor pricing.

Rent

Rent is defined as the payment made to the landlord by a tenant for the use of land, i.e. gift of nature. In other words, it is the reward or price paid for the use of land.

Types of Rent

1. Contract Rent
2. Economic Rent

Contract Rent

- Contract rent is the total payment made by the tenant to the landlord.

- In other words, it is the commercial rent which refers to price paid per unit of time for the services of durable goods, such as land, computer, machineries, house, vehicle, etc. when hired rather than purchased.

- It is also gross rent, which includes economic rent, service charges, depreciation charges, net profit and interest.

Contract Rent = Economic Rent + Service Charges + Depreciation Charges + Profits + Interest
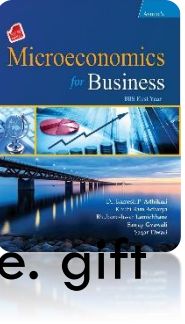
Rent Contd.

Economic Rent

- Economic rent is that part of the payment which is made only for the use of land, i.e. gift of nature. In economics, rent means economic rent. Economic rent is the pure rent.

- In the views of **David Ricardo**, economic rent is the amount paid for the use of original and indestructible power of the soil. But modern economists have extended the concept of economic rent to other factors of production. According to them, economic rent is the earning of any factor of production which exceeds its opportunity cost or minimum supply price in its use.

- The minimum supply price is the transfer earning of the factor, i.e. what the factor could earn in its next best alternative use.

  Economic Rent = Actual Earning – Transfer Earning

Modern Theory of Rent

- The modern theory of rent is based on the ideas of economists like **Alfred Marshall, Mrs. Joan Robinson** and **K.E. Boulding.** This theory of rent believes that rent is a surplus payment in excess of transfer earnings of the factors of production.

    Rent (Economic Rent) = Actual Earning – Transfer Earning

- Transfer earning is the earning or price of a factor of production from its next best or alternative use. In other words, transfer earning is the minimum earning which a unit of factor of production must be paid in order to induce it to stay in the present use or industry or occupation.

- If a factor is getting less than this minimum, it will give up the present employment and shift to its next best alternative employment.

- But, if a factor in its present employment is earning more than the minimum necessary to keep it in the employment, the excess is called economic rent.

Modern Theory of Rent Contd.

According to modern theory of rent, rent depends upon the elasticity of supply. There are three possible situations given by the modern economists, which are follows:

1. When supply of factors of production is perfectly elastic, the actual earning of the factors equals to its transfer earning and hence there will be no economic rent.

2. When supply of factors of production is perfectly inelastic, the transfer earning of the factors will be zero, and all of its earning is a surplus and all is economic rent.

3. When supply of factor of production is less than perfectly elastic, the transfer earning of the factors will differ and they all will earn surplus of varying quantity and economic rent varies.

Modern Theory of Rent Contd.

Types of Supply of the Factors and the Rents Earned by Them

1. **Perfectly elastic supply ($E_S = \infty$):** The supply of a factor for some particular use can be perfectly elastic. In this situation, transfer earning is equal to the actual earning. So, the factor will earn no rent.

Economic Rent = Actual Earning – Transfer Earning

$$= OQEP – OQEP = 0$$
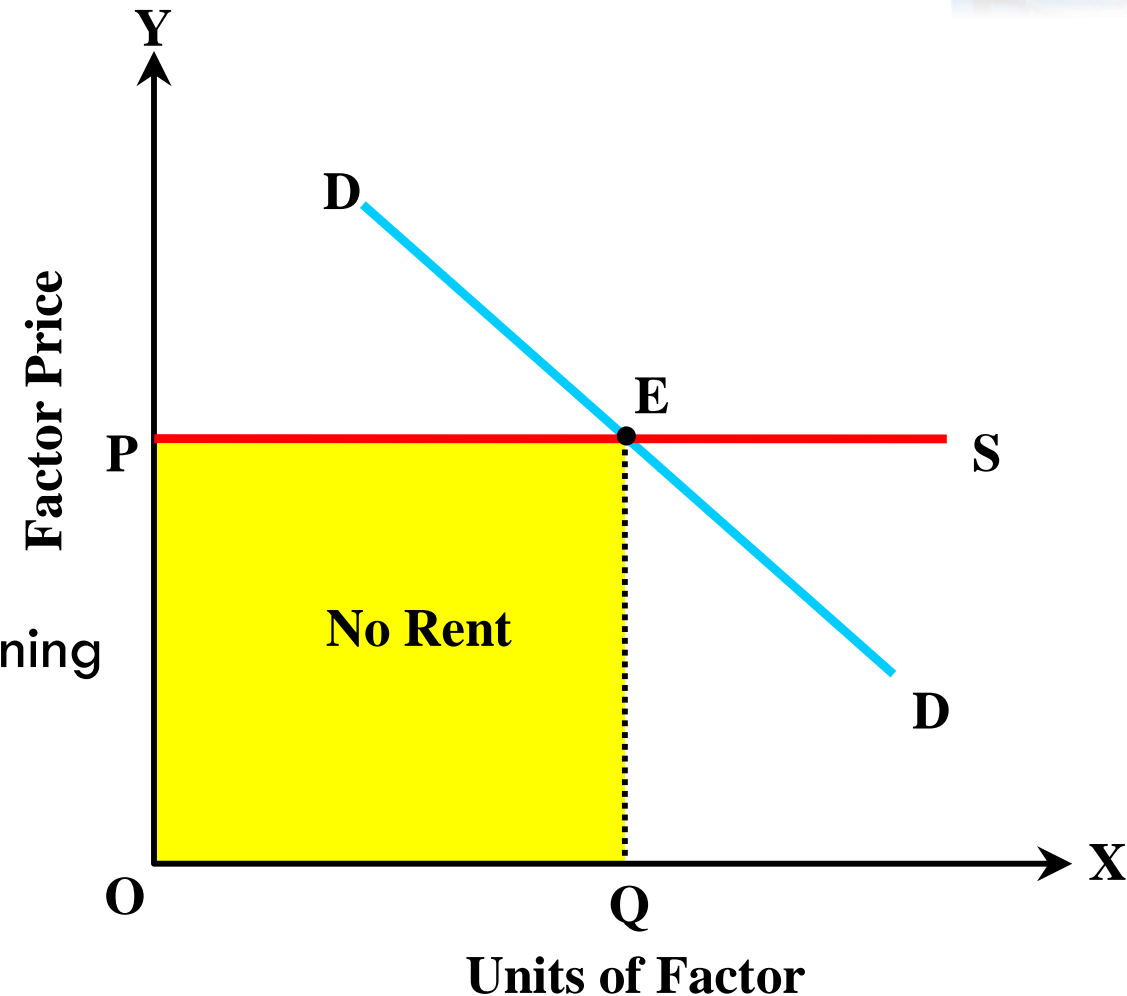
Modern Theory of Rent Contd.

2. **Perfectly inelasticity supply:** The supply of a factor like land is perfectly inelastic. So, it has no transfer earning. The whole of its actual earning is rent.

Economic Rent = Actual Earning – Transfer Earning

= OQEP – 0

= OQEP
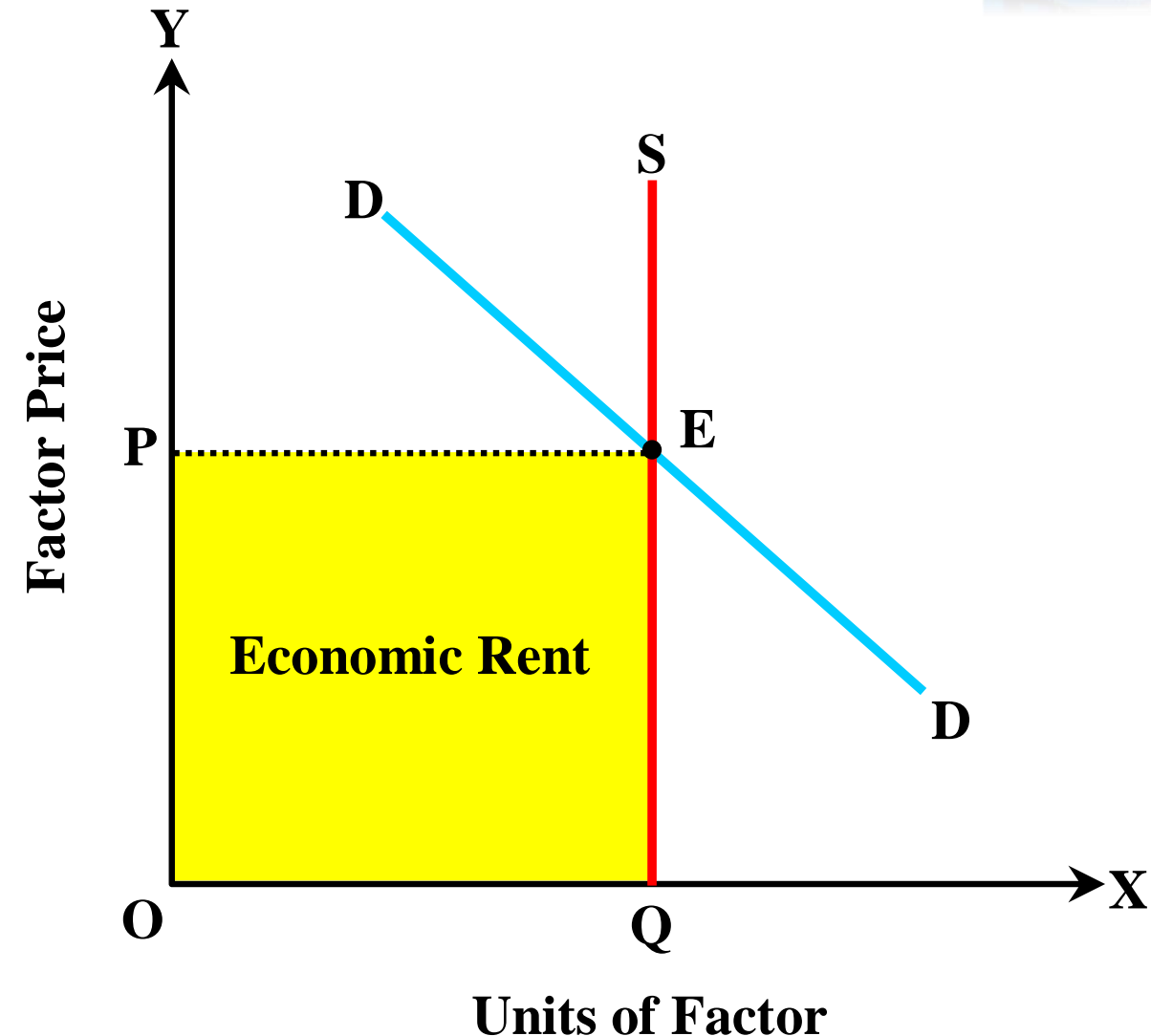
Modern Theory of Rent Contd.

3. **Elastic supply:** The supply of the factor is neither perfectly elastic or nor perfectly inelastic. It is always between these two. In this situation, actual earning will be more than transfer earning. So, rent or economic rent will be occurred.

Economic Rent = Actual Earning – Transfer Earning

= OQEP – OQES

= PES
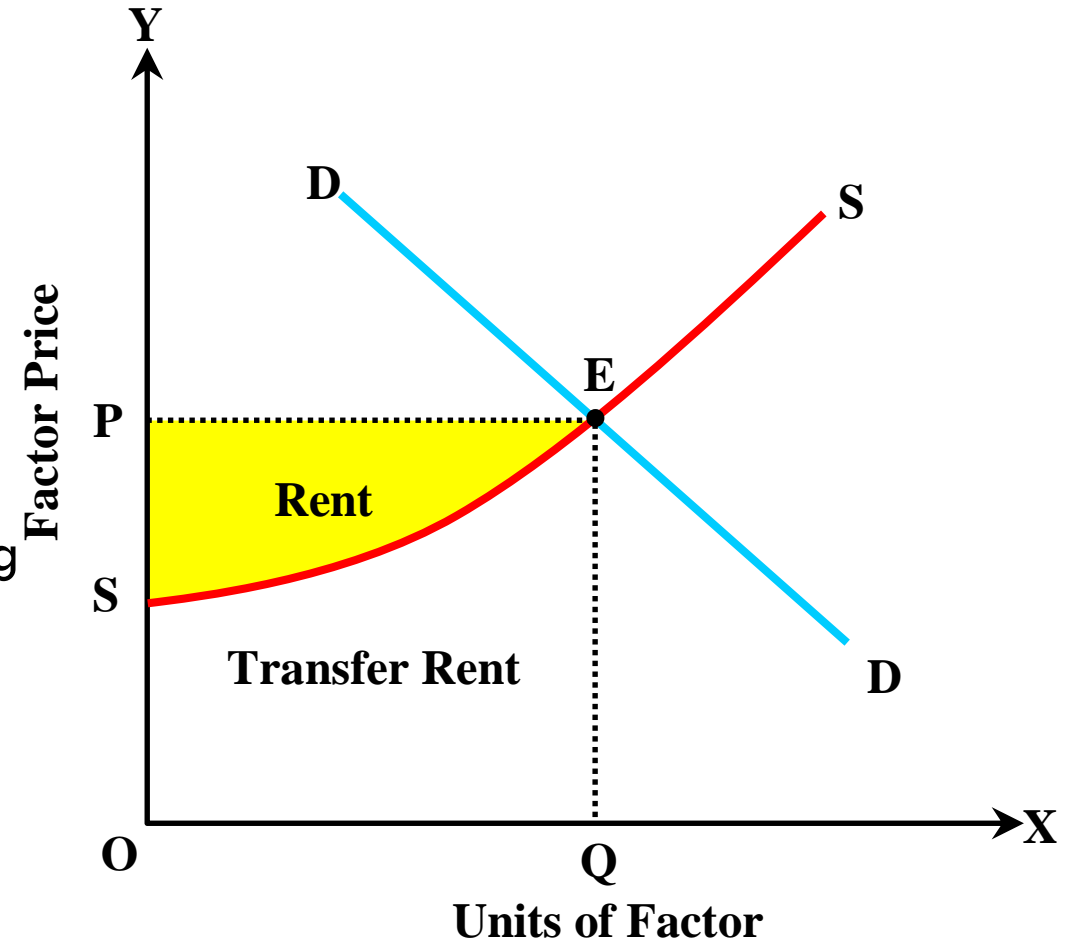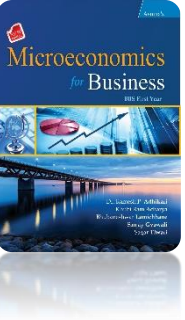
Wages

In economics, wages means payment made to the labour for his or her contribution in the production of goods and services. It is also defined as the reward given to the labour, whether it is mental or physical.

Money Wages (Nominal Wages)

- Money wage is defined as the price or reward paid in monetary terms to a worker for his or her services. Money wage is also called nominal wage.

Real Wages

- Real wages is defined as the purchasing power of money wages. In other words, it is the sum of goods and services that money wage can purchase and extra benefits provided to the labour.

- Extra benefits includes accommodation facilities, health care, transportation facilities, cloth allowances, insurance facilities, etc. The real wage determines the living standard of the labour of a particular country.

Marginal Productivity Theory of Wages

- Marginal productivity of labour means productive capacity of labour.

- The marginal productivity theory of wages was first stated by a German economist, **Von Thunen** in his book 'The Isolated State'. Later, it was developed and popularised by the economists like **J.B. Clark, Alfred Marshall, A.C. Pigou, Leon Walras,** etc.

- According to this theory, wages are determined at a point where value of marginal productivity of labour (VMP_L) equals to the marginal cost of labour (MC_L).
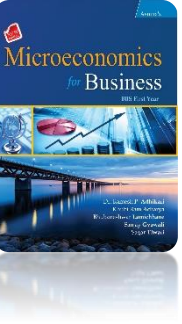
Marginal Productivity Theory of Wages Contd.

Assumptions

- There is perfect competition in both product and factor market.

- There is no change in technique of production.

- The objective of the firm is to maximize profit.

- There is operation of the law of diminishing marginal returns in the productivity of labour.

- There is full employment in the long-run.

- There is perfect mobility of factors of production.

- The labour is homogeneous and perfectly mobile.

- Price of the product remains constant.

Marginal Productivity Theory of Wages Contd.

Condition for Equilibrium

On the basis of above given assumptions, we can express equilibrium condition as follows:

$VMP_L = MC_L$ … (i)

where

VMP_L = Value of marginal productivity of labour

MC_L = Marginal cost of labour

Marginal Productivity Theory of Wages Contd.

Value of Marginal Productivity of Labour (VMP$_L$)

Value of marginal productivity of labour is defined as the additional revenue in total revenue due to employed an additional unit of labour by the firm. It is also obtained by multiplying the price of a commodity say X and marginal productivity of labour. The value of marginal productivity of labour curve is the demand curve for labour, which slopes downward because of constant price of the product and diminishing marginal productivity of labour. Symbolically,

$$\text{VMP}_L = P_X \cdot \text{MP}_L$$

$$= \text{MR}_X \cdot \text{MP}_L \qquad [\because \textbf{In the perfect competition, } P_X = \text{MR}_X]$$

where

VMP$_L$ = Value of the marginal productivity of labour

P$_X$ = Price of the product X, which is constant

MP$_L$ = Marginal productivity of labours

MR$_X$ = Marginal revenue derived from good-X

Marginal Productivity Theory of Wages Contd.

Marginal Cost of Labour (MC$_L$)

Marginal cost of labour is defined as the wage paid to the each additional unit of labour. In other words, marginal cost of labour is the marginal wages, which is constant in the perfect competition. The marginal cost of labour is equal to the wage rate. It is also a supply curve of labour. It is horizontal straight line parallel to X-axis. Symbolically,

MC$_L$ = w

where

w = Wage rate

MC$_L$ = Marginal cost of labour

The profit maximizing firm will hire labour where MC$_L$ equals to VMP$_L$. It can be expressed as

VMP$_L$ = MC$_L$

or, **VMP$_L$ = w,** which is the equilibrium condition.
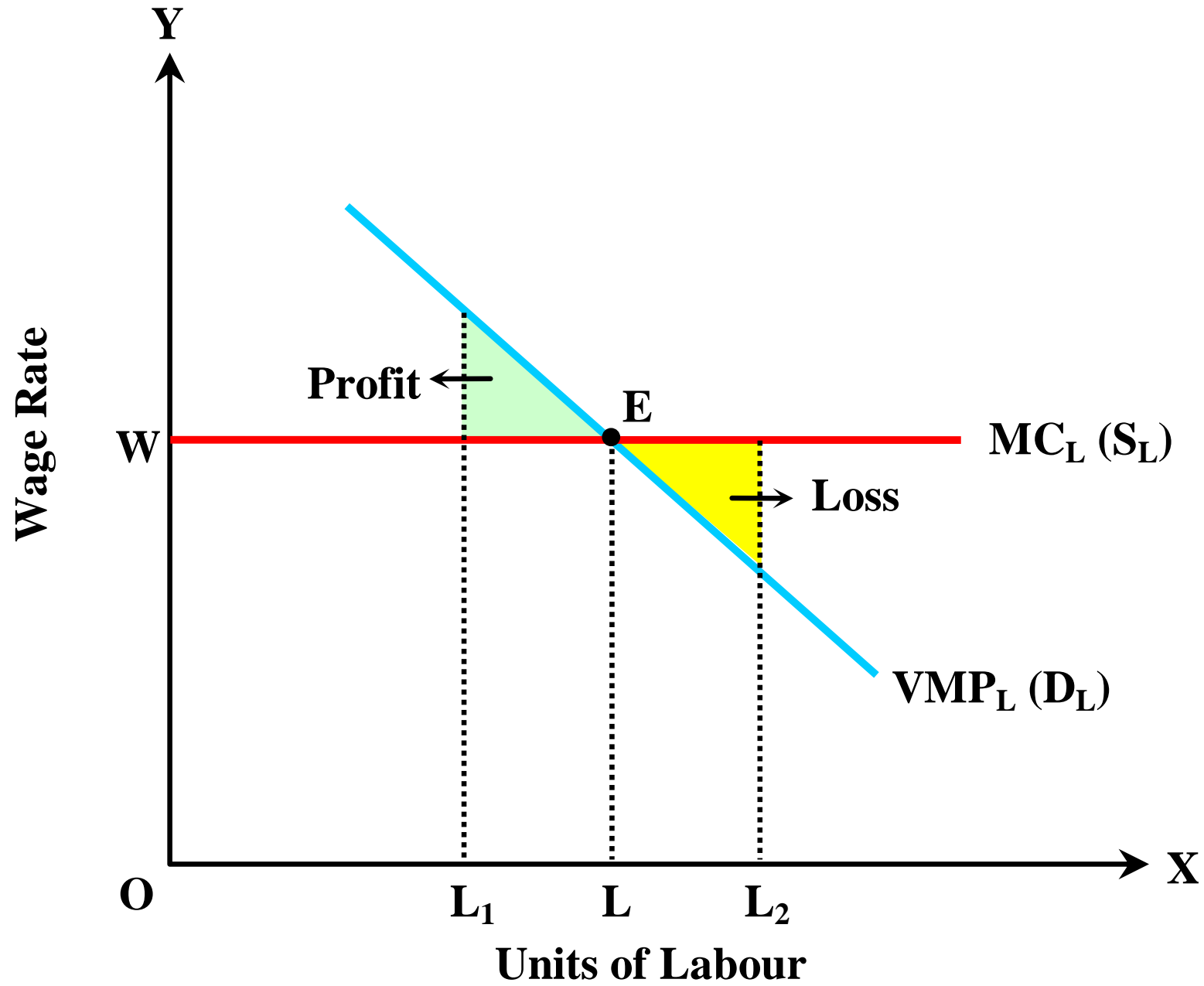
Marginal Productivity Theory of Wages Contd.

Criticisms

1. Based on perfect competition

2. One sided

3. Based on full employment

4. Static theory

5. Difficult to measure marginal productivity

6. Wage differentials

7. Ignored role of labour unions
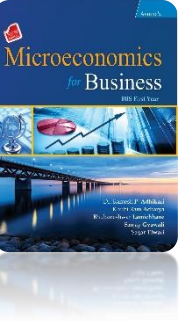
Concept of Collective Bargaining

- The term Collective bargaining was first used by **Sidney** and **Beatrice Webb** in 1891 A.D. Collective bargaining is technique used by the trade union (organization of workers) and employers collectively to resolve their differences without assistance of a third party.

- The phrase Collective Bargaining is made up of two words. Collective means united or a group action and bargaining means negotiating. On the one side, the people involved in the negotiation are the representatives of management and on the other hand, the representatives of employees are trade unions.

- It plays very important role in setting and preventing industrial disputes. It is also an important tool for maintaining industrial peace.

- The responsibility of its proper implementation should be of both the employers and the employees.

Determination of Wages under Collective Bargaining

Collective bargaining is a process of negotiation between employers and trade union (a group of employees) to achieve higher salaries, improving working conditions, non-wage benefits, such as medical facility, provident fund, pension, social security, reduction in working hour, over time, etc. Under collective bargaining, wage determination can be explained in two ways.

1. When there is Perfect Competition in both Labour and Product Market

In the perfectly competitive labour market, wage rate in a particular industry is fixed by the forces of demand for labour and supply of labour. The labour market is in equilibrium when marginal revenue productivity of labour (MRP_L) and its marginal wage rate are equal. Since in the perfect competition, $MR = P$, the value of marginal productivity of labour (VMP_L) is equal to the marginal revenue productivity of labour (MRP_L). MRP_L is product of MR and MP_L. Thus, $MRP_L = MR \times MP_L$. In the perfectly competitive market, marginal wage (MW) is constant and equal to the marginal cost of labour (MC_L). It is also a supply curve of labour. It is horizontal straight line parallel to X-axis. At the intersection point of demand for and supply of labour curves, MRP_L and marginal wage (MW) are equal. Both average wage (AW) and marginal wage (MW) are also equal in the perfect competition market. It can be shown by the help of **Figure**.

Y

Wage

D

S₁

S

W₁

T

R

W

S₁

S

D

O

Q₁ Q

X

Units of Labour
Fig. A
'Industry'

Y

Wage

W₁

E₁

W

E₀

$S_1 = AW_1 = MW_1$

$S = AW = MW$

MRP_L

O

q₁ q

X
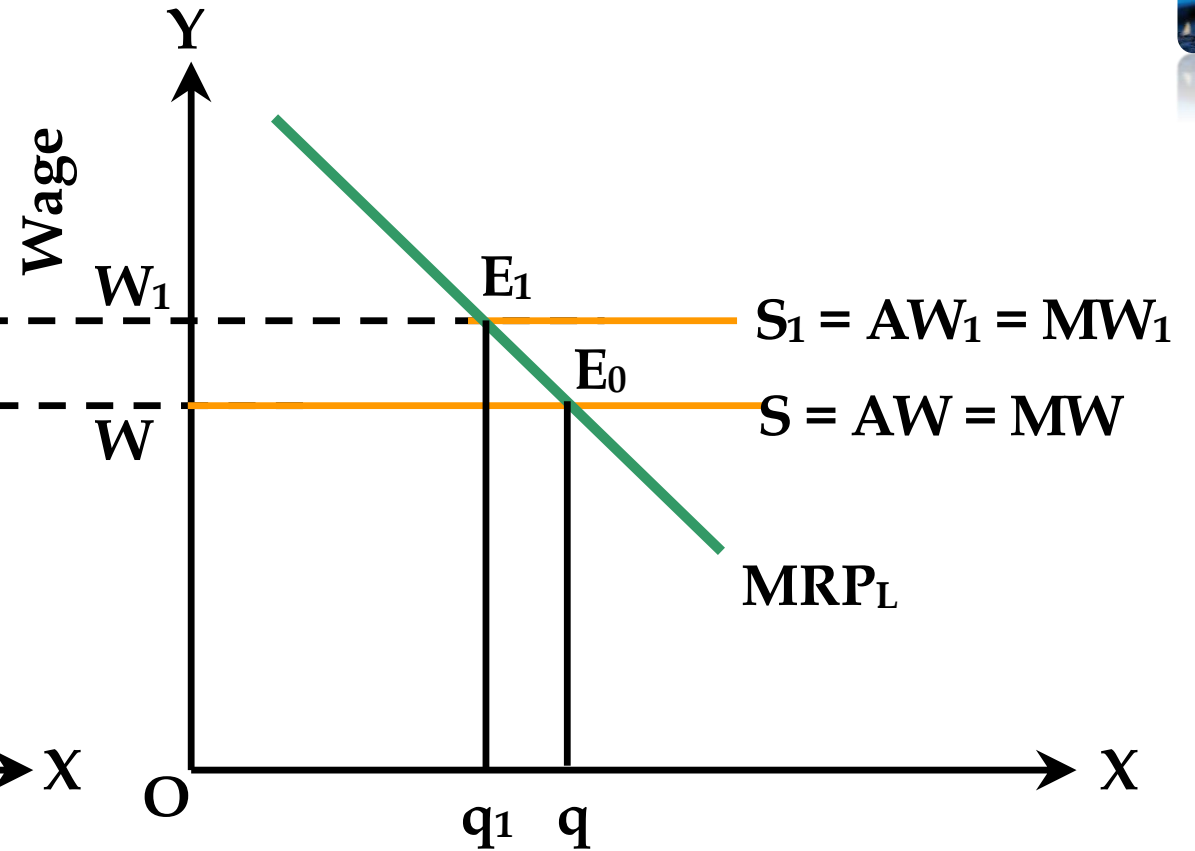
Units of Labour
Fig. B
'Firm'

Determination of Wages under Collective Bargaining Contd.

2. When there is Monopsony in Labour Market and Perfect Competition in Product Market

A monopsonist firm is a single buyer of a factor, i.e. labour in the market. Therefore, the monopsonist firm can buy more units of the factors, i.e. labour by offering higher price per-unit and vice-versa. Thus, the supply curve of firm is positively sloping from left to right upward. Both average wage curve and marginal wage curve are also upward sloping. But MW curve will be above the AW curve. It can be shown by the **Figure**.
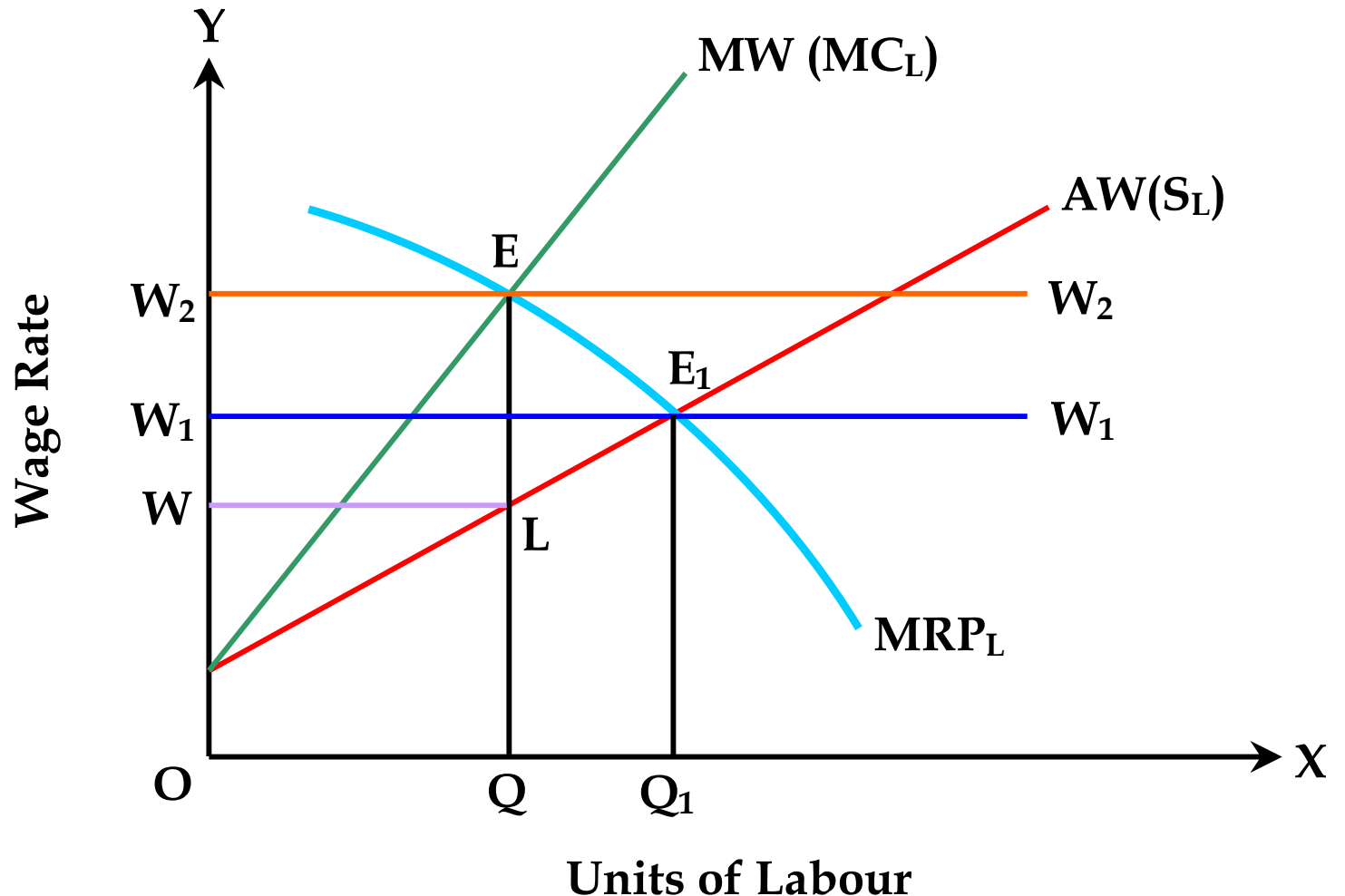
Minimum Wages Fixation

Minimum wages is defined as the minimum amount of remuneration that an employer is required to pay to the workers for the work performed during a given period of time. It is fixed by the government of a country in coordination with business organization and trade unions. The basic purpose of the minimum wage law is to protect interest of labour in the following conditions:

- Market determined wage rate is found to be much lower than required to meet the basic needs of labour.

- Market conditions open the possibility of exploitation of unorganized, unskilled and unemployed labour, and

- Government intends to improve economic condition of labour living in object poverty.

Minimum Wages Fixation Contd.

Here, we examines the effects of minimum wage law on the wage rate and labour employment in the following market conditions.

1. Effect of Minimum Wage Law in Perfectly Competitive Market

Under the perfectly competitive market, minimum wage law increases the wage rate and decreases the employment. It also checks the wage rate falling from minimum level and also checks the possibility of increase in employment. It can be shown by the help of **Figure**.
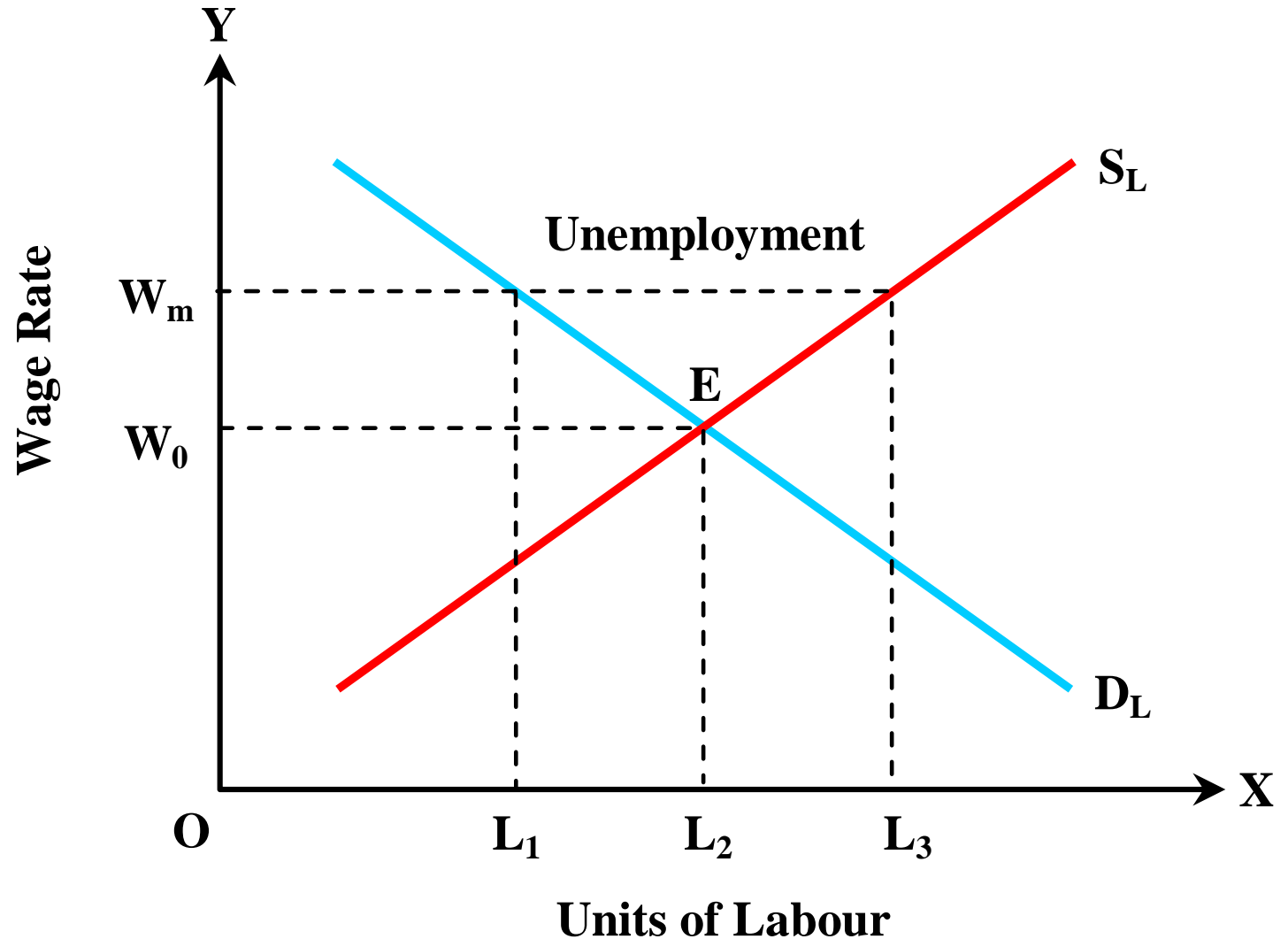
Minimum Wages Fixation Contd.

2. Effect of Minimum Wage Law in Monopsony

Under the monospony in labour market, minimum wage can be fixed by increasing wage rate without affecting the employment and by increasing both wages and employment. It can be shown by the help of the following **Figure.**

Wage Differentials

The theory of wage determination is based on the assumption of homogeneous units of labour. The wage of labour is the same in the perfectly competitions market if labour is homogeneous and non-monetary advantages are the same in all jobs. But in real world labour is not homogeneous and the different kinds of labour are not paid the same wages. It arises wage differentials.

A wage differential is defined as the difference in wages between workers with different skills in the same industry for same work or the difference in wages between the workers with similar skills within the different industries.

Types of Wage Differentials

- Dynamic wage differentials
- Static wage differentials.

Wage Differentials Contd.

Dynamic Wage Differentials

Dynamic wage differentials occur due to the disequilibrium in commodity and factor market time to time. It depends on the demand for and supply of labour. The wage differential removes as the equilibrium is restored. The equilibrium is restored due to the forces of demand for and supply of labour. Therefore, wage differential is a temporary.

Static Wage Differentials

When wage differentials exist in state of equilibrium of industry, it is called static wage differentials. Such wage differentials cannot be removed by the competitive forces of the market. It arises due to the following reasons:

Wage Differentials Contd.

- Heterogeneity of labour, i.e. qualitative differences in labour

- Difference in the nature of occupations

- Differences in the prices of product which various kinds of labour produce

- Market imperfections

- Difference in risk of performing job

- Difference in cost of living

- Difference in cost of education and training

- Difference in hours of leisure.

Interest

- Generally, interest refers to the payment made by a borrower of the fund to the lender for the use of the fund in a specific period of time.

- In other words, interest is defined as the reward received by the capital for its contribution in the production of goods and services.

Types of Interest

1. Gross Interest
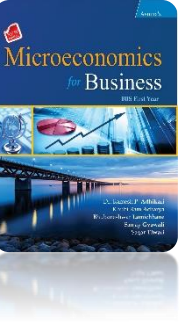
2. Net Interest

Types of Interest Contd...

Gross Interest

Gross interest is defined as the total amount paid by the borrower to a lender in return of the capital borrowed for a period of time. In other words, what we commonly talk about interest is the gross interest. Besides price for the use of capital, gross interest also includes reward for risk, reward for inconvenience, and reward for management of loan.

Gross Interest = Net interest + Reward for risk + Reward for inconvenience + Reward for management of loan

Net Interest

Net interest is defined as a part of gross interest or total interest which is exclusively paid for the use of the capital. It is also known as the pure interest. In order to calculate net or pure interest, the reward for risk, the reward for management of loan and the reward for inconveniences should be deducted from the gross interest.

Net Interest = Gross interest – Reward for risk – Reward for inconvenience – Reward for management of loan

Nominal and Real Interest Rate

- **Nominal interest rate** is defined as the interest rate before taking inflation into account. In other words, nominal interest rate is the percentage yield of a loan without considering the rate of inflation. Nominal rate of interest is also known as the money rate of interest.

- **Real interest rate** is defined as the interest rate that takes inflation rate into accountThe nominal rate of interest is influenced by the inflation rate but real rate of interest is not influenced by the rate of inflation. Thus, nominal rate of interest is the sum of real rate of interest and rate of inflation.

$$R' = R + i$$

where

R' = Nominal rate of interest

R = Real rate of interest

i = Rate of price inflation

Interest Rate Differentials

- Interest rate differential refers to the difference in interest rate between two similar interest bearing assets or securities. For example, if a bond yields 9 percent interest rate and next bond yields 6 percent interest rate, then 3 percent would be the interest rate differentials.

- It is mostly used in carry trade. Under carry trade, investors borrow at a low interest rate and invest it in an asset yielding a higher rate of return.

- Interest rate differentials can also be used to calculate the difference between the interest rate and a bank's posted interest rate on the prepayment date for mortgages.
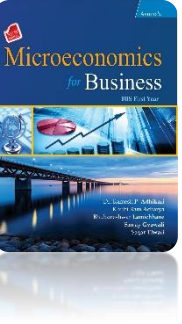
Theories of Interest
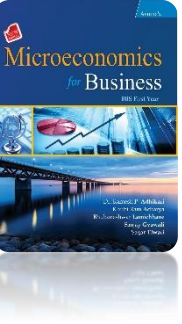
There are various theories of interest. Here, we study following two theories of interest:

1. Loanable Fund Theory of Interest

2. Liquidity Preference Theory of Interest

Loanable Funds Theory of Interest (Neo-Classical Theory of Interest)

- The loanable funds theory of interest was propounded by the economists like **Kunt Wicksell, Gunar Myrdal, Bertin Ohlin, Dennis Robertson,** etc.

- According to this theory, rate of interest is determined from the demand for and supply of loanable funds.

- The demand for loanable funds is inversely related to the rate of interest and supply of loanable funds is positively related to the rate of interest.

- This theory is based on assumptions like existence of full employment of resources in the long-run, perfect competition, flexible rate of interest, no change in level of income, etc.

Loanable Funds Theory of Interest (Neo-Classical Theory of Interest) Contd.
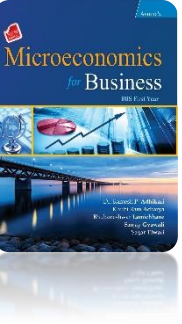
Demand for Loanable Funds (D_L)

1. Investment demand (I)

2. Consumption demand (C)

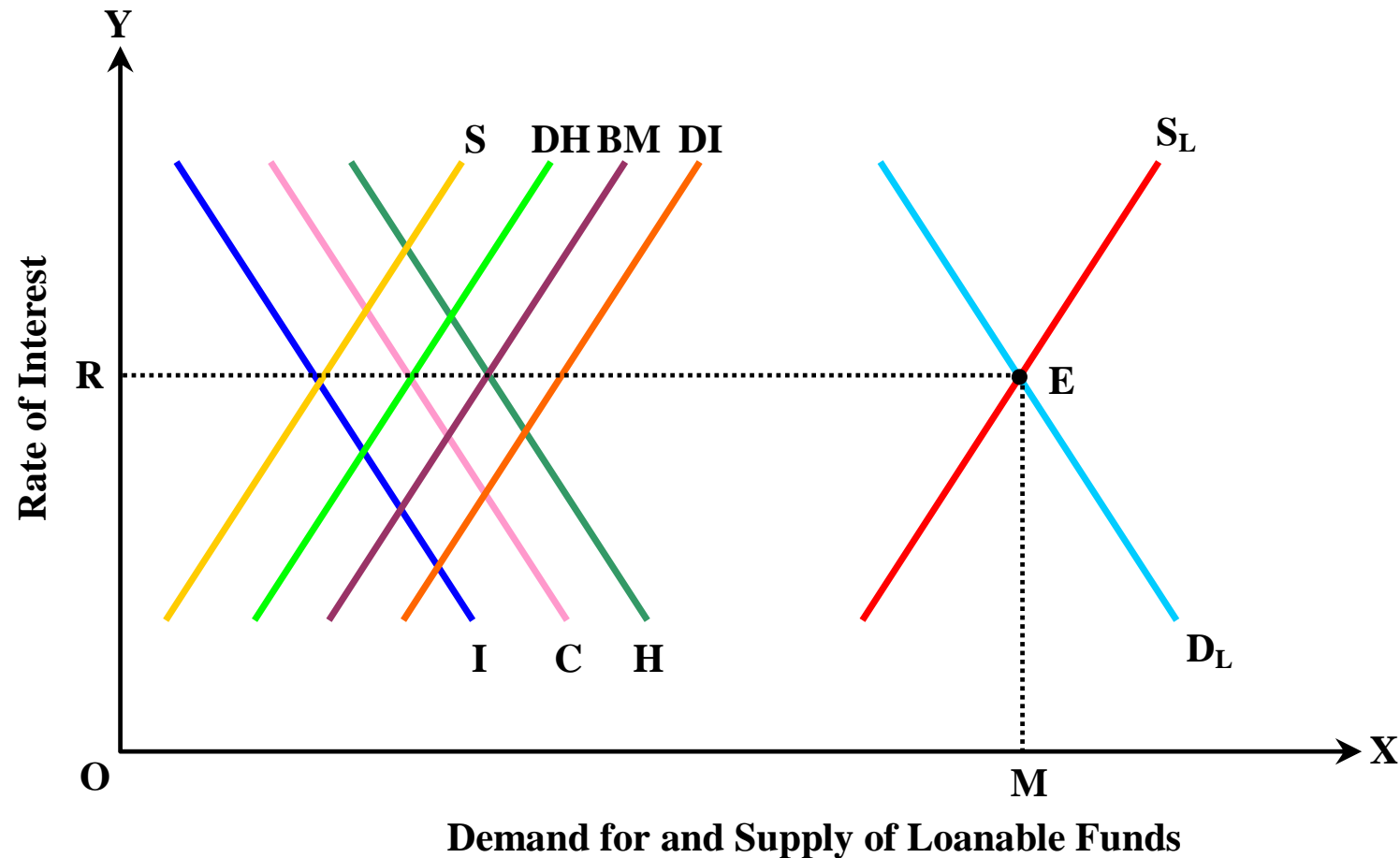3. Demand for hoarding (H)

   $D_L = I + C + H$

Supply of Lonable Funds (S_L)

1. Saving (S)

2. Dishoarding (DH)

3. Bank money (BM)

4. Disinvestment (DI)
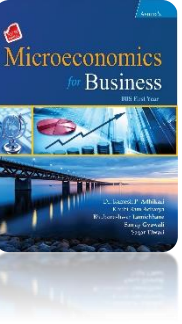
   $S_L = S + DH + BM + DI$

Determination of Rate of Interest

The equilibrium rate of interest is determined by the interaction of the forces of demand for and the supply of loanable funds.

Demand for and Supply of Loanable Funds

Loanable Funds Theory of Interest (Neo-Classical Theory of Interest) Contd.

Criticisms

1.   Unrealistic assumptions

2.   Unrealistic integration of monetary and real factors

3.   Indeterminate theory

4.   Not a practicable theory

5.   Wrong concept of hoarding

Liquidity Preference Theory of Interest (Keynesian Theory of Interest)

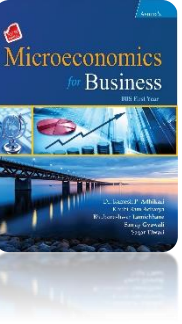- The liquidity preference theory of interest was propounded by the famous British economist **J.M. Keynes** in his book 'General Theory of Employment Interest and Money' published in 1936. Therefore, this theory is also known as the Keynesian theory of interest. Keynes criticised the classical and neo-classical theories of interests and developed his own theory of interest.

- According to him, people desire to hold the assets in the form of cash because they can buy any thing they need or desire with the cash money. This cash money is the liquidity and desire of people to hold cash money is the liquidity preference.
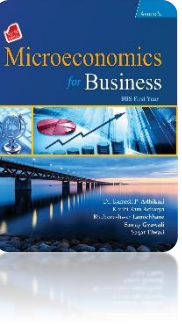
Liquidity Preference Theory of Interest (Keynesian Theory of Interest) Contd.

1. Demand for Money

i. **Transaction motive (L_t):** Transaction motive is the demand for money or desire to hold cash by individuals or business firms to fulfil daily needs.

ii. **Precautionary motive (L_P):** Precautionary motive for holding money refers to the desire of people to hold cash balances for unforeseen contingencies.

$$L_T = f(Y)$$

$$L_P = f(Y)$$

$$L_1 = L_T + L_P = f(Y)$$

iii. **Speculative motive:** Speculative motive is the desire of people or business firms to keep cash or liquid money with them to take advantage of future change in rate of interest and bond prices.

Liquidity Preference Theory of Interest (Keynesian Theory of Interest) Contd.

Total Demand for Money (L)

The total demand for money is the sum of active cash balances (sum of transaction and precautionary motive) and speculative motive of demand for money.

$$L = L_1 + L_2 = L_T + L_P + L_2$$

2. Supply of Money (M_S)

- Supply of money is defined as the total quantity of money in an economy which consists of coins, notes and bank deposits.

- It is exogenously determined by the central bank and assumed to be constant in the short-run. It is not influenced by the rate of interest.

- Therefore, supply curve of money is vertical straight line parallel to Y-axis, i.e. perfectly inelastic.

Liquidity Preference Theory of Interest (Keynesian Theory of Interest) Contd.

3. Determination of Interest Rate

- According to Keynes, the equilibrium rate of interest is determined at the point where demand for money curve, i.e. liquidity preference curve and money supply curve intersect each other.

- It means that the forces of demand for and supply of money determine the rate of interest.

Demand for and Supply of Money
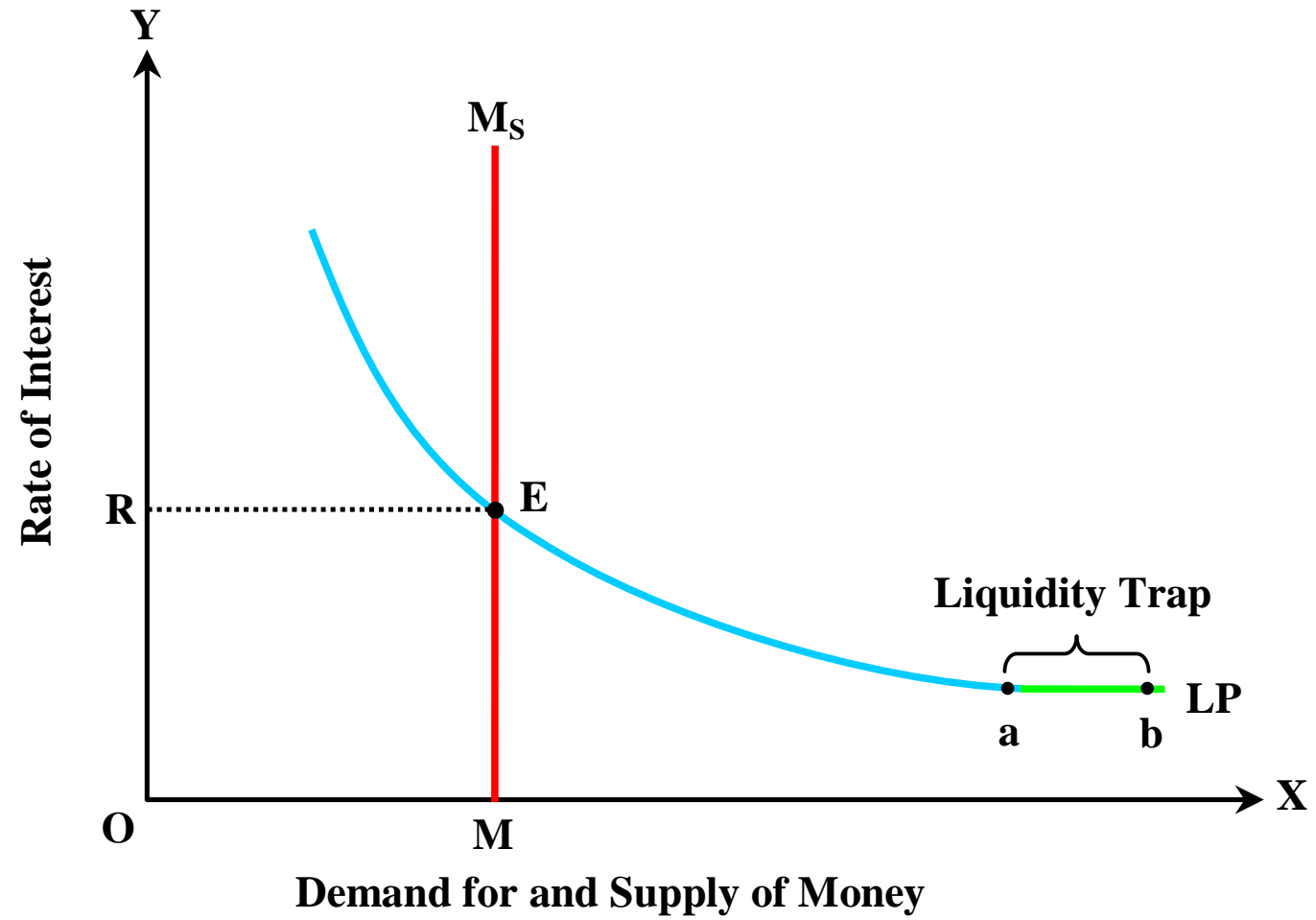
Liquidity Preference Theory of Interest (Keynesian Theory of Interest) Contd.

4. Liquidity Trap

- Liquidity trap is defined as the situation in which rate of interest falls to such a low level that it becomes unattractive to lend money and people will keep whole money with them.

- It further implies that rate of interest can not be lower any more.

- In this situation, demand for money curve become perfectly elastic, i.e. horizontal straight line parallel to X-axis.

- In **Figure**, 'ab' part of the LP curve is horizontal, which represents liquidity trap.
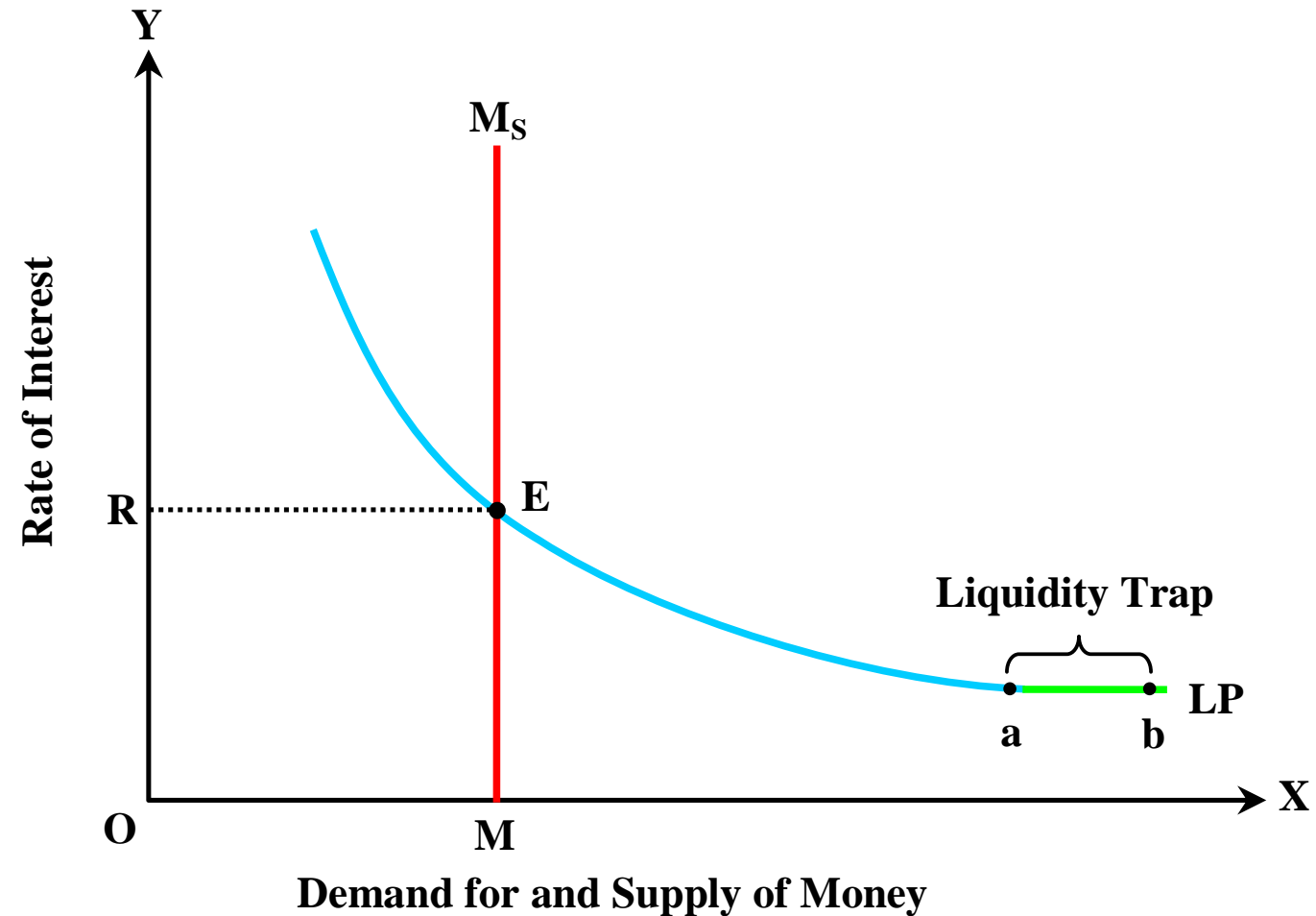
Demand for and Supply of Money

Liquidity Preference Theory of Interest (Keynesian Theory of Interest) Contd.

Criticisms

1. Real factors ignored

2. No liquidity without saving

3. Long period ignored

4. Liquidity preference arises not for three motives only

5. Indeterminate

Profit
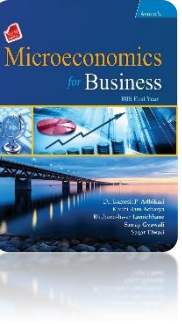
- Profit is defined as the excess of total revenue over the cost of production.

- In other words, profit is the reward for the entrepreneur for his or her efforts, skill, risks and innovations.

- Profit is the residual income of an entrepreneur left after payments to the other inputs, i.e. rent to the land, wages to labour and interest to the capital.

- The definition of profit is quite different for the economists than for accountants.

- Accountants are concerned with business profit whereas economists are concerned with economic profit.
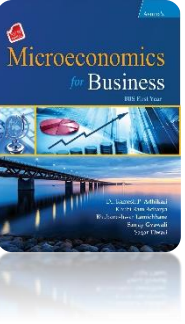
Business Profit and Economic Profit

Business Profit

Business profit is defined as the excess of total revenue over the explicit cost or accounting cost. It is also known as the accounting profit or gross profit. In the business sense, business profit is the excess of total revenue over the total cost of production.

Business Profit (Accounting Profit) = Total Revenue – Explicit Cost

= Total Revenue – Accounting Cost

Economic profit

Economic profit is defined as the excess of total revenue over the economic cost. Economic cost is the sum of implicit cost and explicit cost.

Economic Profit = Business Profit – Implicit Cost

Economic profit is also calculated deducting economic cost from total revenue. Thus,

Economic Profit = Total Revenue – Economic Cost

= Total Revenue – (Implicit Cost + Explicit Cost)

= Total Revenue – Implicit Cost – Explicit Cost

Theories of Profit

There are various theories of profit. Here, we study only following two theories:

1. Dynamic Theory of Profit

2. Innovation Theory of Profit

Dynamic Theory of Profit

The dynamic theory of profit was introduced by an American economist, **J.B. Clark** in 1891 AD. According to him, profit arises only in the dynamic economy. There is no profit in a static economy.

Types of Economies

1. Static Economy

2. Dynamic Economy

Dynamic Theory of Profit Contd.

1. **Static economy:** According to this theory, profit cannot emerge in the static economy. In the static economy, demand and supply remain same. The factors which determine demand and supply, such as technology of production, size of the population, human wants, supply of capital, forms of business organization, habit and nature of people, fashion, consumption pattern, etc. remain same.

2. **Dynamic economy:** According to dynamic theory of profit, profits arise only in the dynamic economy. The following five changes occur in the dynamics economy:

    *   Changes in size of population

    *   Changes in supply of capital

    *   Changes in production technique

    *   Changes in human wants

    *   Changes in the forms of business organization

Dynamic Theory of Profit Contd.

Criticisms

1. Origin of profit

2. Incomplete explanation

3. No difference between profit and wages

4. Failed to determined the size of profits

5. Profit not only due to changes occurring in the society

6. Important determinants of profit ignored

Innovation Theory of Profit

- The innovation theory of profit was introduced by an eminent American economists **Joseph A. Schumpeter.**

- According to him, the principle function of an entrepreneur is to make innovation and profits are the reward for performing this important function.

- In the words of Schumpeter, *"Profit is the reward for innovation."*

- Thus, the main sources of profit are innovations.

- Here, the word innovation means all changes that occur in the production process.

- The objective of innovation is to reduce cost of production and increase demand for goods and services.

- This theory assumes existence of perfect competition, free market and closed economy.

Innovation Theory of Profit Contd.

Types of Innovations

1. **Cost reducing innovation:**

   - Introduction of new production technique

   - Introduction of new machine

   - Exploration of new raw materials

   - Change in organization of production

   - Introduction of new production process

2. **Demand expanding innovations:**

   - Introduction of new product

   - Improvement in quality of product

   - Introduction of superior methods of advertisement

   - Discovery of new markets

Innovation Theory of Profit Contd.

Criticisms

1. Narrowly defined activities of an entrepreneur

2. Windfall or monopoly profits ignored

3. Other determinants of profit ignored

4. Unsatisfactory and incomplete theory

5. Unable to determine the size of profit
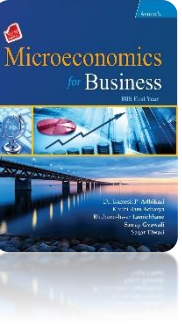
Numerical Examples 1

Consider the following schedule

No. of Labour (L)	Total Productivity of Labour (TP/ Q)	Marginal Productivity of Labour (MP$_L$)	Value of Marginal Productivity of Labour (VMP$_L$)
1	20	......	......
2	36	......	......
3	48	......	......
4	56	......	......
5	60	......	......

a. Complete the above schedule assuming price of product $5.

b. Compute profit maximizing number of labour at wage rate $60.

SOLUTION

a. Given

$P_X = \$5$

We know that

$VMP_L = P_X \cdot MP_L$

$MP_L = \dfrac{\Delta TP}{\Delta L}$

L	TP$_L$	MP$_L$	P$_X$	VMP$_L$ = P$_X$ · MP$_L$
1	20	20	5	100
2	36	16	5	80
3	48	12	5	60
4	56	8	5	40
5	60	4	5	20

SOLUTION

b. We know that a firm maximizes profit when value of marginal product of labour is equal wage rate, i.e.

$$VMP_L = w$$

In the above table, value of marginal product of labour (VMP_L) is equal to wage rate (w) at 3rd unit of labour, i.e. both are $60 at 3rd unit of labour. Therefore, profit maximizing unit of the labour is 3 units or L = 3 units.

Numerical Examples 2

Tejaswini, a fashion designer, working as a manager of a Boutique for Rs. 120,000 per year wants to start her own business by investing her own money of Rs. 400,000 on which she could earn 10 percent interest if deposited in a bank. Her estimated revenue during the first year of operation is Rs. 300,000 and costs are - salaries to employee Rs. 90,000; supplies Rs. 30,000; rent Rs. 20,000 and utilities Rs. 2,000.

a.   Calculate is the business profit.

b.   Calculate is the economic profit.

c.   If she seeks your advice on whether to stay in the business or not what will be your advice and why?

SOLUTION

a.   Business profit (Accounting profit) = TR – Total explicit costs

= TR – (Salaries to employee + Supplies + Rent + Utilities)

= 300,000 – (90,000 + 30,000 + 20,000 + 2,000)

= 300,000 – 142,000

= Rs. 158,000

Alternatively,

Particulars	Amount (Rs.)	Amount (Rs.)
Revenue		300,000
Less: Explicit costs Salaries to employees Supplies Rent Utilities	90,000 30,000 20,000 2,000	142,000
Business Profit/ Accounting Profit		158,000
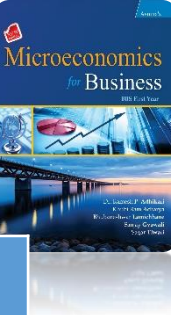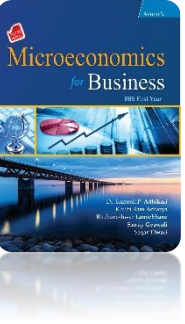
b. Economic profit = Business profit − Implicit costs

= Business profit − (Salary of previous job + Interest of her own money invested)

= 158,000 − (120,000 + 10% of 400,000)

= 158,000 − (120,000 + 40,000)

= − Rs. 2,000 (Loss)

Alternatively,

Particulars	Amount (Rs.)	Amount (Rs.)
Business profit/ Accounting profit		158,000

Less: Implicit costs
           Salary of previous job
           Interest on Rs. 400,000 @ 10%
	120,000
	
	40,000
		160,000

Economic profit		(2,000) or −2,000
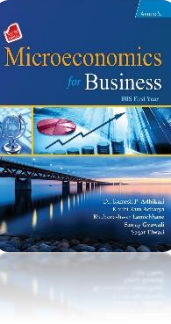
c. Here, she has loss of Rs. 2,000 because economic profit is negative economic profit is lower than total revenue. Therefore, I advice her not to start new business. If economic profit was positive, I would suggest to start new business.

Thank You
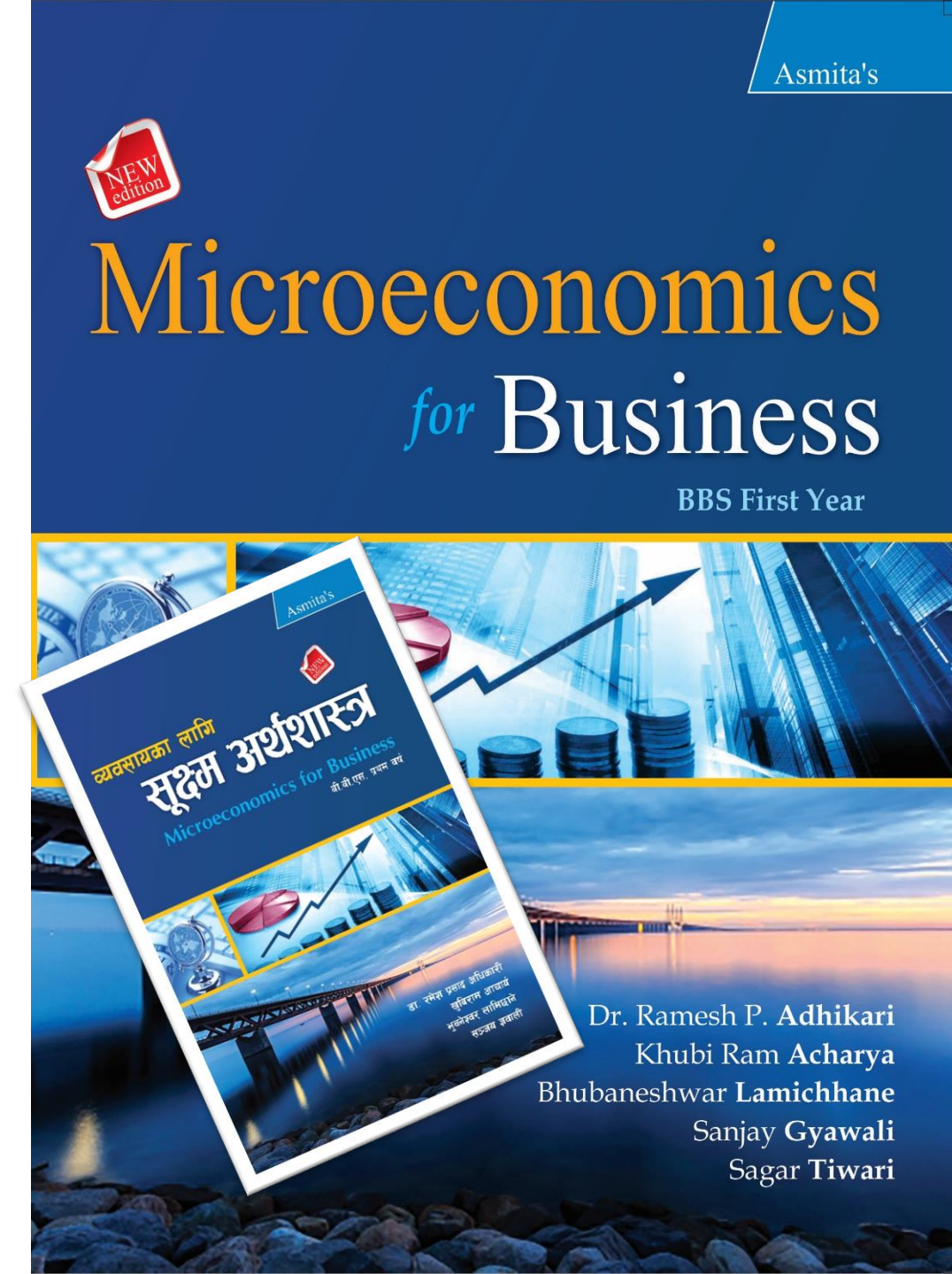
Elasticity of Demand and Supply

Unit 3

Asmita's

NEW edition

Microeconomics
for Business
BBS First Year

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सूक्ष्म अर्थशास्त्र
Microeconomics for Business

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Khubi Ram **Acharya**
Bhubaneshwar **Lamichhane**
Sanjay **Gyawali**
Sagar **Tiwari**

Learning Objectives

On completion of this unit, students will be able to:

- explain the concept and degrees of price elasticity of demand
- calculate price elasticity of demand by percentage and average method
- explain the point elasticity of demand
- describe price elasticity of demand and total expenditure
- explain the concept and degrees of income elasticity of demand
- calculate income elasticity of demand by using percentage and average method
- explain the concept of advertisement elasticity of demand
- describe the uses of price, income, cross and advertisement elasticity of demand
- describe the concept and degrees of price elasticity of supply
- calculate price elasticity of supply using percentage and average method.

Introduction

- The law of demand states that there is inverse relationship between price of a commodity and its quantity demanded, all other factors remaining the same.

- This law does not explain the degree of relationship between the change in price of the commodity and its quantity demanded. It is silent on the amount of change in demand at the given change in price.

- The explanation on how much or to what extent quantity demanded for a commodity changes as a result of change in price, we study in the elasticity of demand.

- Similarly, the explanation on how much or to what extent quantity supplied for a commodity changes as a result of change in price, we study in the elasticity of supply.

Elasticity of Demand and Its Types

- The concept of elasticity of demand was first introduced by the classical economists **A.A. Cournot and J. S. Mill.** Latter on neo-classical economist **Alfred Marshall** developed it in the scientific way in his book **Principles of Economics**.

- The elasticity of demand is the measure of responsiveness of demand for a commodity to the change in any of its determinants.

Types of Elasticity of Demand

1. Price elasticity of demand

2. Income elasticity of demand

3. Cross elasticity of demand

4. Advertisement elasticity of demand

Price Elasticity of Demand (E_P)

Price elasticity of demand is defined as the responsiveness of change in quantity demanded of a commodity to the change in its price. In other words, the price elasticity of demand is defined as the ratio of percentage change in quantity demanded to the percentage change in price.

$$E_P = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

$$= \frac{\dfrac{\text{Change in quantity demanded}}{\text{Initial Quantity demanded}} \times 100}{\dfrac{\text{Change in price}}{\text{Initial Price}} \times 100} = \frac{\dfrac{DQ}{Q} \times 100}{\dfrac{DP}{P} \times 100} = \frac{DQ}{DP} \cdot \frac{P}{Q}$$

$$\backslash \quad E_P = \frac{DQ}{DP} \cdot \frac{P}{Q}$$

where

E_P = Coefficient of price elasticity of demand

Q = Initial quantity demanded   P = Initial price

DQ = Change in quantity demanded   **D**P = Change in price
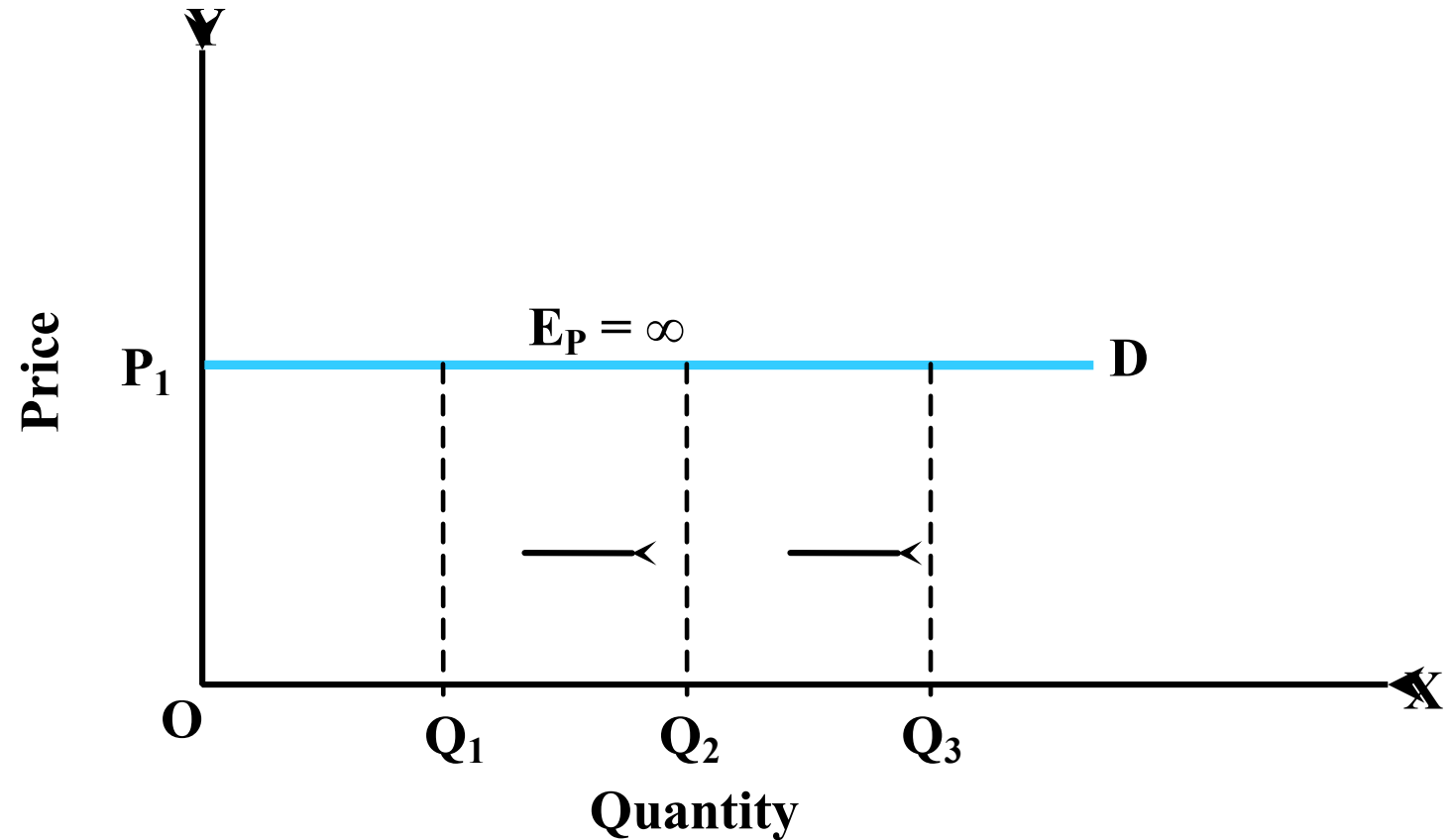
Types (Degrees) of Price Elasticity of Demand

1. **Perfectly Elastic Demand ($E_P = \infty$)**

Demand is said to be perfectly elastic if negligible change in price leads to infinite change in the quantity demanded. Perfectly elastic demand is theoretical concept. It is hardly found in practice or real life.

Types (Degrees) of Price Elasticity of Demand Contd.

2. Perfectly Inelastic Demand ($E_P = 0$)

When the demand for a commodity does not change with the change in its price, the demand is said to be perfectly inelastic demand. For example, medicine and salt have perfectly inelastic demand.
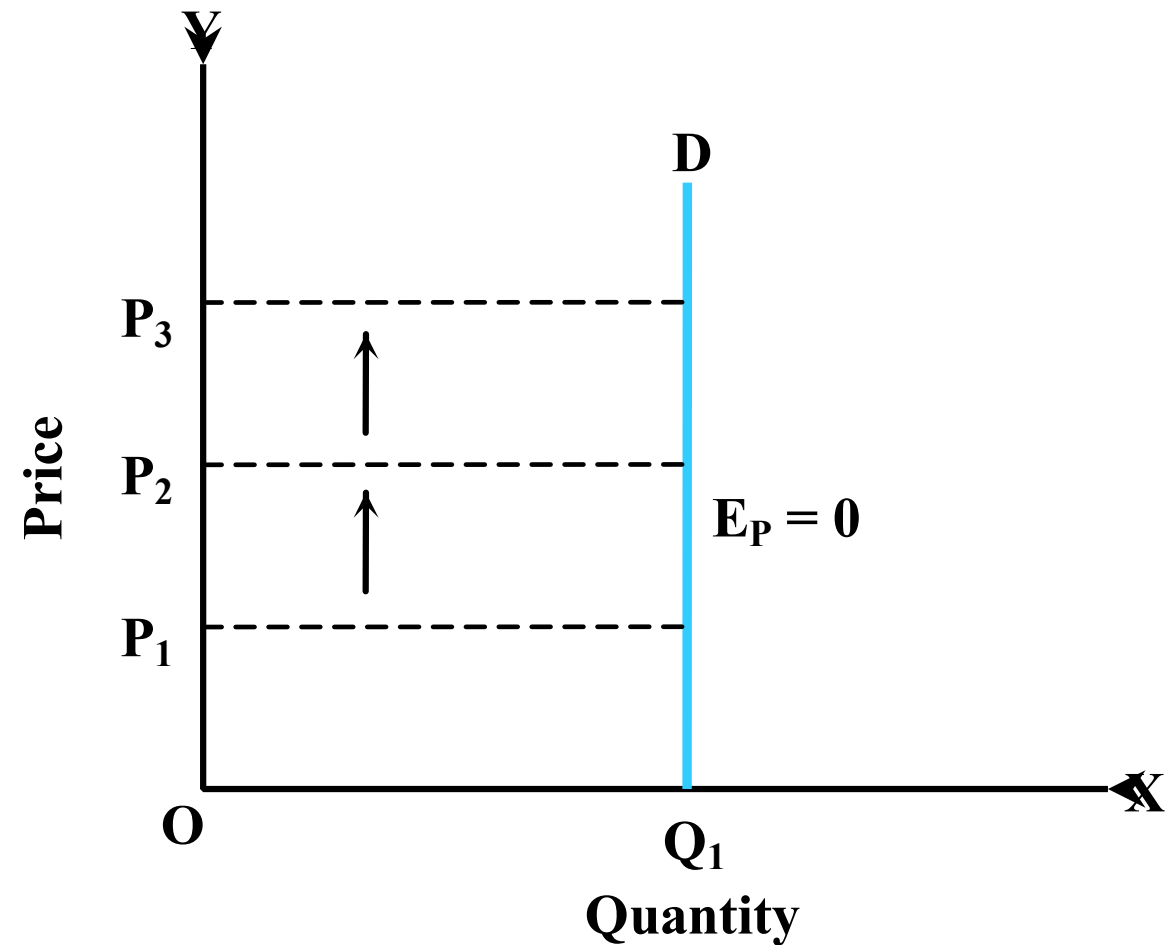
Types (Degrees) of Price Elasticity of Demand Contd.

3. Unitary Elastic Demand ($E_P = 1$)

When the percentage change in the quantity demanded is equal to the percentage change in price, the demand for a commodity is said to be unitary elastic demand.
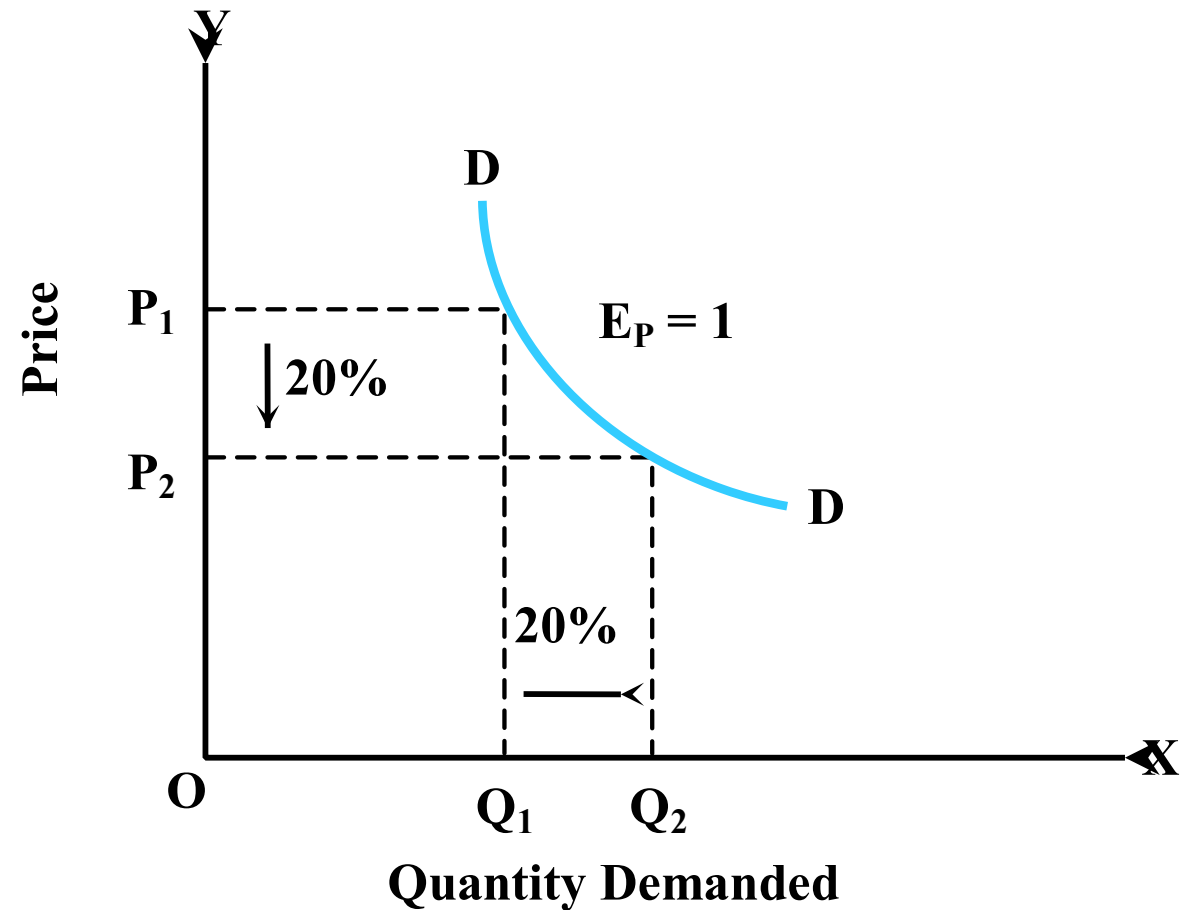
Types (Degrees) of Price Elasticity of Demand Contd.

4. Relatively Elastic Demand ($E_P > 1$)

When the percentage change in the quantity demanded for a commodity is more than percentage change in its price, it is called relatively elastic demand. Such kind of elasticity of demand is found in case of luxury goods like LED television, refrigerator, car, etc.
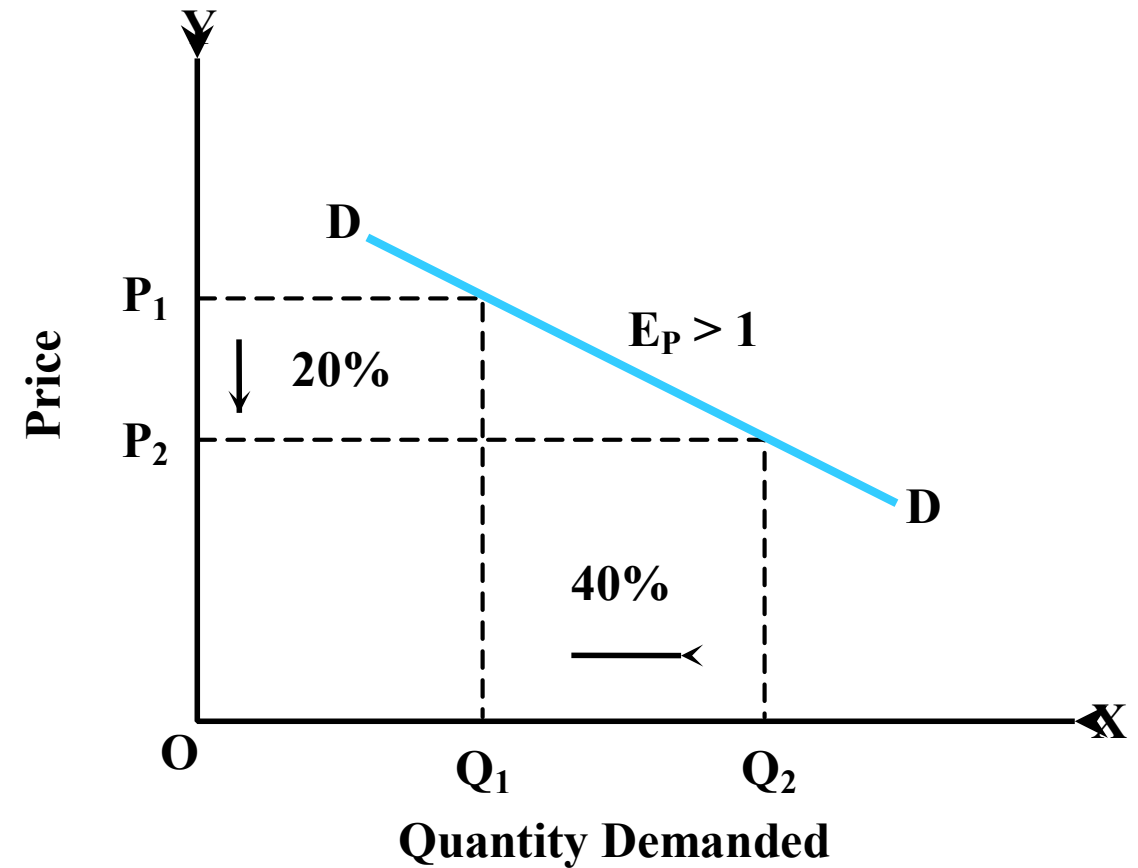
Types (Degrees) of Price Elasticity of Demand Contd.

5. Relatively Inelastic Demand ($E_P < 1$)

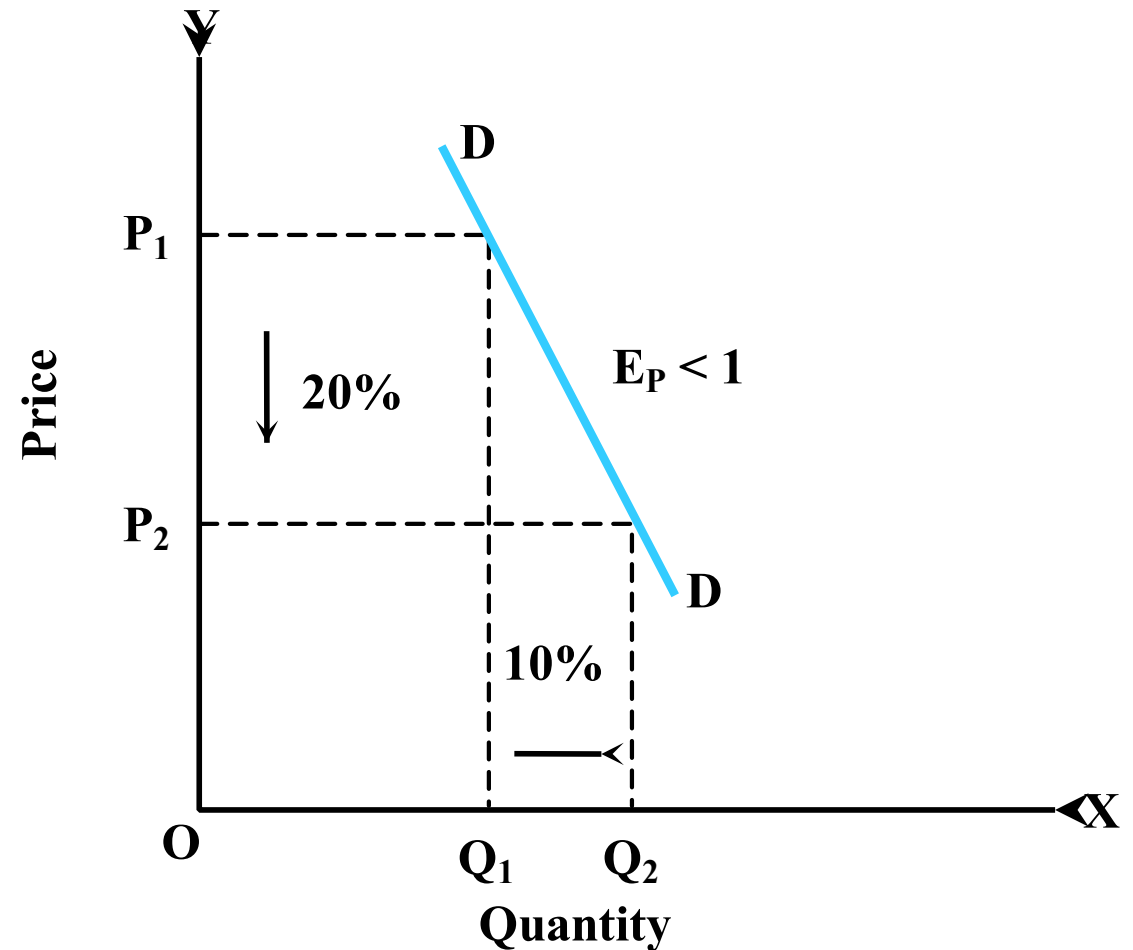If the percentage change in the quantity demanded of a commodity is less than the percentage change in its price, it is called relatively inelastic demand. It is found in case of necessity or basic good like rice, vegetable, clothes, etc.

Calculation of Price Elasticity of Demand

1. Percentage/ Proportionate Method

Percentage method was developed by **Prof. Flux** as an improvement over the outlay method. The price elasticity of demand is measured by its coefficient. The coefficient (E_P) measures the percentage change in the quantity demanded of a commodity resulting from a given percentage change in its price.

$$E_P = \frac{\text{Percentage change in quantity demanded}}{\text{Percentage change in price}}$$

$$= \frac{\frac{\Delta Q}{Q} \times 100}{\frac{\Delta P}{P} \times 100} = \frac{\left(\frac{\Delta Q}{Q}\right)}{\left(\frac{\Delta P}{P}\right)} = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

where

Q = Initial quantity demanded   P = Initial price

ΔQ = Change in quantity demanded ΔP = Change in price

Calculation of Price Elasticity of Demand Contd.

2. Average Method (Arc Method)

The coefficient of price elasticity of demand between two points on a demand curve is called average or arc elasticity of demand. This method is used when there is large change in price and quantity demanded. Any two points on a demand curve make an arc as in figure.
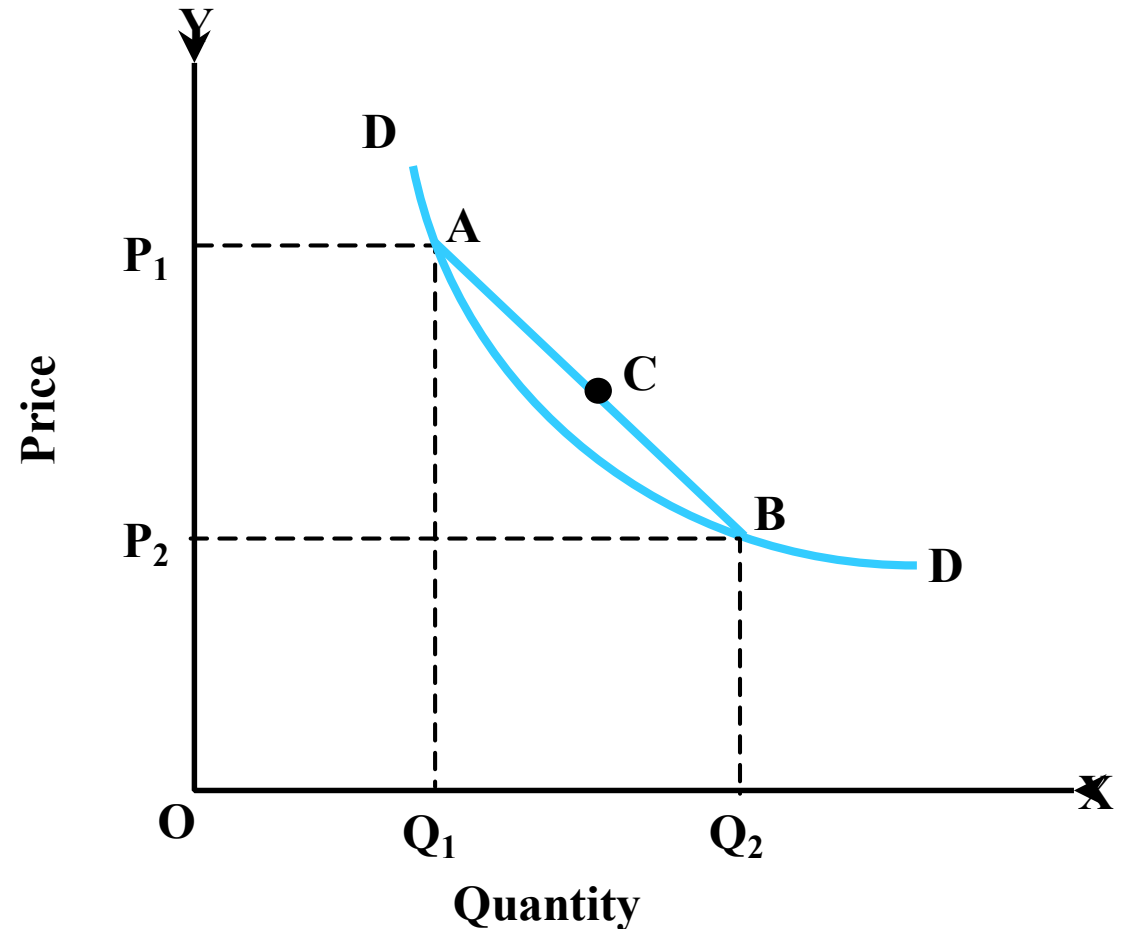
Calculation of Price Elasticity of Demand Contd.

$$E_P \quad = \quad \dfrac{\left(\dfrac{\textbf{Change in quantity demanded}}{\textbf{Average quantity demanded}}\right)}{\left(\dfrac{\textbf{Change in Price}}{\textbf{Average Price}}\right)}$$

$$= \quad \dfrac{\dfrac{DQ}{\dfrac{Q_1 + Q_2}{2}}}{\dfrac{DP}{\dfrac{P_1 + P_2}{2}}} \quad = \quad \dfrac{DQ}{DP} \times \dfrac{P_1 + P_2}{Q_1 + Q_2} \quad = \quad \left(\dfrac{Q_2 - Q_1}{P_2 - P_1}\right) \times \dfrac{P_1 + P_2}{Q_1 + Q_2}$$

where

Q_1 = Initial quantity demanded P_1 = Initial Price

Q_2 = New quantity demanded P_2 = New Price

D Q =   Change in quantity demanded   **D** P   = Change in Price

Point Elasticity of Demand

Prof. Marshall developed point method for measuring price elasticity of demand at a point on a demand curve. Point elasticity is the measure of price elasticity at a particular point on a demand curve. In other words, point elasticity is the measure of the percentage change in quantity demanded in response to a very small percentage change in price. It may be symbolically expressed as

$$E_P = \frac{\triangle Q}{\triangle P} \times \frac{P}{Q}$$

where

Q = Initial quantity   P = Initial price

ΔQ = Change in quantity demanded   ΔP = Change in price

The method of measuring price elasticity on linear and non-linear demand curve is explained below:
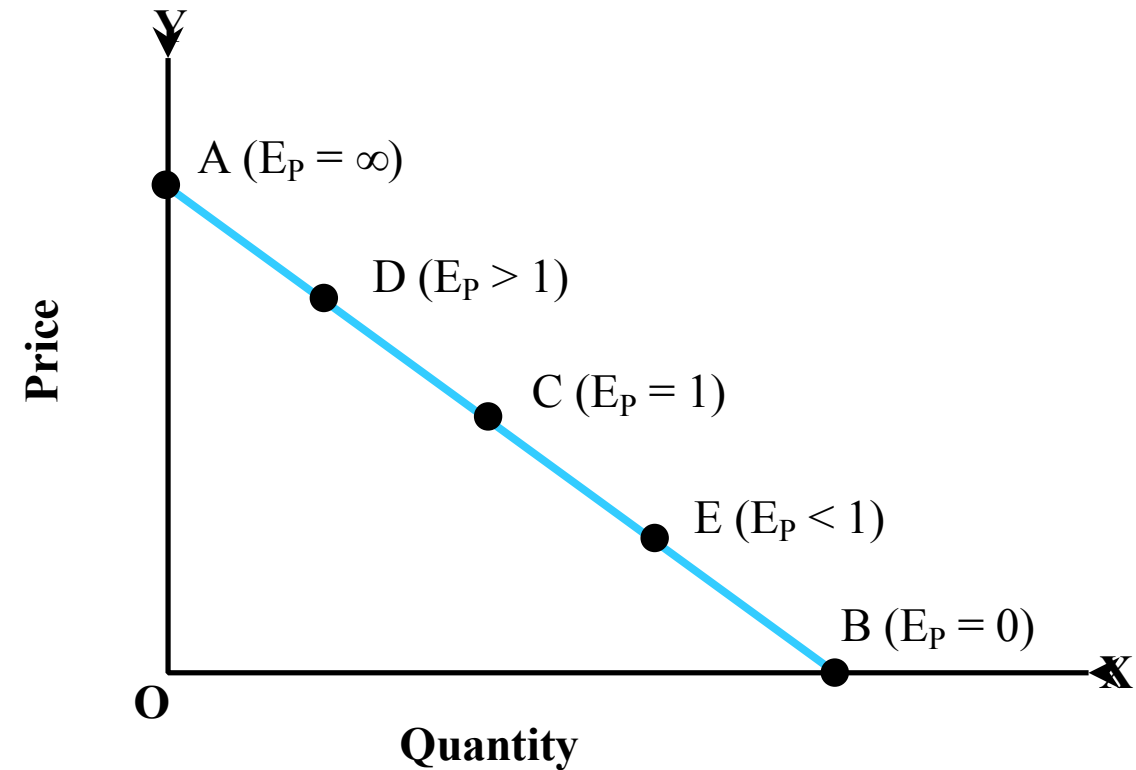
Point Elasticity of Demand Contd.

i. Point Elasticity on a Linear Demand Curve

In Figure, AB represents a linear demand curve. Let us suppose, C is the middle point of the demand curve. Using the formula of point elasticity of demand, we can find out coefficient of price elasticity as follows:

$$E_P = \frac{RB}{RA} = \frac{\text{Lower segment}}{\text{Upper segment}}$$

Point Elasticity of Demand Contd.

E_P at point C $= \dfrac{\text{Lower segment}}{\text{Upper segment}} = \dfrac{CB}{AC} = 1 \ (\because AC = CB)$

It is the case of unity elastic demand.

E_P at point A $= \dfrac{\text{Lower segment}}{\text{Upper segment}} = \dfrac{AB}{0} = \infty$

It is the case of perfectly elastic demand.

E_P at point D $= \dfrac{\text{Lower segment}}{\text{Upper segment}} = \dfrac{DB}{AD} > 1 \quad (\because DB > AD)$

It is the case of relatively elastic demand.

E_P at point E $= \dfrac{\text{Lower segment}}{\text{Upper segment}} = \dfrac{EB}{AE} < 1 \quad (\because EB > AE)$

It is the case of relatively inelastic demand.

E_P at point B $= \dfrac{\text{Lower segment}}{\text{Upper segment}} = \dfrac{0}{AB} = 0$

It is the case of perfectly inelastic demand.

Point Elasticity of Demand Contd.

ii. Point Elasticity on a Non-linear Demand Curve

Point elasticity on a non-liner demand cure is measured by drawing a tangent to the demand curve at the chosen point and measuring the elasticity of the tangent at this point. This gives the elasticity of the demand curve at the chosen point.

$$E_P = \frac{\text{Lower segment of the tangent line}}{\text{Upper segment of the tangent line}} = \frac{RB}{AR}$$

Price Elasticity of Demand and Total Expenditure

Total outlay method is also known as the total expenditure method of measuring price elasticity of demand. Marshall developed this method to measure price elasticity of demand. According to this method, we compare total outlay of a consumer before and after the variations in price. Total outlay is the price multiplied by the quantity of a good purchased.

Total outlay (Total Expenditure) = Price × Quantity Purchased

i.   **Elasticity greater than unity ($E_P > 1$):** When total expenditure increases with the fall in price and decreases with the rise in price, the demand is said to be elastic demand.

ii. **Elasticity less than unity ($E_P < 1$):** If with the fall in price, the total expenditure decreases and with the rise in price, the total expenditure increases, demand is said to be less than unity.

iii. **Elasticity equal to unity ($E_P = 1$):** When the total expenditure remains unchanged with a fall or rise in price, the price elasticity of demand is said to be equal to unity.

Price Elasticity of Demand and Total Expenditure Contd.

Situation	Price (P) (in Rs.)	Quantity (Q) (in unit)	Total Expenditure TE = P · Q	EP
I	6	1	6	EP > 1
	5	2	10	
II	4	3	12	EP = 1
	3	4	12	
III	2	5	10	EP < 1

Price Elasticity of Demand and Total Expenditure Contd.
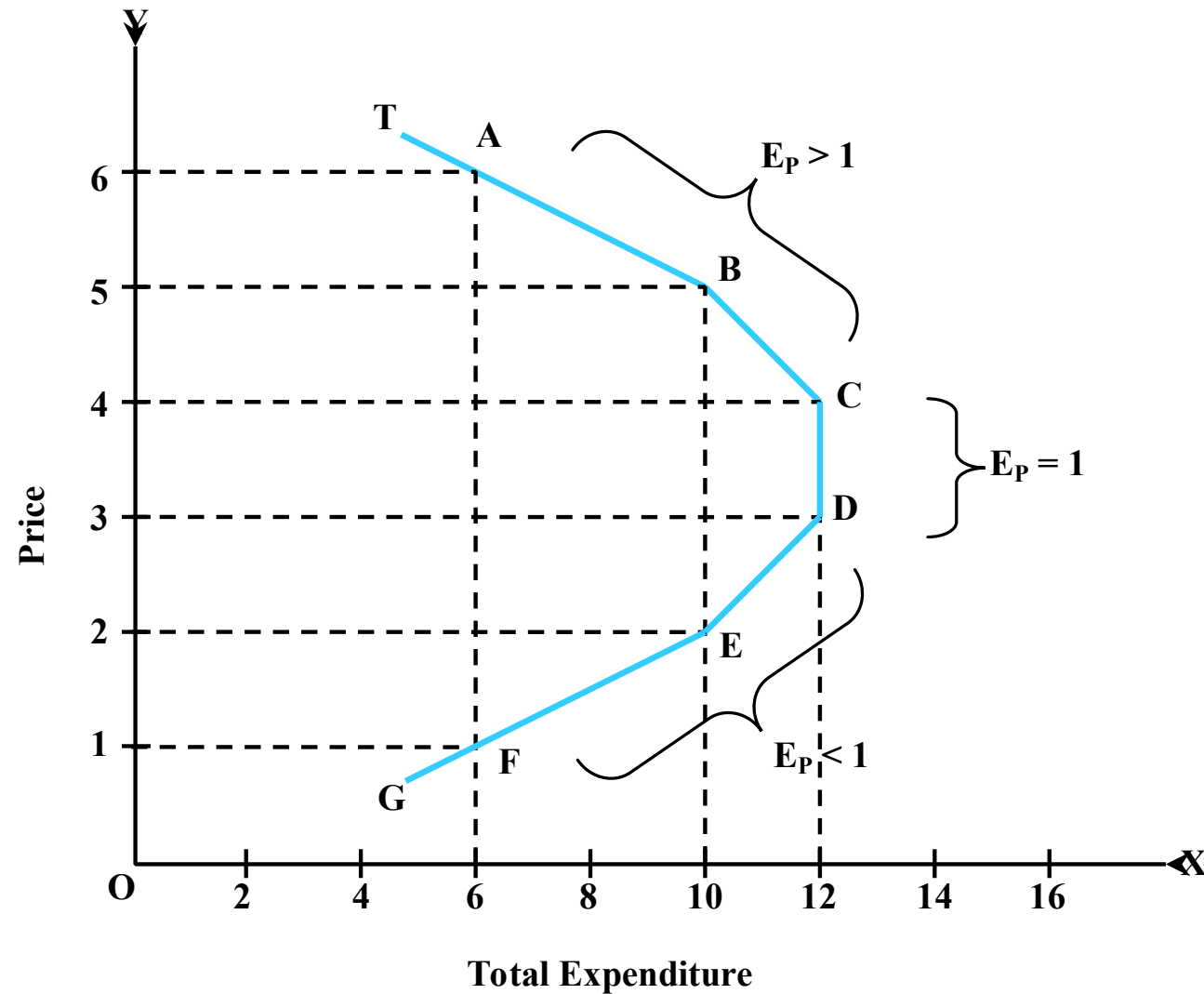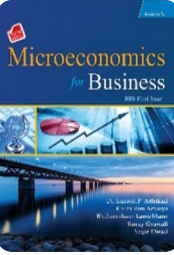
Uses or Importance of Price Elasticity of Demand

1. Monopoly price determination
2. Price determination under discriminating monopoly
3. Price determination of public utilities
4. Price determination of joint products
5. Wage determination
6. International trade
7. Importance to finance minister
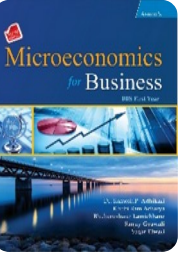
Income Elasticity of Demand (E$_Y$)

Income elasticity of demand is defined as the degree of responsiveness of demand for a commodity to the change in the income of the consumer. In other words, income elasticity of demand is the ratio of the percentage change in demand for a commodity to the percentage change in income.

$$E_Y = \frac{\textbf{Percentage change in quantity demanded}}{\textbf{Percentage change in income}}$$

$$= \frac{\dfrac{\textbf{Change in quantity demanded}}{\textbf{Initial quantity demanded}} \times \textbf{100}}{\dfrac{\textbf{Change in income}}{\textbf{Initial income}} \times \textbf{100}} = \frac{\dfrac{\Delta Q}{Q} \times \textbf{100}}{\dfrac{\Delta Y}{Y} \times \textbf{100}} = \frac{\Delta Q}{\Delta Y} \times \frac{Y}{Q}$$

where

E$_Y$ = Coefficient of income elasticity of demand

Q   = Initial quantity demanded   Y   = Initial income

ΔQ   = Change in quantity demanded   ΔY   = Change in income

Types (Degrees) of Income Elasticity of Demand

1. Positive Income Elasticity of Demand ($E_Y > 0$)

If increase in income leads to increase in demand for a commodity and decrease in income leads to decrease in demand for a commodity, it is called positive income elasticity of demand. The commodity, which has positive income elasticity is called normal good. Positive income elasticity can be divided into three types:

a. Income elasticity greater than unity ($E_Y > 1$)

b. Income elasticity less than unity ($E_Y < 1$)
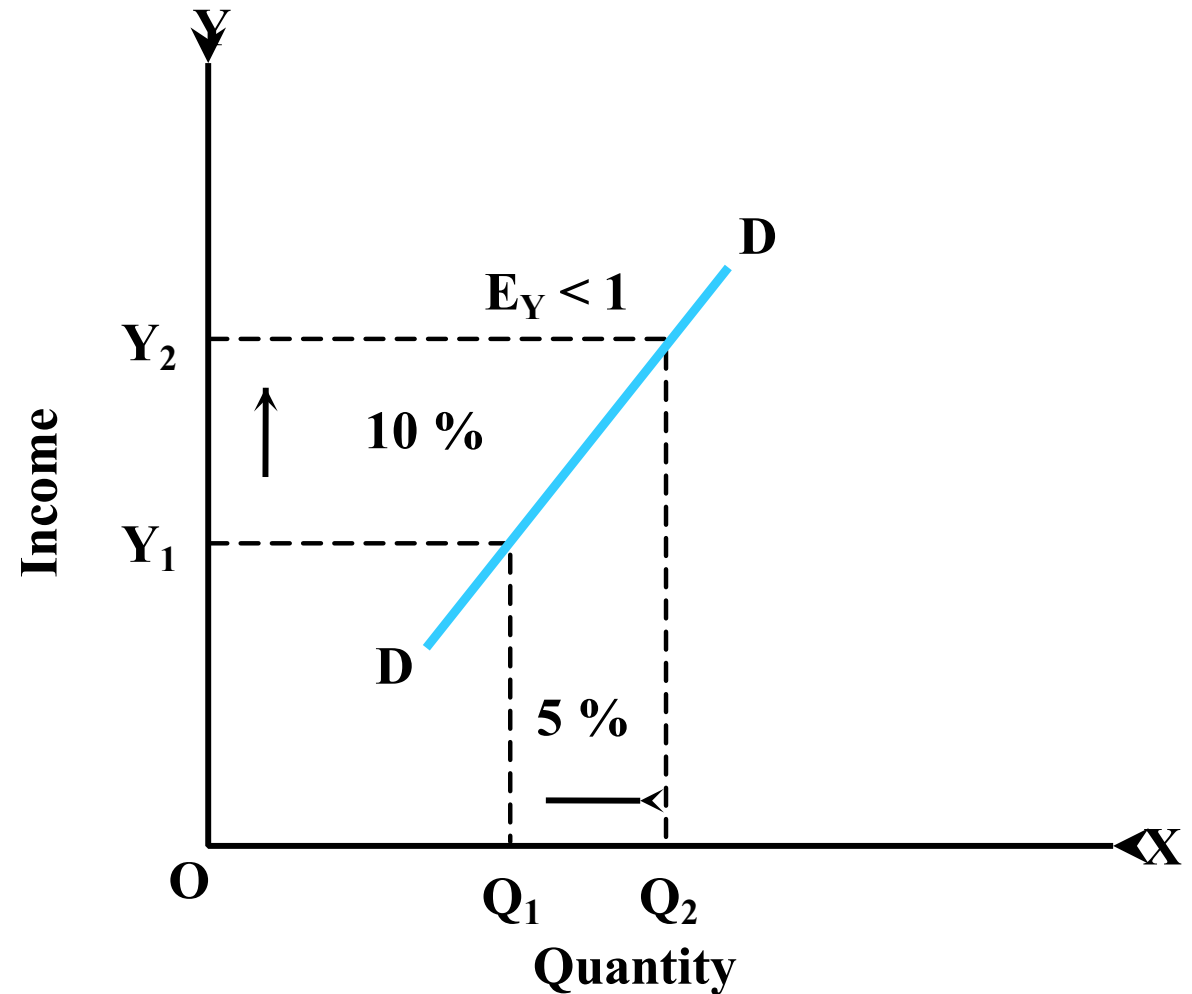
c. Income elasticity equal to unity ($E_Y = 1$)

Types (Degrees) of Income Elasticity of Demand Contd.

a. **Income elasticity greater than unity ($E_Y > 1$):** The income elasticity of demand is greater than unity when the demand for a commodity increases more than percentage to rise in income. In case of luxury goods, income elasticity of demand is more than unity.
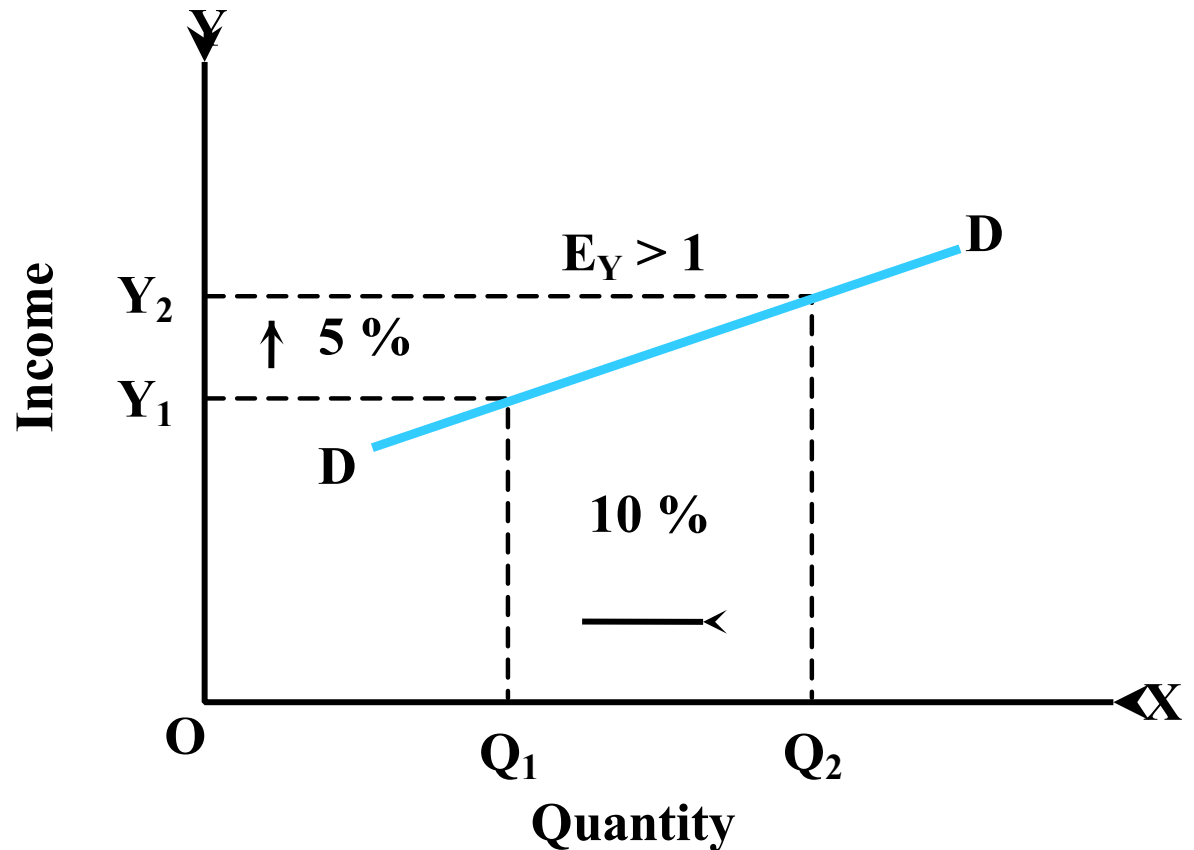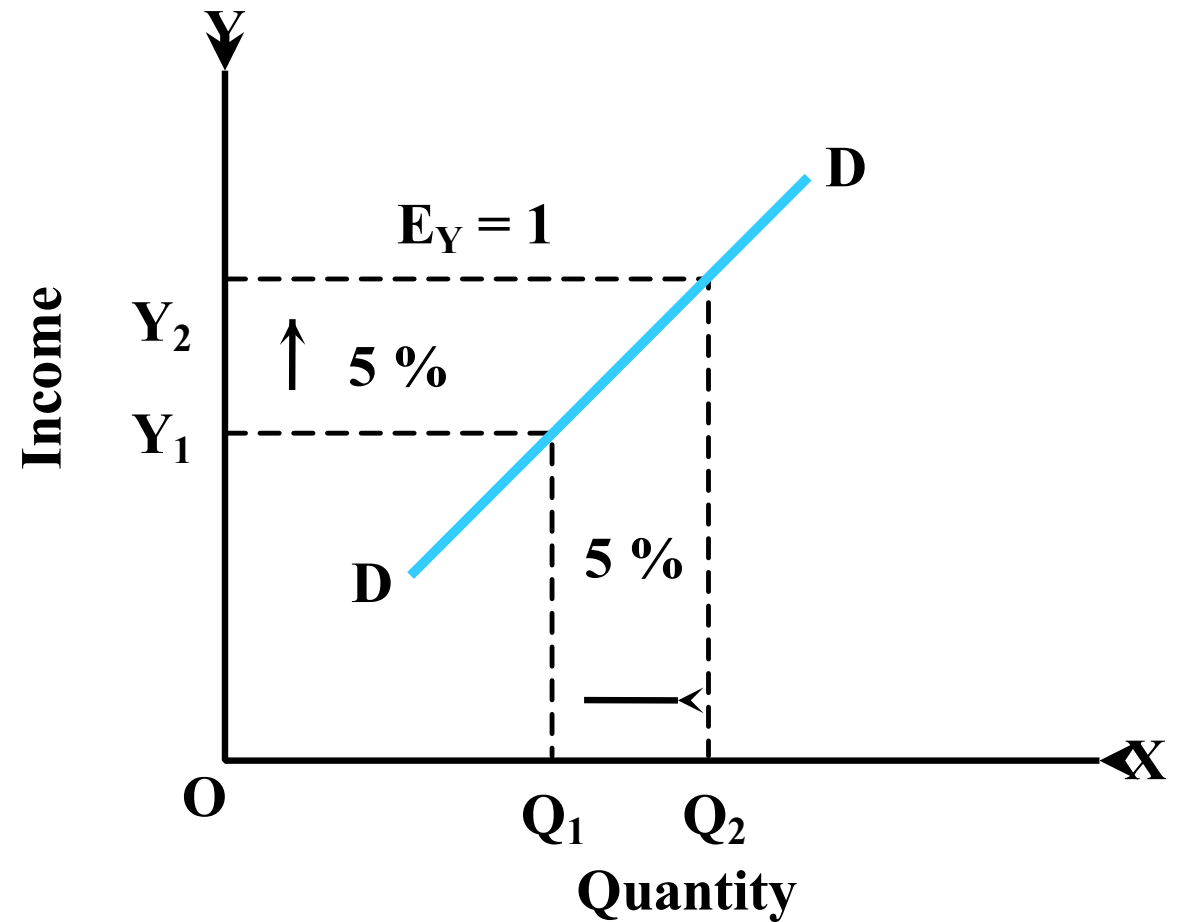
Types (Degrees) of Income Elasticity of Demand Contd.

b. **Income elasticity less than unity ($E_Y < 1$):** Income elasticity of demand is less than unity when the demand for a commodity increases less than percentage to the rise in income. In case of normal necessities, income elasticity of demand is less than unity.
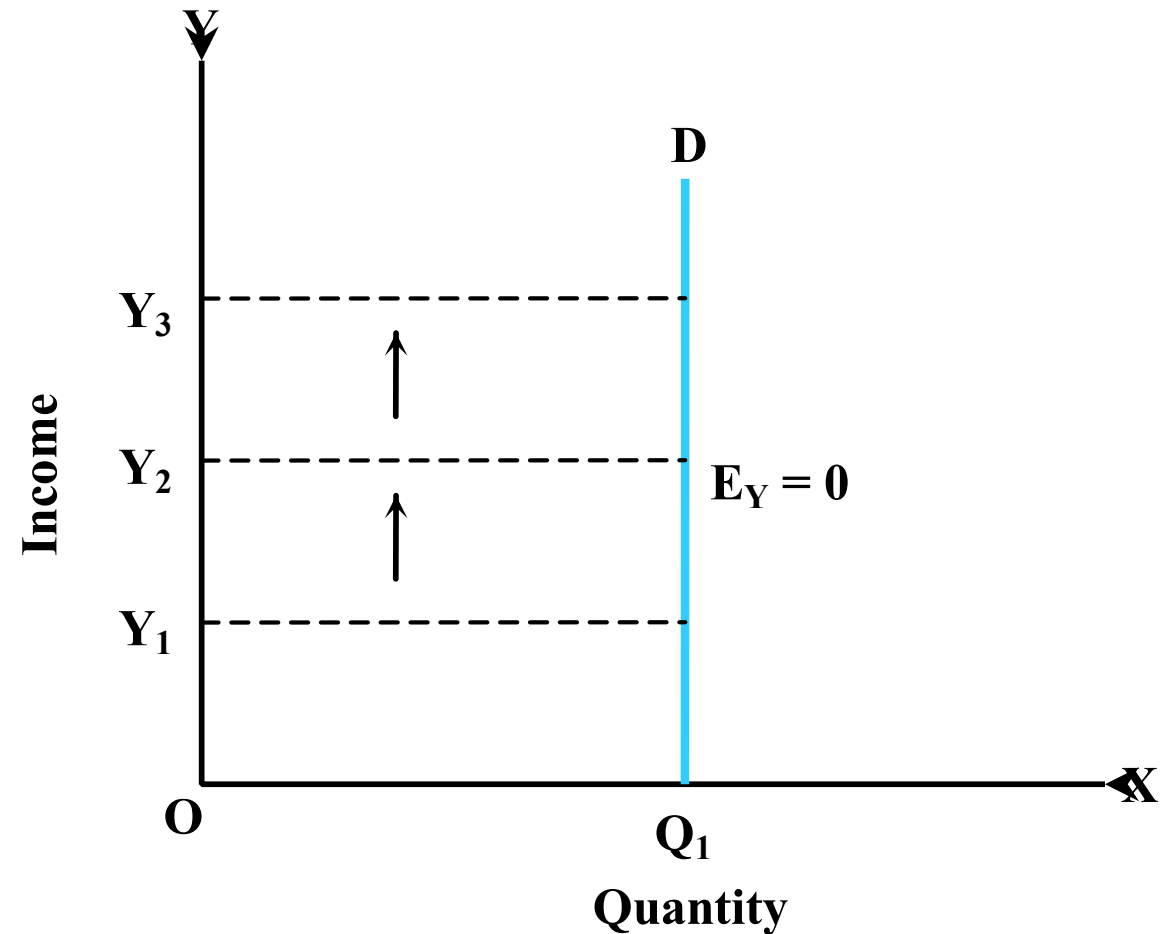
Types (Degrees) of Income Elasticity of Demand Contd.

c. **Income elasticity equal to unity ($E_Y = 1$):** Income elasticity is unity when the demand for a commodity increases in the same proportion as the rise in income. In case of comfortable goods, income elasticity of demand is equal to unity.

Types (Degrees) of Income Elasticity of Demand Contd.
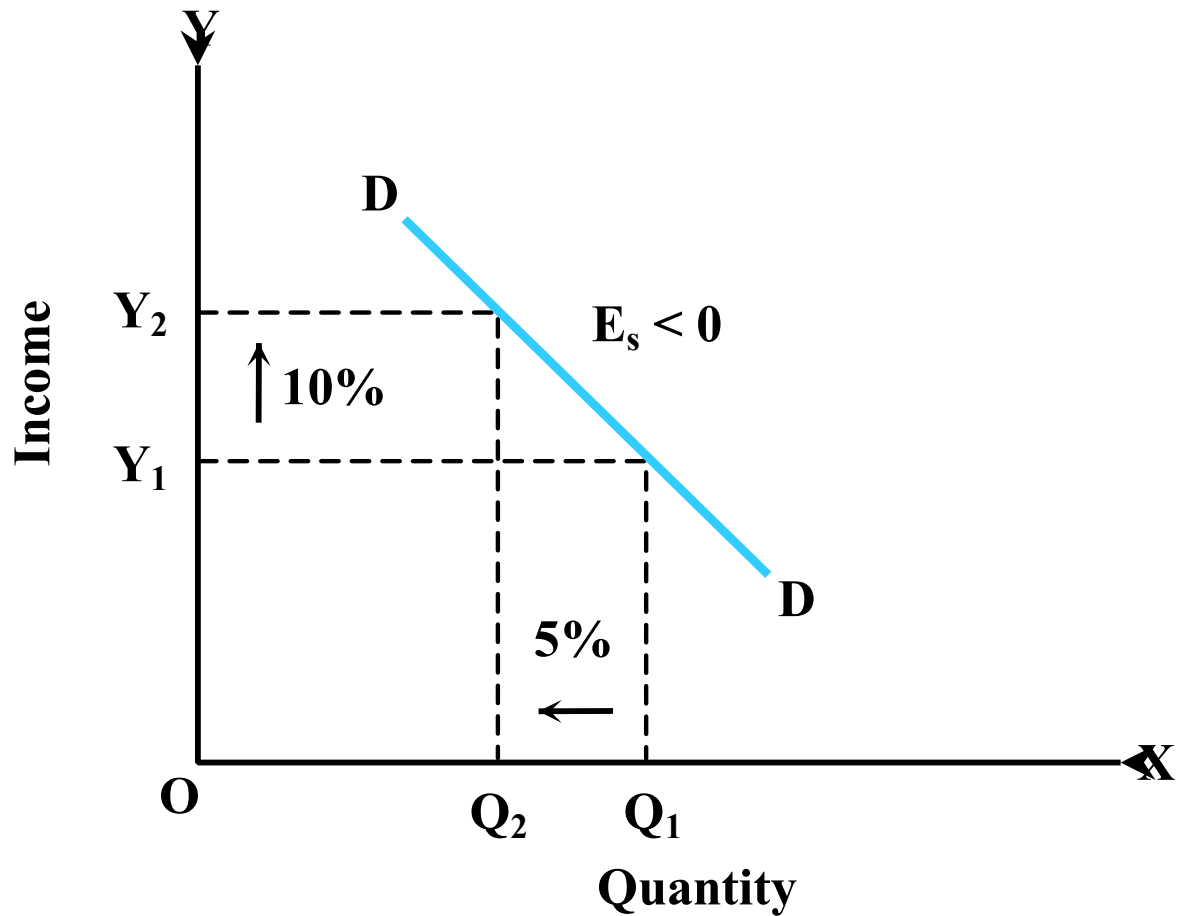
2. Zero Income Elasticity of Demand ($E_Y = 0$)

If quantity demanded remains unchanged despite change in income and vice-versa, the income elasticity is said to be zero. In case of neutral goods like salt, income elasticity of demand is zero.

Types (Degrees) of Income Elasticity of Demand Contd.

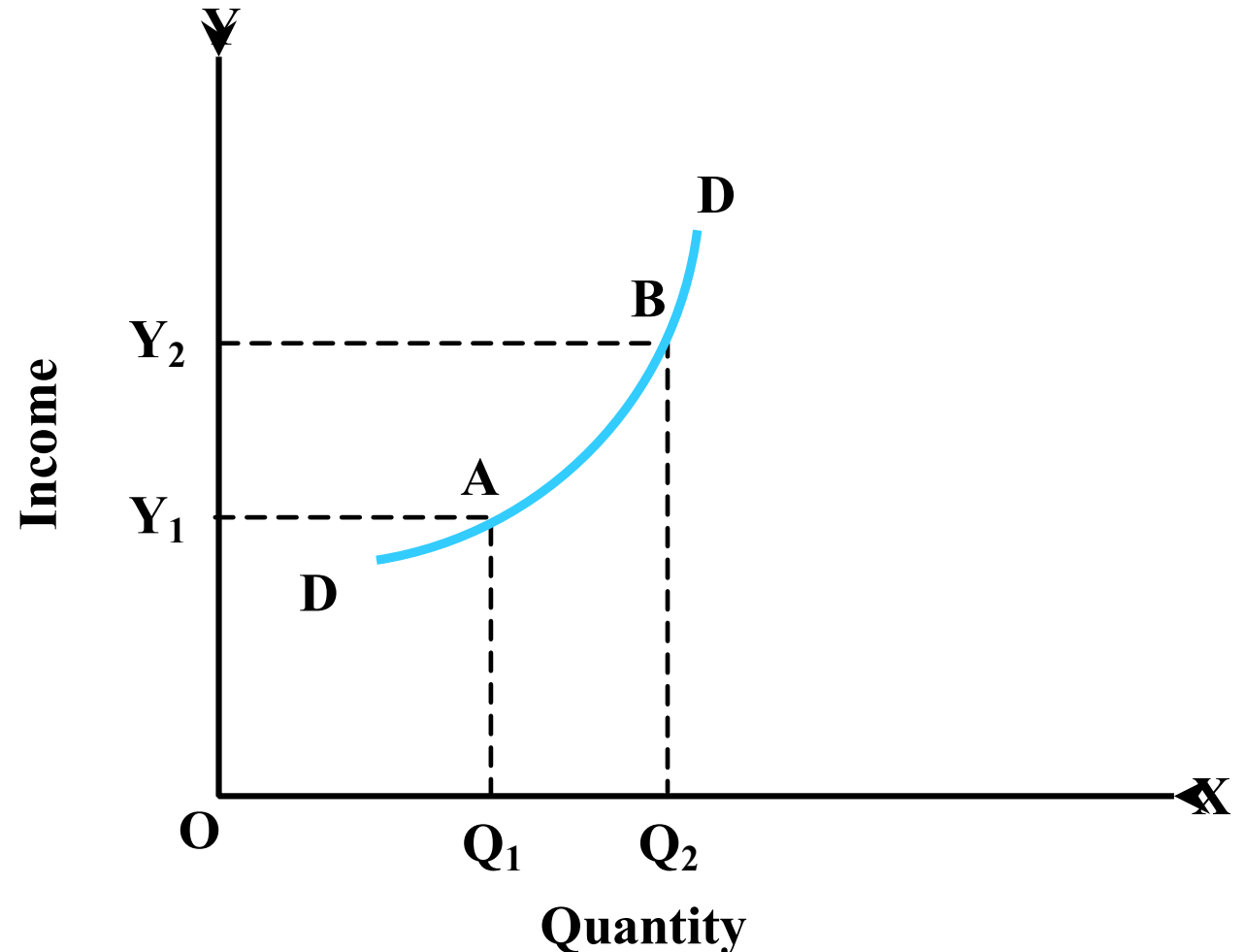## 3. Negative Income Elasticity of Demand ($E_Y < 0$)

In the case of inferior goods, the income elasticity of demand is negative. When the consumer reduces his demand with the rise in income and vice versa, the income elasticity of demand is said to be negative. It is found in case of inferior or low quality goods.

Calculation of Income Elasticity of Demand

1. Percentage/ Proportionate Method

According to the percentage method, income elasticity of demand is measured dividing percentage change in demand by percentage change in income.

$$E_Y = \frac{\text{Percentage change in demand}}{\text{Percentage change in income}} = \frac{\frac{\Delta Q}{Q} \times 100}{\frac{\Delta Y}{Y} \times 100} = \frac{\Delta Q}{\Delta Y} \times \frac{Y}{Q}$$

where

E_Y = Income elasticity

Q = Initial quantity Y = Initial income

ΔQ = Change in quantity ΔY = Change in income

Calculation of Income Elasticity of Demand Contd.

2. Average/ Arc Method

The coefficient of income elasticity of demand between two points on an income demand curve is called average or arc elasticity of income demand. This method is used when there is big change in income and demand.

Calculation of Income Elasticity of Demand Contd.

Average or arc elasticity between point A and B income demand curve DD (E_Y),

$$E_Y = \frac{\left(\dfrac{\text{Change in demand}}{\text{Average demand}}\right)}{\left(\dfrac{\text{Change in Income}}{\text{Average Income}}\right)} = \frac{\dfrac{\Delta Q}{\dfrac{Q_1 + Q_2}{2}}}{\dfrac{\Delta Y}{\dfrac{Y_1 + Y_2}{2}}}$$

$$= \frac{\Delta Q}{\Delta Y} \times \left(\frac{Y_1 + Y_2}{Q_1 + Q_2}\right) \qquad = \left(\frac{Q_2 - Q_1}{Y_2 - Y_1}\right) \left(\frac{Y_1 + Y_2}{Q_1 + Q_2}\right)$$

where

E_Y = Coefficient of income elasticity of demand

Q_1 = Initial demand Y_1 = Initial income of the consumer

Q_2 = New demand Y_2 = New income of the consumer

ΔQ = Change in demand ΔY = Change in income

Uses or Importance of Income Elasticity of Demand

1. Useful to know about stage of trade cycle
2. Useful for forecasting demand
3. Useful for classification of normal and inferior goods
4. Useful for making marketing strategy

Cross Elasticity of Demand (E$_{XY}$)

The cross elasticity of demand is defined as the percentage change in the quantity demanded of good-X resulting from a percentage change in the price of Y. In other words, the ratio of percentage change in the quantity demanded of good–X to a given percentage changes in the price of good-Y.

$$E_{XY} = \frac{\text{Percentage change in demand for good–X}}{\text{Percentage change in price of good–Y}}$$

$$= \frac{\dfrac{\text{Change in demand for good–X}}{\text{Initaial demand for good–X}} \times 100}{\dfrac{\text{Change in price of good–Y}}{\text{Initial price of good–Y}} \times 100} = \frac{\dfrac{\Delta Q_X}{Q_X} \times 100}{\dfrac{\Delta P_Y}{P_Y} \times 100} = \frac{\Delta Q_X}{\Delta P_Y} \times \frac{P_Y}{Q_X}$$

where

E_{XY} = Coefficient of cross elasticity of demand

Q_X = Quantity of good-X P_Y = Price of good-Y,

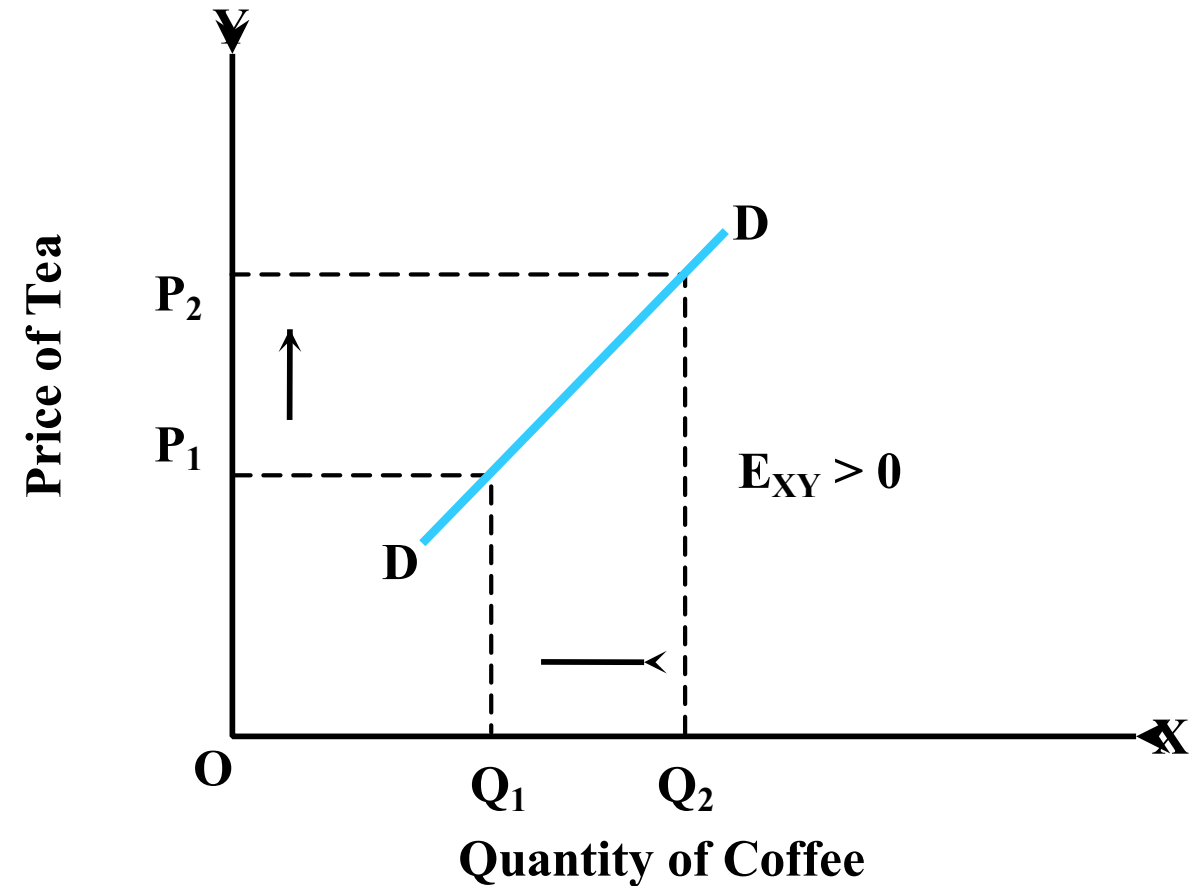ΔQ_X = Change in the demand for good-X ΔP_Y = Change in the price of good-Y

Types (Degrees) of Cross Elasticity of Demand

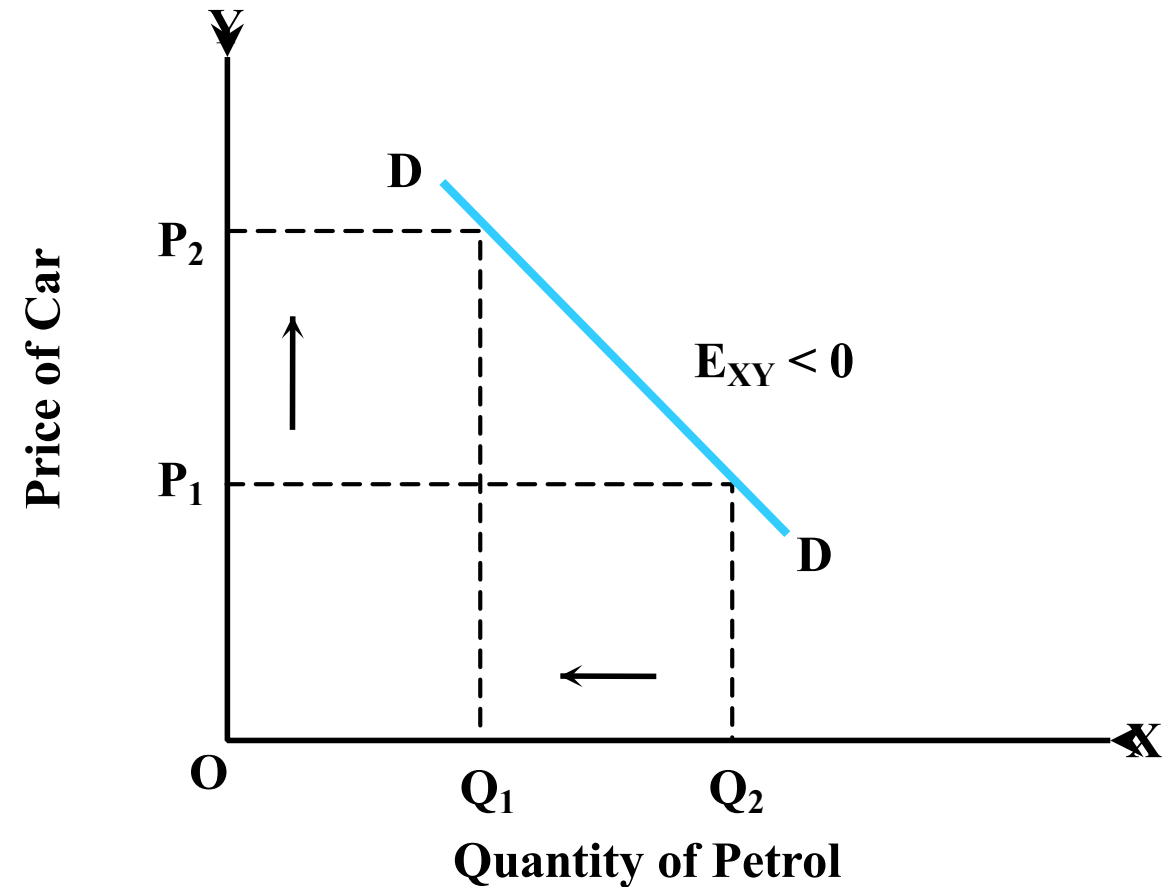## 1. Positive Cross Elasticity of Demand ($E_{XY} > 0$)

When the quantity demand of a commodity and price of related commodity change into same direction, the cross elasticity of demand is positive. In the case of substitute goods, the cross elasticity of demand is positive

Price of Tea

P_2

P_1

D

D

$E_{XY} > 0$

O

Q_1 Q_2

Quantity of Coffee

Types (Degrees) of Cross Elasticity of Demand Contd.

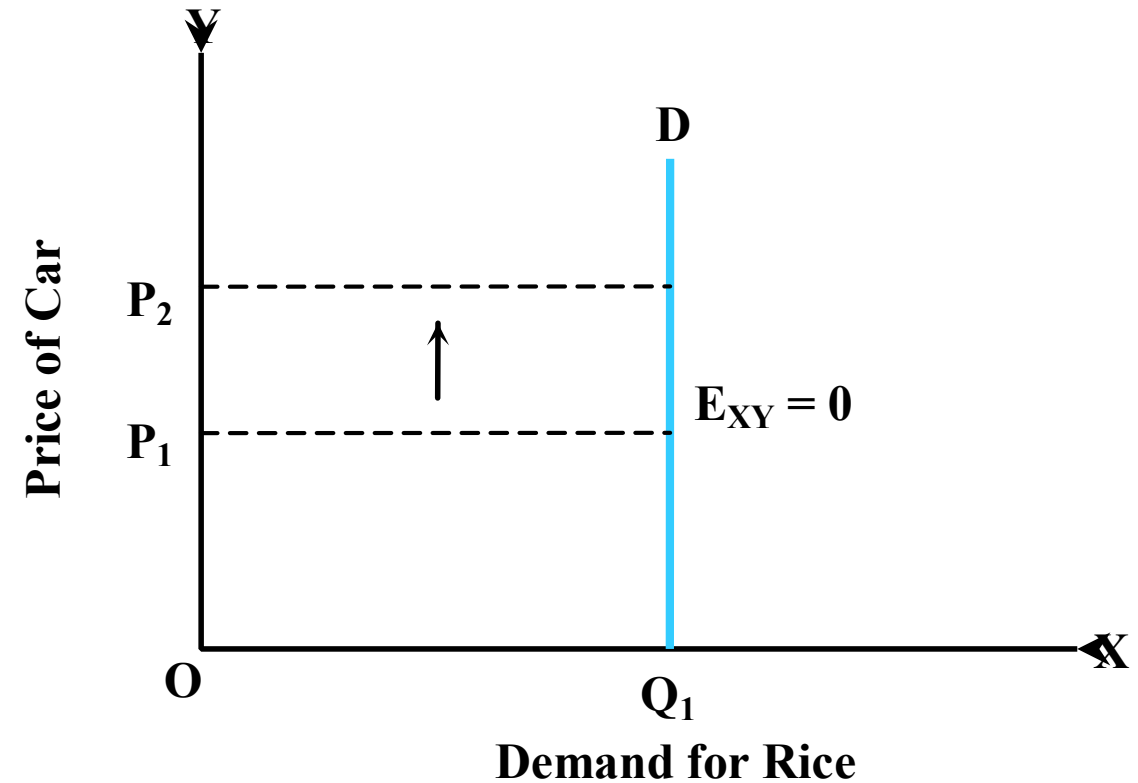2. **Negative Cross Elasticity of Demand ($E_{XY} < 0$)**

When demand for a commodity and price of related commodity change into opposite direction, the cross elasticity of demand is negative. In the case of complementary goods, cross elasticity of demand is negative.

Types (Degrees) of Cross Elasticity of Demand Contd.

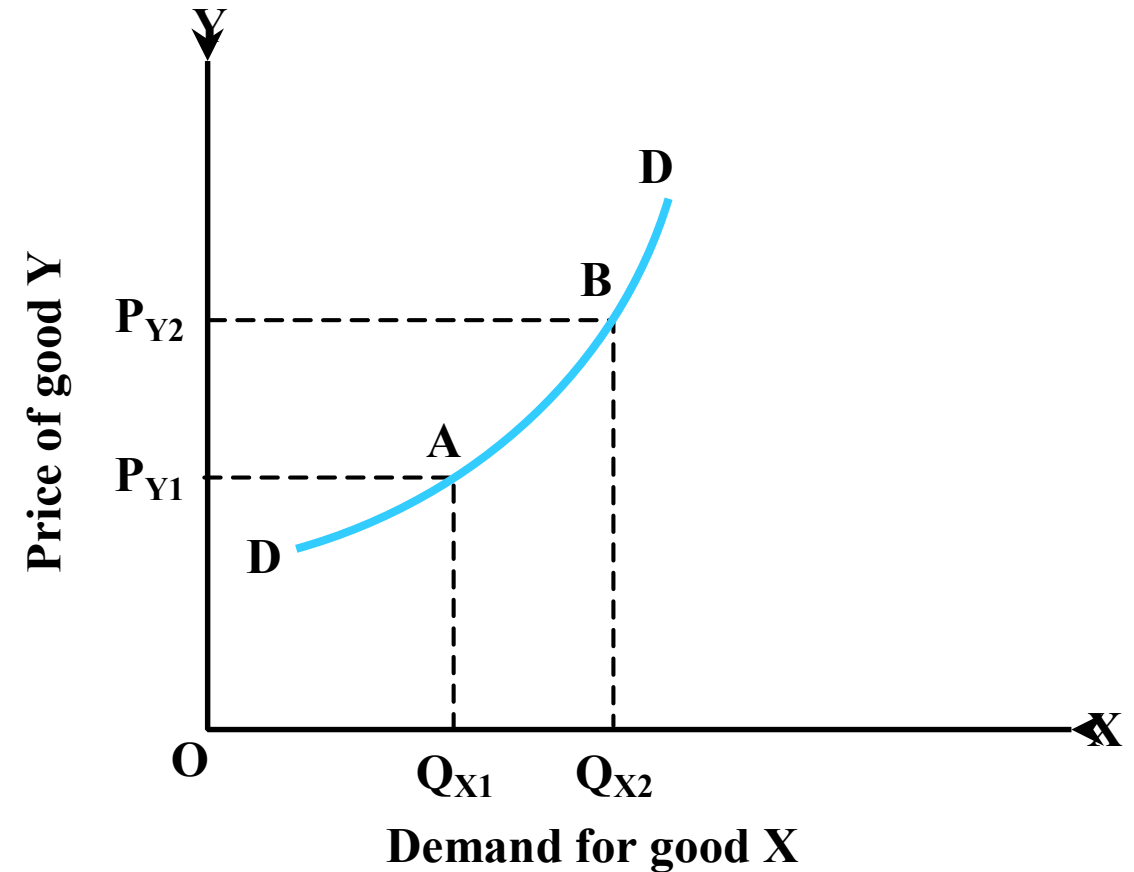**3. Zero Cross Elasticity of Demand ($E_{XY} = 0$)**

When the change in price of one good has no effect on the demand for another good, the cross elasticity of demand is zero.

Calculation of Cross Elasticity of Demand

1. Percentage/ Proportionate Method

According to percentage method, cross elasticity of demand is measured dividing percentage change in demand for a good –X divided by percentage change in price of good-Y. Let us suppose, two related goods X and Y.

$$E_{XY} = \frac{\text{Percentage change in demand for good X}}{\text{Percentage change in price of good Y}}$$

$$= \frac{\dfrac{\Delta Q_X}{Q_X} \times 100}{\dfrac{\Delta P_Y}{P_Y} \times 100} = \frac{\Delta Q_X}{\Delta P_Y} \times \frac{P_Y}{Q_X}$$

where

E_Y = Cross elasticity of demand between good –X and good Y

Q_X = Initial quantity of good X P_Y = Initial price of good Y

ΔQ_X = change in demand for good X ΔP_Y = Change in price of good Y

Calculation of Cross Elasticity of Demand Contd.

2. Average/ Arc Method

The coefficient of cross elasticity of demand between two points on a cross demand curve is called arc elasticity of demand. This method is used to measure the cross elasticity of demand when there is greater change in price and quantity demanded.

Calculation of Cross Elasticity of Demand Contd.

In **Figure**, DD represents cross demand curve of substitute goods X and Y. The cross elasticity between two points A and B is measured by using following formula:

$$E_{XY} = \frac{\left(\dfrac{\text{Change in demand for good X}}{\text{Average demand for good X}}\right)}{\left(\dfrac{\text{Change in Price of good Y}}{\text{Average Price of good Y}}\right)}$$

$$= \frac{\dfrac{\Delta Q}{\dfrac{Q_{X1} + Q_{X2}}{2}}}{\dfrac{\Delta P_Y}{\dfrac{P_{Y1} + P_{Y2}}{2}}} = \frac{\Delta Q_X}{\Delta P_Y} \times \left(\frac{P_{Y1} + P_{Y2}}{Q_{X1} + Q_{X2}}\right) = \left(\frac{Q_{X2} - Q_{X1}}{P_{Y2} - P_{Y1}}\right) \times \left(\frac{P_{Y1} + P_{Y2}}{Q_{X1} + Q_{X2}}\right)$$

where

E_{XY} = Coefficient of cross elasticity of demand
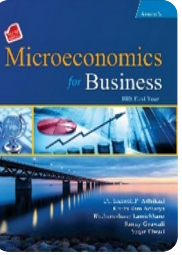
Q_{X1} = Initial demand for good X P_{Y1} = Initial price of good Y

Q_{X2} = New demand for good X P_{Y2} = New price of good Y

Uses or Importance of Cross Elasticity of Demand

1. Classification of goods
2. Classification of market
3. Pricing policy
4. Determination of boundaries between industries

Advertising Elasticity of Demand (E$_A$)

The ratio of percentage change in quantity demanded and percentage change in advertisement expenditure is called advertising elasticity of demand. In other words, it is responsiveness of change in demand to the change in advertisement expenditure.

$$E_A = \frac{\textbf{Percentage change in quantity demanded}}{\textbf{Percentage change in advertisement expenditure}}$$

$$= \frac{\dfrac{\Delta Q}{Q} \times 100}{\dfrac{\Delta A}{A} \times 100} = \frac{\Delta Q}{\Delta A} \times \frac{A}{Q}$$

where

E$_A$ = Coefficient of advertisement elasticity of demand

Q = Initial demand A = Advertisement expenditure

ΔQ = Change in quantity demanded ΔA = Change in advertisement expenditure

Advertising Elasticity of Demand (E_A) Contd.

The arc or average advertising elasticity of demand between any two advertising expenditure is as

$$E_A = \frac{\Delta Q}{\Delta A} \times \frac{A_1 + A_2}{Q_1 + Q_2} = \frac{Q_2 - Q_1}{A_2 - A_1} \times \frac{A_1 + A_2}{Q_1 + Q_2}$$

where

Q_1	= Initial demand	A_1	= Initial advertisement expenditure
Q_2	= New demand	A_2	= New advertisement expenditure

Since, there is always positive relationship between quantity demanded and advertisement expenditure, the coefficient of advertising elasticity of demand is positive

Types (Degrees) of Advertisement Elasticity of Demand

There are three types of advertisement elasticity of demand which are as follows:

1. **Advertisement elasticity of demand equal to 1 ($E_A = 1$):** If percentage change in demand is equal to percentage change in advertisement expenditure, it is called advertisement elasticity of demand equal to 1.

2. **Advertisement elasticity of demand more than 1 ($E_A > 1$):** If percent change in demand is more than percentage change in advertisement expenditure, it is called advertisement elasticity more than 1.

3. **Advertisement elasticity of demand less than 1 ($E_A < 1$):** If percentage change in quantity demanded is less than the percentage change in advertisement expenditure, it is called advertisement elasticity of demand less than 1.

Uses or Importance of Advertising Elasticity of Demand in Decision Making

- An important advantage of the study of advertising elasticity of demand is that it helps the management in deciding whether the expenditure on advertisement should be increased or decreased or maintained at present level

- Study of this concept helps the management to know the effect of advertisement on the sales revenue. If the management finds saturation point has been arrived, expenditure on advertising should be stopped.

- Study of this concept helps in evaluating the effectiveness of various media of advertisement.

Determinants of Elasticity of Demand

1. Nature of the commodity
2. Substitute
3. Goods having several uses
4. Joint demand
5. Income of the consumer
6. Postpone of the consumption
7. Habits
8. Price level
9. Time factor

Price Elasticity of Supply

The price elasticity of supply is defined as the responsiveness of quantity supplied of a commodity to the change in its price. The price elasticity of supply is also defined as the ratio between percentage change in quantity supplied and percentage change in price of a commodity.

$$E_s = \frac{\text{Percentage change in quantity supplied}}{\text{Percentage change in price}}$$

$$= \frac{\dfrac{\text{Change in quantity supplied}}{\text{Initial quantity supplied}} \times 100}{\dfrac{\text{Change in price}}{\text{Initial price}} \times 100} = \frac{\dfrac{\Delta Q}{Q} \times 100}{\dfrac{\Delta P}{P} \times 100} = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

where

E_S = Coefficient of price elasticity of supply
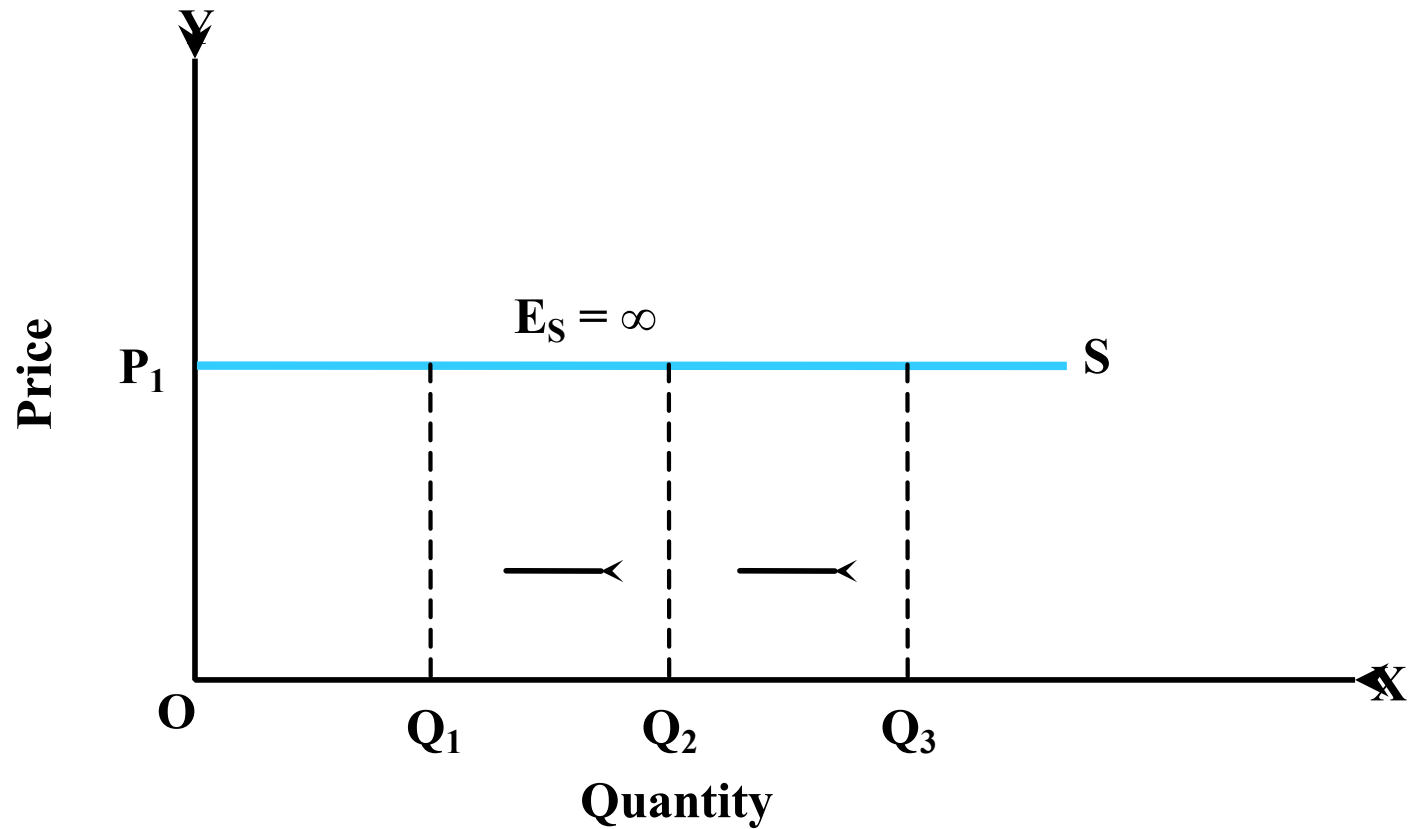
Q = Initial quantity supplied ΔQ = Change in quantity supplied

P = Initial price ΔP = Change in price

Types (Degrees) Price of Elasticity of Supply

## 1. Perfectly Elastic Supply ($E_s = \infty$)

Supply is said to be perfectly elastic supply if negligible change in price leads to infinite change in the quantity supplied. Visibly, no change in price causes infinite change in supply..

Types (Degrees) Price of Elasticity of Supply Contd.

## 2. Perfectly Inelastic Supply ($E_s = 0$)

When the supply of a commodity does not change despite the change price, the supply is said to perfectly inelastic supply.
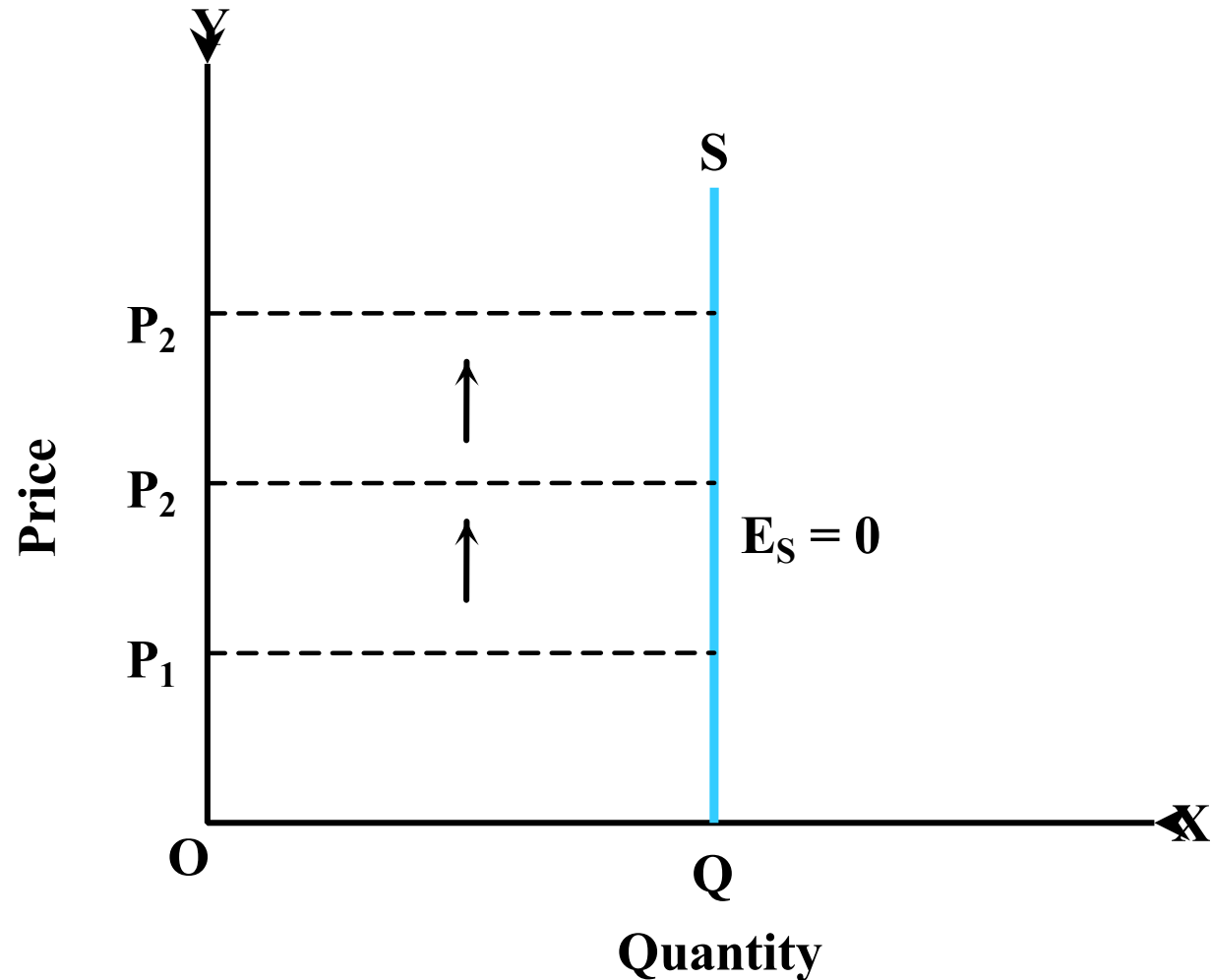
Types (Degrees) Price of Elasticity of Supply Contd.
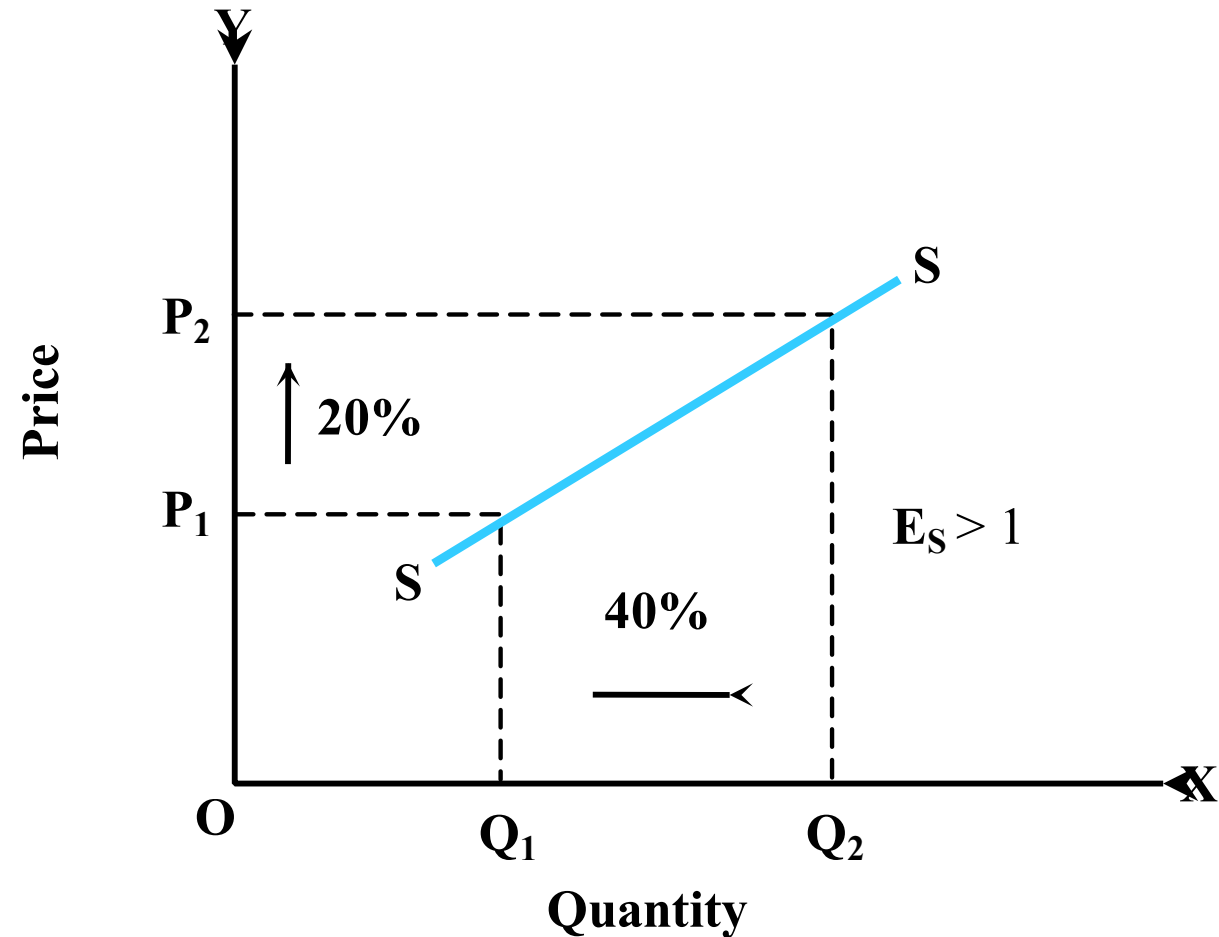
3. Unitary Elastic Supply ($E_S = 1$)

When the percentage change in the quantity supplied is equal to the percentage change in price, the supply of a commodity is said to be unitary elastic.
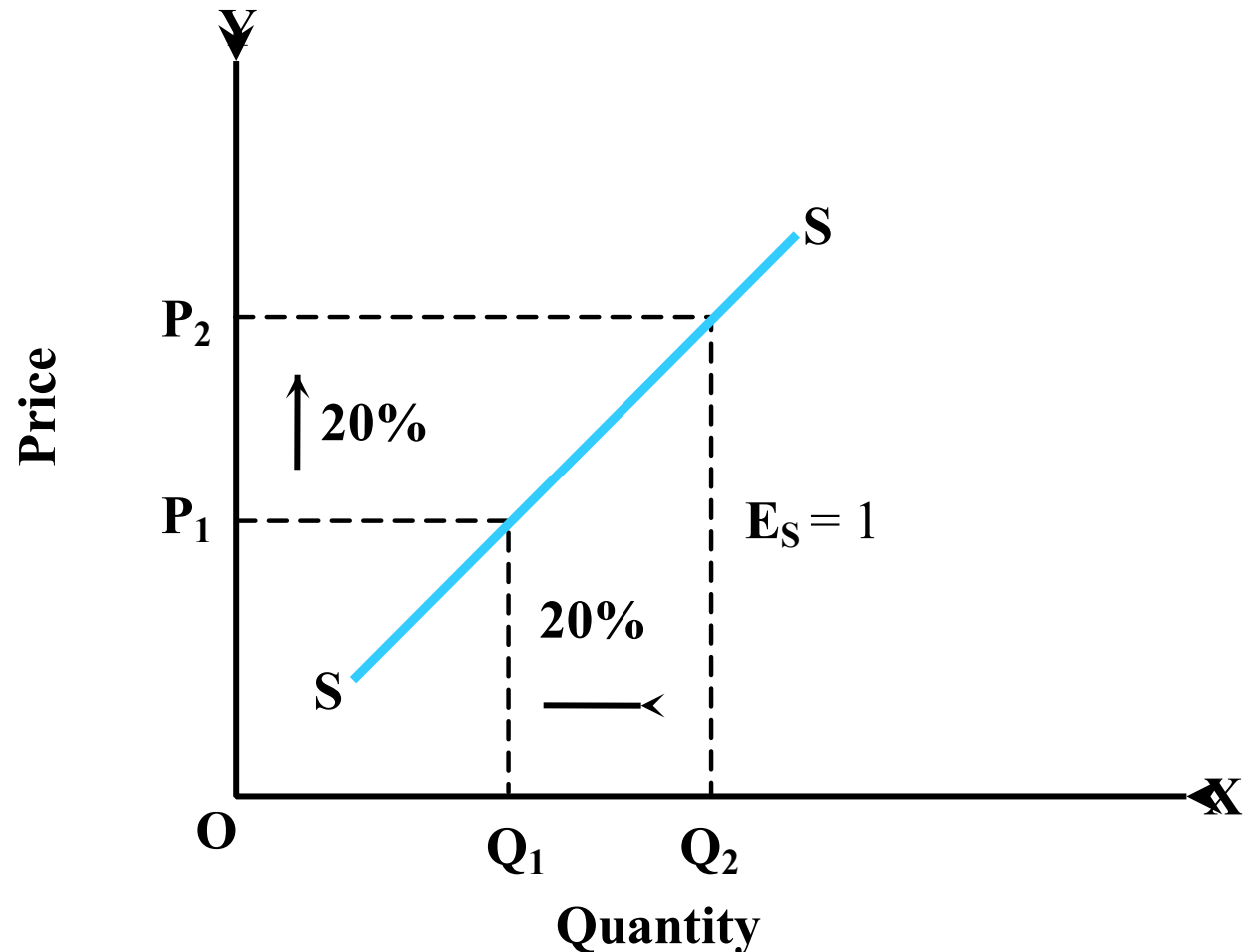
Types (Degrees) Price of Elasticity of Supply Contd.

## 4. Relatively Elastic Supply ($E_s > 1$)

When the percentage change in the quantity supplied of a commodity is more than the percentage change in price, it is called relatively elastic supply..

Types (Degrees) Price of Elasticity of Supply Contd.

5. Relatively Inelastic Supply ($E_s < 1$)

When the percentage change in the quantity supplied of a commodity is less than percentage change in price, it is called relatively inelastic supply.
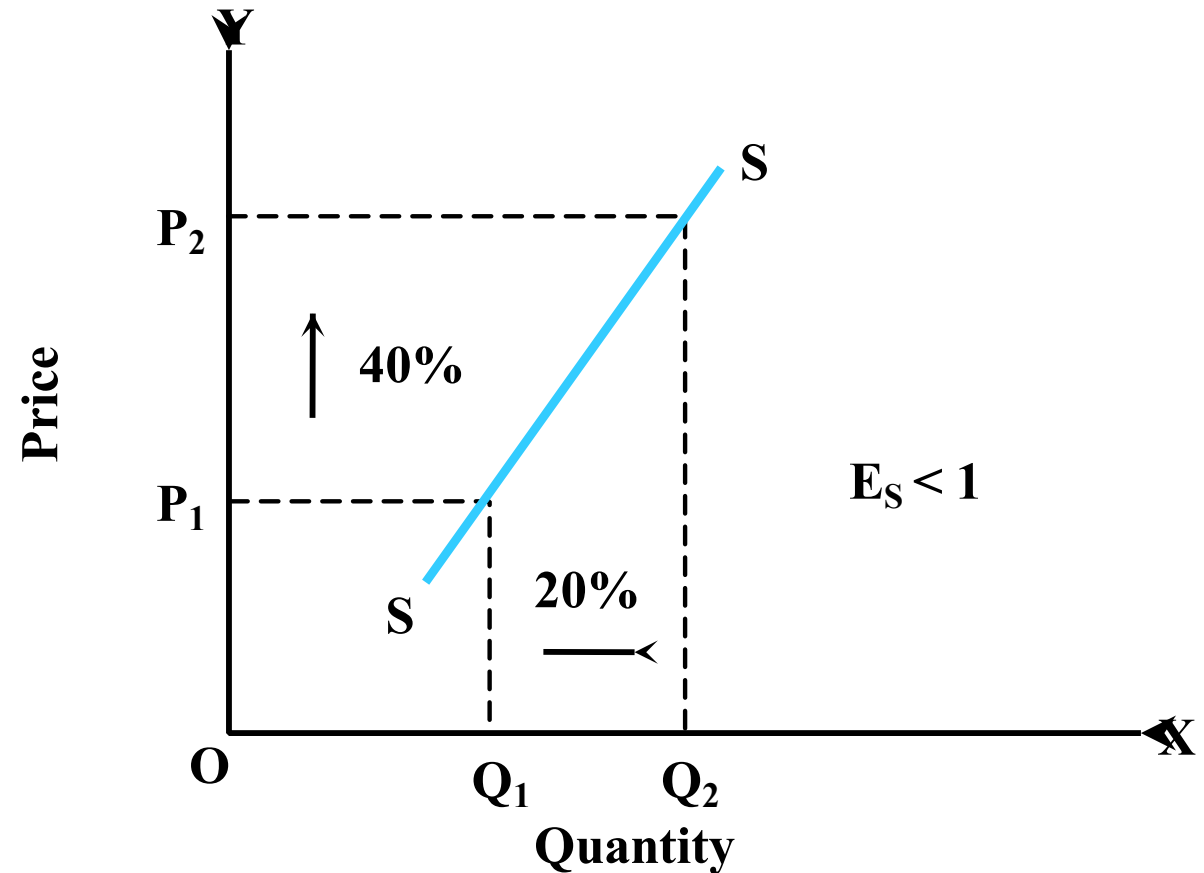
Calculation of Price Elasticity of Supply

1. Percentage/ Proportionate Method

According to this method, price elasticity of supply is calculated dividing percentage change in quantity supplied divided by percentage change in price.

$$E_S = \frac{\text{Percentage change in quantity supplied}}{\text{Percentage change in price}}$$

$$= \frac{\left(\dfrac{\text{Change in quantity supplied}}{\text{Initial quantity supplied}} \times 100\right)}{\left(\dfrac{\text{Change in Price}}{\text{Initial Price}} \times 100\right)} = \frac{\dfrac{\Delta Q}{Q} \times 100}{\dfrac{\Delta P}{P} \times 100} = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q}$$

where

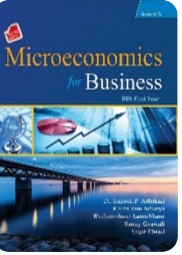E_S = Coefficient of price elasticity of supply

Q = Initial quantity supplied   P = Initial Price

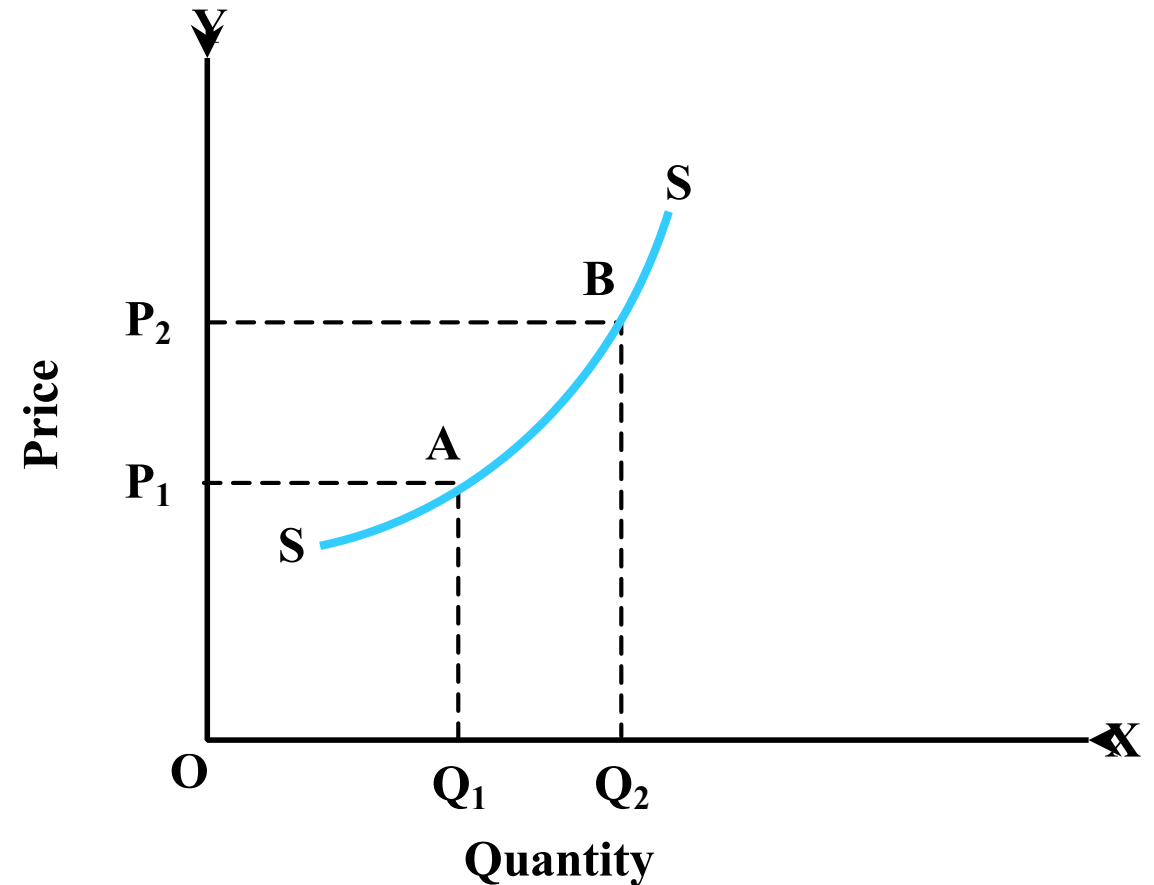ΔQ = Change in quantity supplied ΔP = Change in price

Calculation of Price Elasticity of Supply Contd.

2. Average/ Arc Method

The coefficient of elasticity of supply between two points on a supply curve is called average or arc elasticity of supply. This method is used to measure elasticity of supply when there is greater change in price and quantity supplied.

Calculation of Price Elasticity of Supply Contd.

$$E_S = \dfrac{\left(\dfrac{\text{Change in quantity supplied}}{\text{Average quantity supplied}}\right)}{\left(\dfrac{\text{Change in Price}}{\text{Average Price}}\right)}$$

$$= \dfrac{\left(\dfrac{\Delta Q}{\dfrac{Q_1 + Q_2}{2}}\right)}{\left(\dfrac{\Delta P}{\dfrac{P_1 + P_2}{2}}\right)} = \dfrac{\Delta Q}{\Delta P} \times \left(\dfrac{P_1 + P_2}{Q_1 + Q_2}\right) = \left(\dfrac{Q_2 - Q_1}{P_2 - P_1}\right)\left(\dfrac{P_1 + P_2}{Q_1 + Q_2}\right)$$

where

E_S = Coefficient of price elasticity of supply

Q_1 = Initial quantity supplied P_1 = Initial Price

Q_2 = New quantity supplied P_2 = New Price

Factors Influencing Price Elasticity of Supply

1. Nature of the commodity
2. Cost of production
3. Time element
4. Producers expectation
5. Technical condition of production
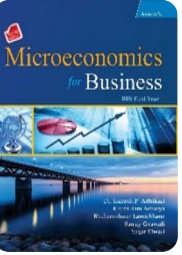
Numerical Examples 1

Calculate the price elasticity of demand by percentage and average method, when price decrease from Rs. 20 to Rs. 10 in the following example:

Price (Rs.)	20	10
Demand	40	80

SOLUTION

Proportionate Method

Initial price (P) = Rs. 20 Initial quantity (Q) = 40

New price (P₁) = Rs. 10 New quantity (Q₁) = 80

$\Delta P = -10$ $\Delta Q = 40$

$$E_P = \frac{\Delta Q}{\Delta P} \times \frac{P}{Q} = \left(\frac{40}{-10} \times \frac{20}{40}\right) = -2$$

Since, E = - 2, the demand is relatively elastic.

Arc Method/ Mid Point Method/ Average Method

$$E_P = \left(\frac{Q_2 - Q_1}{P_2 - P_1}\right) \times \frac{P_1 + P_2}{Q_1 + Q_2} = \frac{80 - 40}{10 - 20} \times \frac{20 + 10}{40 + 80} = -1$$

Since, E = -1, the demand is unitary price elastic.

Numerical Examples 2

From the following table calculate income elasticity of demand for commodity X when income rises from Rs. 10,000 to Rs. 15,000 and determine what type of goods is commodity X:

Q_X	100	250
Y	Rs. 10,000	Rs. 15,000

Here,

Initial demand (Q_X) = 100

New demand (Q_{X1}) = 250

Change in demand (ΔQ_X) = $Q_{X1} - Q_x$ = 250 – 100 = 150 units

Initial income (Y) = Rs. 10,000

New income (Y_1) = Rs. 15,000

Change in income (ΔY) = $Y_1 - Y$ = 15,000 – 10,000 = Rs. 5,000

$$E_Y = \frac{\Delta Q_X}{\Delta Y} \times \frac{Y}{Q} = \frac{150}{5,000} \times \frac{10,000}{100} = 3$$

Since, E_Y = 3 is positive and greater than 1, the commodity is luxury.

SOLUTION

Here,

Initial demand $(Q_X) = 100$

New demand $(Q_{X1}) = 250$

Change in demand $(\Delta Q_X) = Q_{X1} - Q_x = 250 - 100 = 150$ units

Initial income $(Y) = $ Rs. 10,000

New income $(Y_1) = $ Rs. 15,000

Change in income $(\Delta Y) = Y_1 - Y = 15,000 - 10,000 = $ Rs. 5,000

$$E_Y = \frac{\Delta Q_X}{\Delta Y} \times \frac{Y}{Q} = \frac{150}{5,000} \times \frac{10,000}{100} = 3$$

Since, $E_Y = 3$ is positive and greater than 1, the commodity is luxury.

Numerical Examples 3

Consider the following supply schedule:

Points	A	B	C	D
Price (P_X)	0	5	10	15
Supply (Q_X)	10	20	30	40

a.   Compute the price elasticity of supply at the movement from B to C by percentage method.

b.   Compute the price elasticity of supply by average method between C and D.

SOLUTION

a. Initial quantity supplied (Q_X) = 20
New quantity supplied (Q_{X1}) = 30
Change in quantity supplied (ΔQ_X) = $Q_{X1} - Q_X$ = 30 – 20 = 10
Initial price of good X (P_X) = Rs. 5
New price of good X (P_{X1}) = Rs. 10
Change in price of good X (ΔP_X) = 10 – 5 = 5

$$E_S = \frac{\Delta Q_X}{\Delta P_Y} \times \frac{P_Y}{Q_X} = \frac{10}{5} \times \frac{5}{20} = \frac{1}{2} = 0.5 < 1$$

Interpretation: Since, E_S = 0.5 < 1, the supply is relatively inelastic. One percentage increase in price results 0.5 percentage increase in quantity supplied and vice-versa.

b. Initial quantity supplied (Q_{X1}) = 30
New quantity supplied (Q_{X2}) = 40
Initial Price (P_{X1}) = Rs. 10
New Price (P_{X2}) = Rs. 15

$$E_S = \frac{(Q_{X2} - Q_{X1})}{(P_{X2} - P_{X1})} \times \frac{(P_{X1} + P_{X2})}{(Q_{X1} + Q_{X2})}$$

$$= \frac{(40 - 30)}{(15 - 10)} \times \frac{(10 + 15)}{(30 + 40)} = \left(\frac{10}{5}\right) \times \left(\frac{25}{70}\right) = 0.71$$

Interpretation: Since, E_S = 0.71 < 1, the supply is relatively inelastic. One percentage increase in price results 0.71 percentage increase in quantity supplied and vice-versa.

Thank You
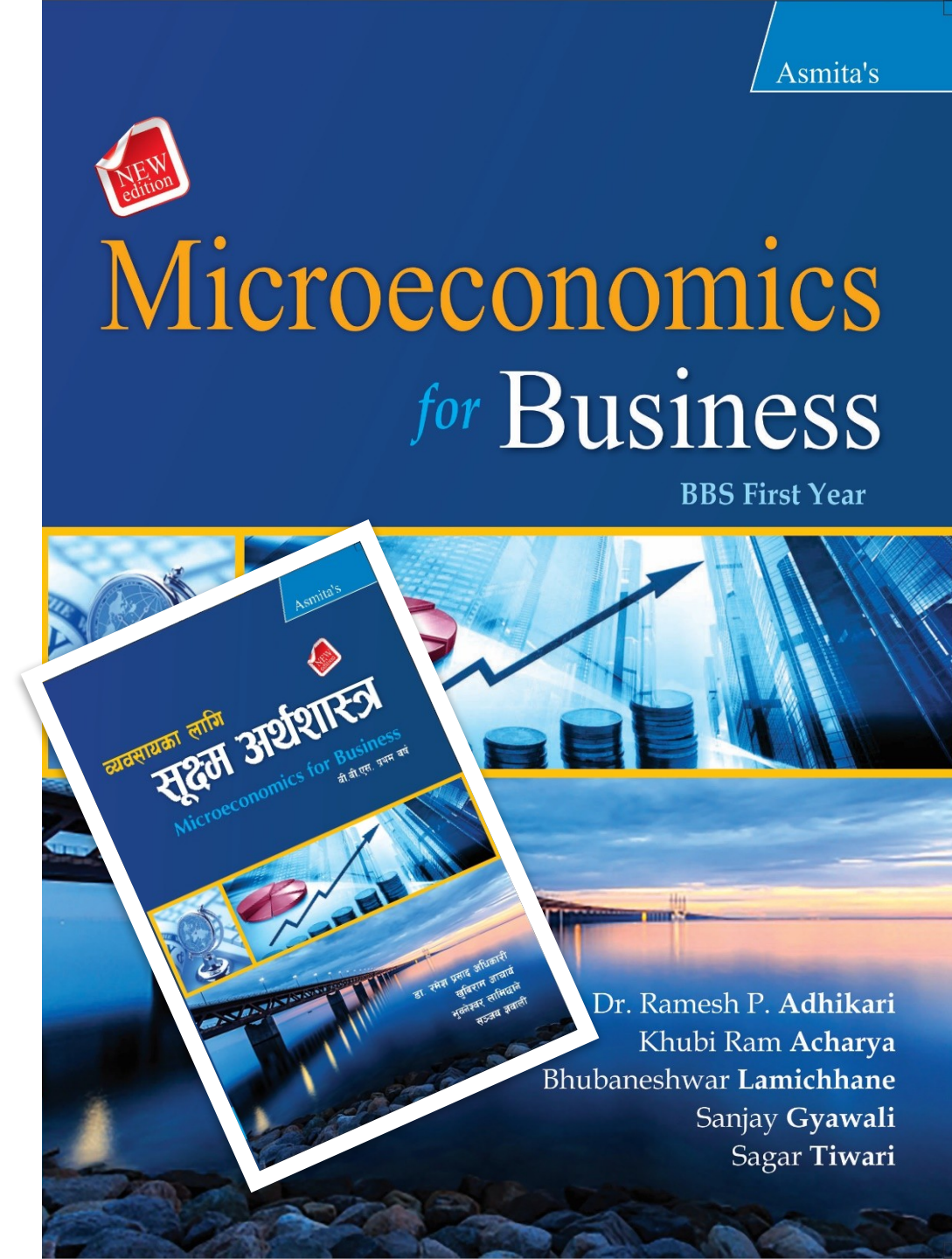
Introduction

Unit 1

Asmita's

NEW edition

Microeconomics
for Business
BBS First Year

व्यवसायका लागि
सूक्ष्म अर्थशास्त्र
Microeconomics for Business

Dr. Ramesh P. **Adhikari**
Khubi Ram **Acharya**
Bhubaneshwar **Lamichhane**
Sanjay **Gyawali**
Sagar **Tiwari**
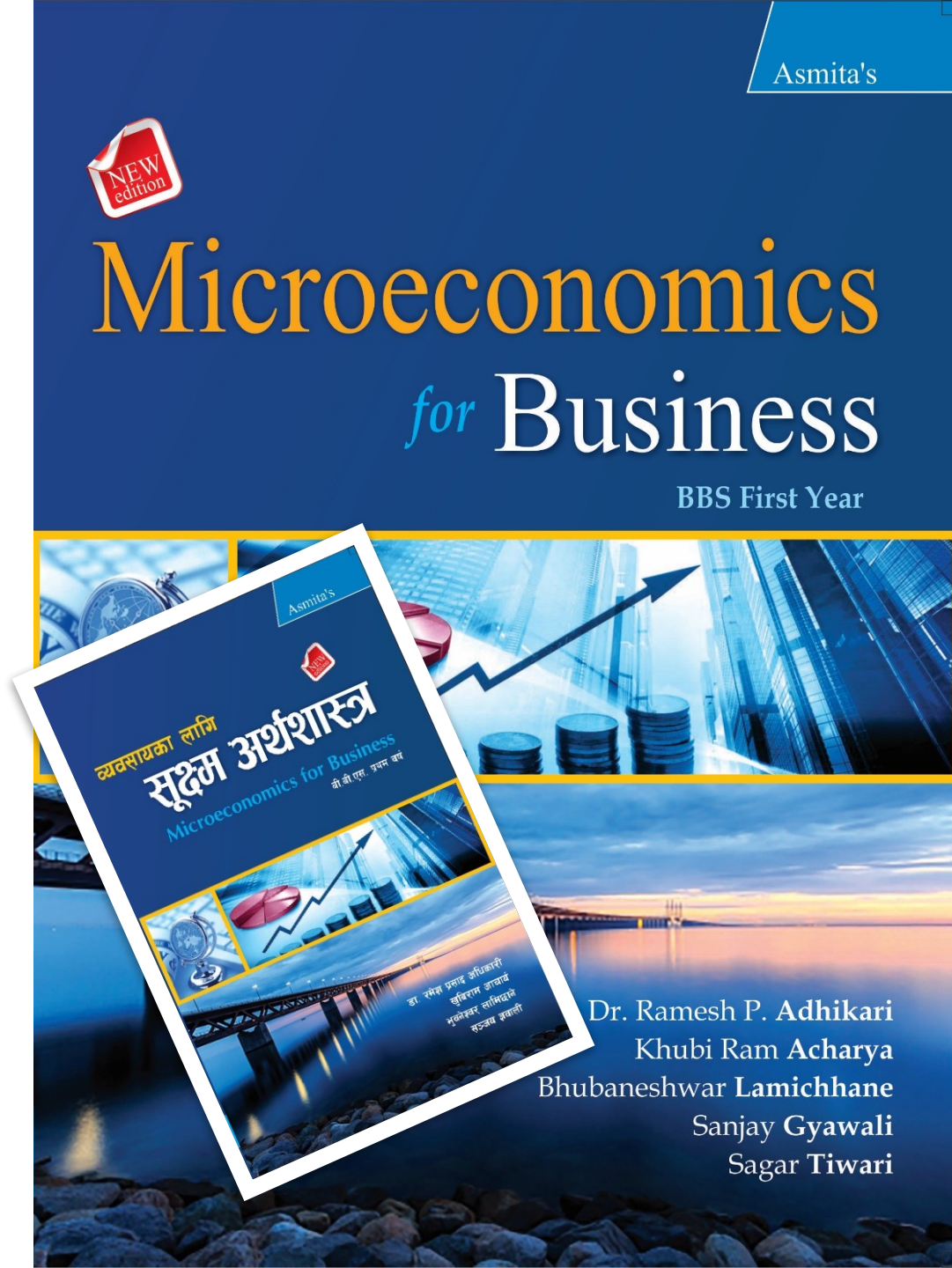
Learning Objectives

On completion of this unit, students will be able to:

- define microeconomics
- explain the scope of microeconomics
- explain the uses and limitations of microeconomics
- describe the nature and scope of business economics
- explain and illustrate the concept of production possibility curve
- acquire the knowledge of marginal and incremental analysis
- analyse the static and dynamic equilibrium analysis in microeconomics
- explain the Ten Principles of Economics.

Introduction

- Economics is a social science, which is a study of people in society and how they interact with each other.

- To analyze the fundamental issues of economics, i.e. scarcity and choice, we divide economics into two parts: microeconomics and macroeconomics.

- The words 'micro' and 'macro' was first used by Ragnar Frisch in 1933.

- The term 'micro' has been derived from the Greek word *'mikros'*, which means small.

- The word macro has been derived from Greek word 'makros', which means large.

- From the meaning, it is clear that microeconomics deals with small individual parts of an economy whereas macroeconomics deals with economy as a whole.

Definition/ Meaning of Microeconomics

- Microeconomics is defined as the branch of economics which deals with individual parts of an economy.

- In other words, it is the part of economic analysis, which is concerned with the behaviour of individual units: consumers, households and firms.

- It examines how consumers choose between goods and services, how workers choose between jobs, and how business firms decide what to produce, how to produce, how much to produce, and for whom to produce.

Features of Microeconomics

- Microeconomics studies the individual parts of an economy.

- It is concerned with the individual firms and consumers.

- It is based on the assumptions of full employment, partial equilibrium analysis and perfect competition.

- It is applicable only in the free market economy.

- The major variables of microeconomics are relative price, individual demand and supply, output of an individual firm, etc.

- It is also known as price theory because it studies how price of a product is determined.

- It is also known as the slicing method as well as microscopic analysis.

- It is like study of a particular tree of the whole forest.

Scope of Microeconomics

1. Theory of demand
2. Theory of production and cost
3. Theory of product pricing
4. Theory of factor pricing
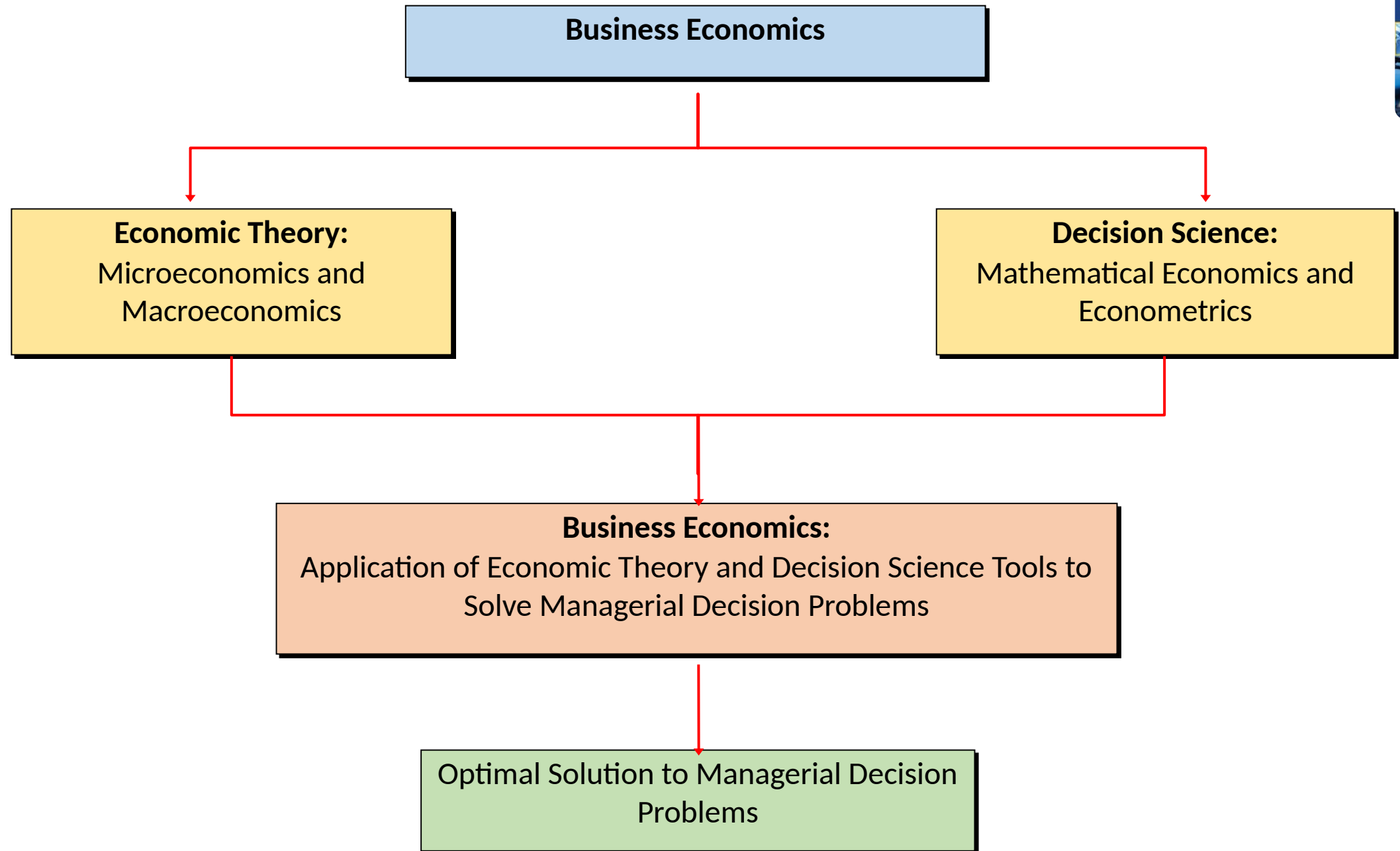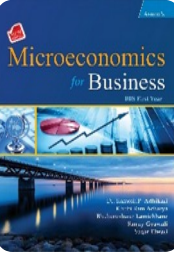5. Theory of economic welfare
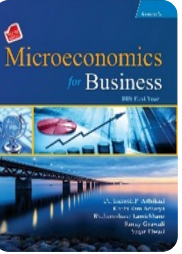
Uses/ Importance of Microeconomics

1. Understanding functioning of the economy
2. Helpful to formulate economics policies
3. Helpful to study human behaviour
4. Helpful in efficient allocation of resources
5. Useful in international trade
6. Basis of welfare economics
7. Helpful in business decision making

Limitations of Microeconomics

1. Static analysis
2. Wrong conclusions
3. Unrealistic assumptions
4. Limited scope
5. Ignores role of the government

Business Economics: Nature and Scope

- Business economics is defined as the branch of economics which uses economic principles and methods to business practices.

- It is a relatively new branch of economics.

- It was born in 1950s. In the management studies the term, 'Business Economics' and 'Managerial Economics' are often synonyms.

- Both terms are used interchangeably.

- In other words, business economics is also called managerial economics or economics of firm.

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│  Economic Theory:    │    │   Decision Science:      │
│  Microeconomics and  │    │  Mathematical Economics  │
│   Macroeconomics     │    │    and Econometrics      │
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│                 Business Economics:                 │
│  Application of Economic Theory and Decision Science│
│   Tools to Solve Managerial Decision Problems       │
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        │  Optimal Solution to Managerial   │
        │       Decision Problems           │
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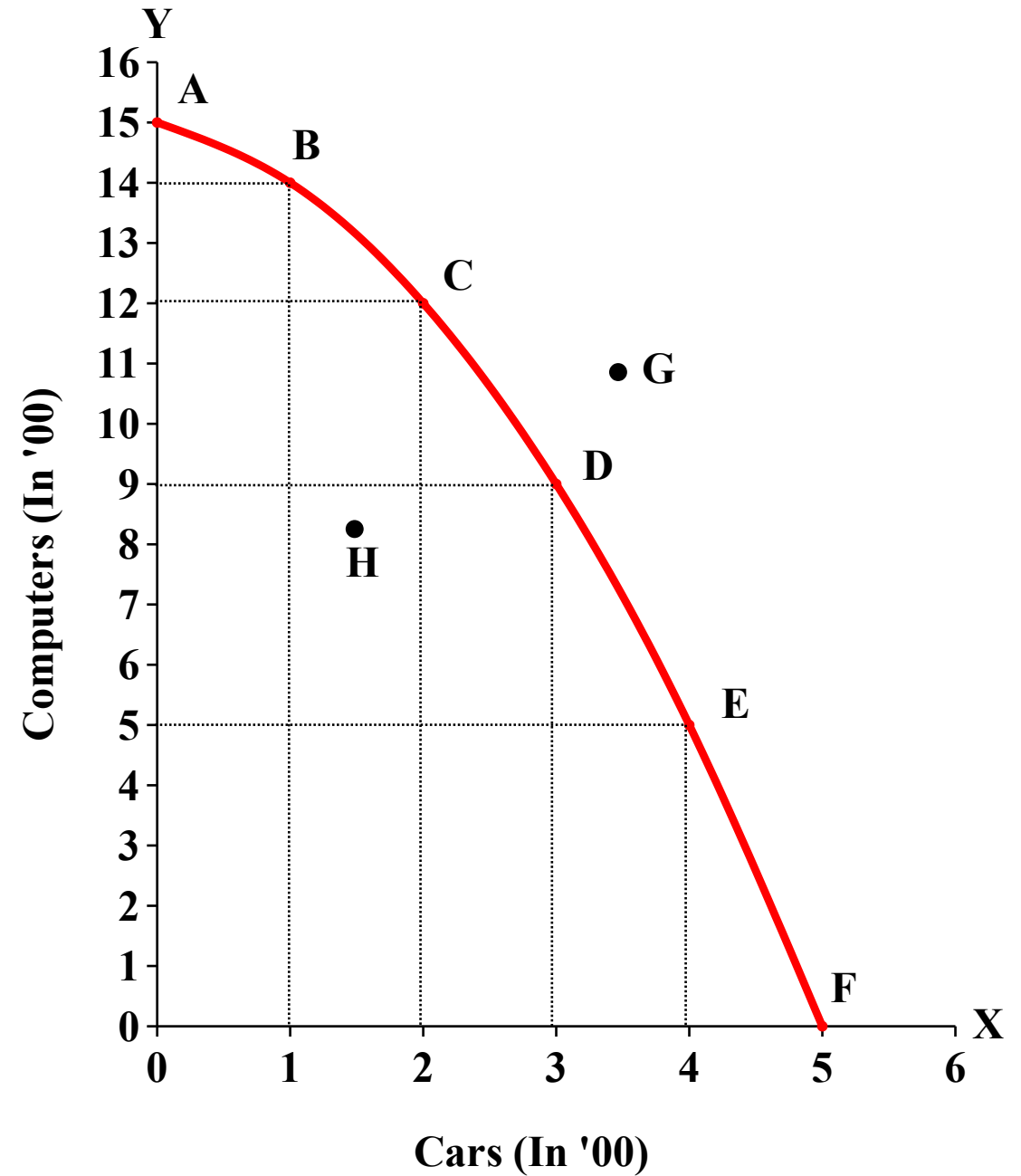
Scope of Business Economics

1. Demand analysis and forecasting
2. Theory of production and cost analysis
3. Price theory or theory of exchange
4. Theory of profit
5. Theory of capital and investment
6. Business environment

Basic Concepts of Economics
Production Possibility Curve (PPC)

- Production possibility curve is defined as the locus of different combinations of any two goods that an economy can produce by the full utilization of its existing resources.

- It is the graphical explanation of scarcity, choice and opportunity cost.

- It is also known as the production possibility frontier.

- It is useful to show the concept of scarcity, choice, and opportunity cost among other things.

Basic Concepts of Economics
Production Possibility Curve (PPC) Contd…

Assumptions

- There is no change in technology.
- There is perfect mobility of factors of production from one use to another.
- There is full and efficient utilization of resources in the economy.
- All the resources are scarce or limited.
- There is production of only two goods.

Production Possibilities	Cars (In '00)	Computers (In '00)
A	0	15
B	1	14
C	2	12
D	3	9
E	4	5
F	5	0

Shift in Production Possibility Curve (PPC)

- The production potential of a country is constantly changing.

- If its capacity to produce goods and services increases, the production possibility curve will shift outward to the right and vice-versa.

- The shift in production possibility curve is shown in the figure.

Concept of Marginal Analysis and Incremental Analysis

Marginal Analysis

- Marginal analysis is the study of additional benefits of an activity compared to the additional cost incurred by the same activity.

- Marginal refers to the extra cost or extra benefit of the 'next' unit or individual.

- It is used to determine if the costs associated with the change in activity will result in a benefit that is sufficient enough to balance them.

- The most important use of marginal analysis in microeconomics is to determine optimum level of output by a firm, which maximizes profit.

Concept of Marginal Analysis and Incremental Analysis Contd…

- It is also a basic economic principle which is very useful to make business decision making.

- According to marginal analysis, so long as marginal benefit of an activity (such as expanding output or sales) exceeds marginal cost, it encourages firm to expand its output.

- The total net benefit or profit is maximized when marginal benefit or marginal revenue equals to marginal cost.

Concept of Marginal Analysis and Incremental Analysis Contd.

Incremental Analysis

- Incremental analysis is a broader concept than marginal analysis.

- It is economist's generalization of marginal concept.

- It involves alternative managerial decision or courses of action on revenues, costs, and profits.

- It focuses on the changes or difference between the available alternatives.

- The incremental change is the change resulting from a given managerial decision.

- Incremental analysis is the decision making technique used in business to determine the true cost difference between alternatives.

Concept of Marginal Analysis and Incremental Analysis Contd.

- It helps firms to decide whether or not to accept a special order.

- The incremental revenue, incremental cost and incremental profit are the total change in revenue, cost and profit respectively due to implementation of a decision.

- If firm's decision reduces cost of production, it should be made.

- But if its decision increases cost more than revenue, it should not be made.

Static and Dynamic Equilibrium Analysis in Microeconomics

- In microeconomics, equilibrium refers to a situation in which the market price reaches to the level at which quantity supplied equals quantity demanded.

- Equilibrium analysis in microeconomics is divided into following three types:

1. Micro Static Analysis

2. Comparative Micro Static Analysis

3. Micro Dynamic Analysis

Micro Static Analysis

- Micro static analysis is the static relationship between microeconomic variables whose values relate to the same point of time or to the same period of time.

- It assumes that there will be no change in relationship between the variables.

- It shows equilibrium situation at the specified time.

Comparative Micro Static Analysis

- Comparative micro static analysis is the comparative study between different equilibrium positions determined from the interaction between microeconomic variables at different points of time.

- It compares the equilibrium positions at different periods of time.

Micro Dynamic Analysis

- Micro dynamic analysis is the analysis of the process through which the system moves from one equilibrium to another.

- It explains the lagged relationship between the microeconomic variables.

- It studies models involving time and path through which new equilibrium in the market is established.

- It provides answer to the causes of breaking initial equilibrium and establishing new equilibrium.
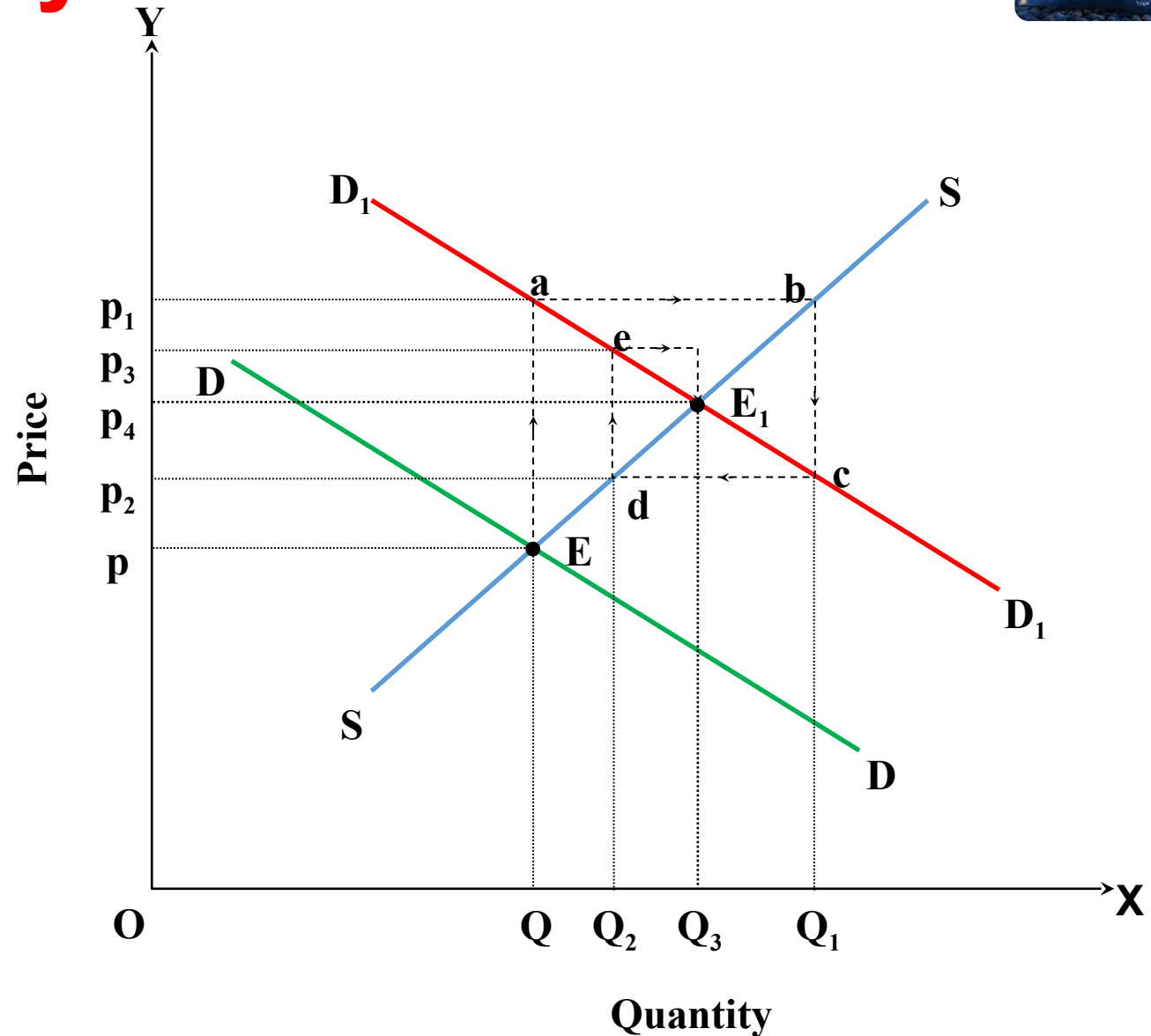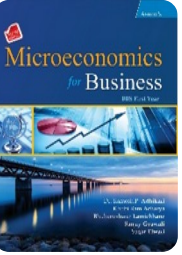
Ten Principles of Economics

- Economics is the study of how society manages its scarce resources.

- In most of the societies, resources are allocated by millions of households and firms.

- Economics, therefore, studies how people make decisions, i.e. how much they work, what they buy, how much they save, and how they invest their savings.

- Economics also studies about how people interact with one another.

- Economics analyses forces and trends that affect the economy as a whole including the economic growth, unemployment, inflation, etc.

- Ten Principles of Economics given by **N.G. Mankiw** consists of many central ideas of economics.
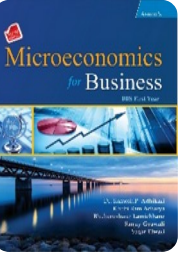
Ten Principles of Economics Contd.

How people make decisions

Principle 1   :   People face trade-off

Principle 2   :   The cost of something is what you give up to get it

Principle 3   :   Rational people think at margin

Principle 4   :   People respond to incentives

How people interact

Principle 5   :   Trade can make everyone better off

Principle 6   :   Markets are usually a good way to organize economic activity

Principle 7   :   Governments can sometimes improve market outcomes

Ten Principles of Economics Contd.

How economy as a whole works

Principles 8 :   A country's standard of living depends on its ability to produce goods and services

Principle 9   :   Prices rise when government prints too much money

Principle 10 :   Society faces a short run trade-off between inflation and unemployment

Thank You
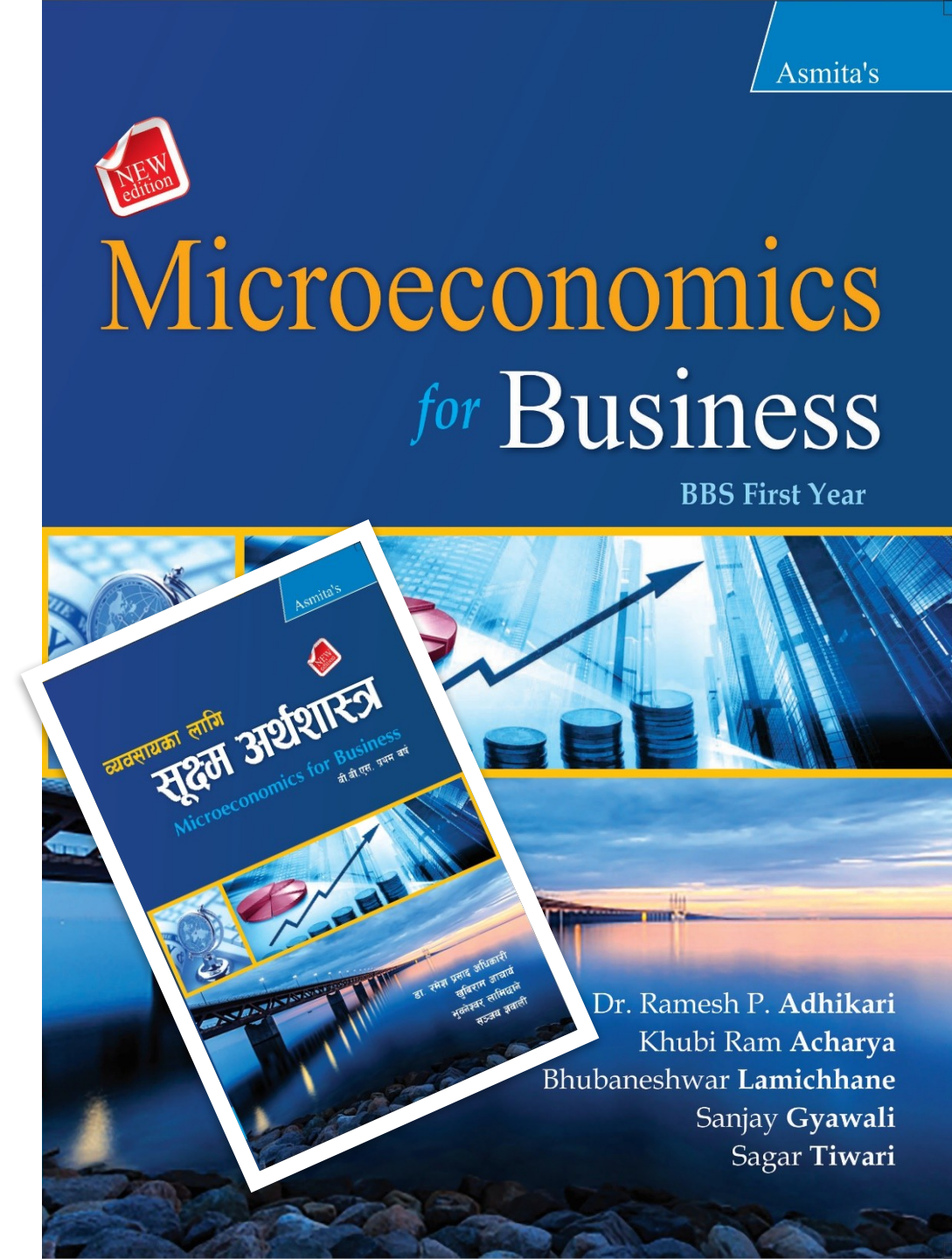
Product Pricing: Theories and Practices

Unit 7
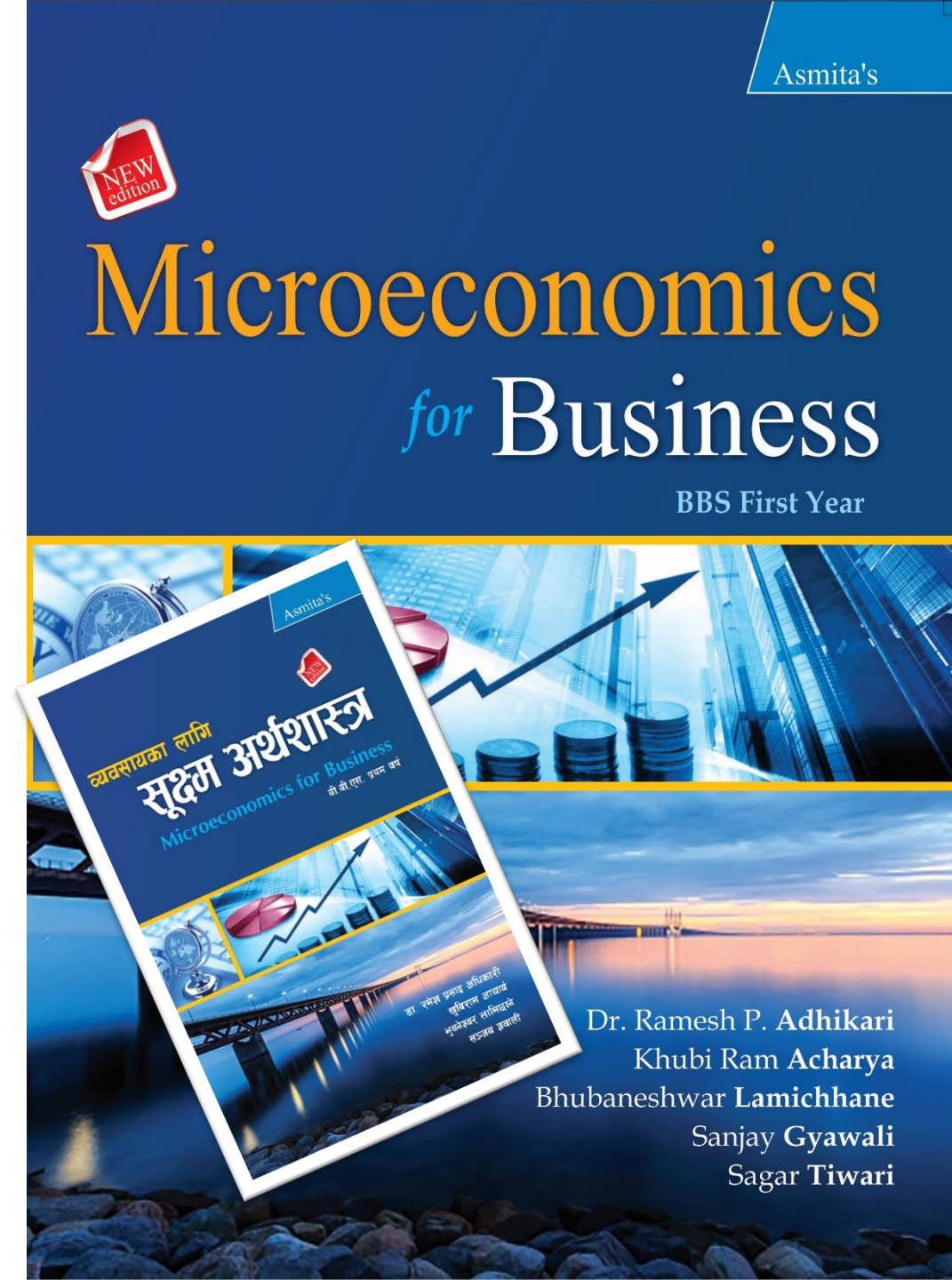
Learning Objectives

On completion of this unit, students will be able to:

- define different market structures and explain their characteristics
- illustrate the profit maximizing goal of firm
- describe the process of price and output determination under different market structures
- derive short–run supply curve of a firm and industry under perfect competition
- point out the economic effects of monopoly
- explain how a monopolistically competitive firm attains equilibrium under product variation and selling expenses
- define cartel and explain its types
- explain about pricing under joint profit maximization cartel
- give an introduction of various pricing practices in the real world.

Introduction

- The theories of product pricing are concerned with the determination of equilibrium price and quantity of the output in the different market structures.

- The way in which price and quantity of output are determined depends on the market structure.

- The determination of price and quantity of output under different market structures is very crucial for business decision making.

- The success of the business also depends on the determined price and quantity of the output.

Market Structure: Concept and Characteristics

- The forces behind the demand and supply play a vital role in the determination of price of output.

- But the way in which these two factors determine the price of output depends on market structure i.e., how the firms are organized.

- Thus, the pricing of output depends on how product markets are organized, that is whether there are one, two or many firms or producers, whether the product is homogeneous, and so on.

- The market structure refers to the characteristics or structural variables of the market that affect managerial decisions.

- These characteristics are: the number of firms competing in a market, the relative size of firms, technological and cost conditions, demand conditions and the ease with which firms can enter or exit the industry.

Characteristics Market Structure

1.   Number of firms in the industry
2.   Size of the firm
3.   Industry concentration
4.   Technology used to produce goods and services
5.   Demand and market conditions
6.   Potential for entry

Perfect Competition

Definition

Perfect competition is the market structure in which there are many buyers and sellers of a homogeneous product. Under this market structure, the price of a product is determined in the industry and the sellers and buyers accept that price, so the price is fixed.

Characteristics of Perfect Competition

1. Large number of sellers and buyers
2. Homogenous products
3. Free entry and exit
4. Perfect mobility of factors of production
5. No government intervention
6. Perfect knowledge about the market
7. Profit maximization objective
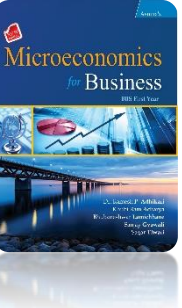
Monopoly

Definition

Monopoly is defined as the market structure where there is a single seller of a product having no close substitutes. The word 'monopoly' has been derived from the Greek words 'monos polein', which means 'alone to sell'.

Characteristics of Monopoly

1. Single seller
2. No close substitutes
3. Barriers to entry
4. Firm and industry
5. Independent price policy
6. Price discrimination
7. Profit maximization

Monopoly Contd.

Factors that give rise to Monopoly (Sources of Monopoly)

1.   Patent over new innovations

2.   Control over the raw materials

3.   Cost of establishing an efficient plant

4.   Market franchises
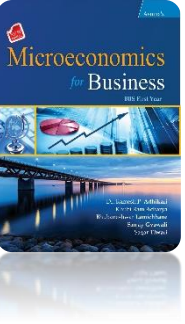
Monopolistic Competition

Definition

Monopolistic competition is defined as the market structure where there are many sellers and buyers of differentiated or heterogeneous product. Differentiated products are products that are similar but not identical.

Characteristics of Monopolistic Competition

1. Large number of sellers and buyers
2. Differentiated Product
3. Free entry and exit of firms
4. High selling cost
5. Relatively elastic demand curve
6. Heroic assumption
7. Profit maximizing objective

Oligopoly

Definition

Oligopoly is a form of market structure where there are a few sellers of homogeneous or differentiated products. If the products are homogeneous, it is called homogeneous or perfect or pure oligopoly and if products are differentiated, it is called heterogeneous or differentiated or imperfect oligopoly.

Characteristics of Oligopoly

1.   A few sellers
2.   Interdependence of decision making
3.   Barriers to entry
4.   Indeterminate price and output
5.   Advertising and selling cost
6.   Nature of the product
7.   Price rigidity

Non-collusive oligopoly and Collusive oligopoly

- **Non–collusive oligopoly** is one of the two types of oligopoly market in which oligopoly firms act independently, they is competition with one another and there is no-collusion between the firms.

- **Collusive oligopoly** is another type of oligopoly market where firms have been found to be in some kind of collusion or agreement. There are mainly two models of collusive oligopoly which are:

  1.Cartel: It is a type of collusive oligopoly market, where firms or sellers of a commodity are formally organized with the aim of restricting competition and maximizing profits.

  2.Price Leadership: The form of market collusion in oligopolistic markets whereby the firm that serves as the price leader initiates a price change and other firms in the industry soon match it.

Profit Maximizing Goal of the Firm

- The main objective of a firm is to maximize profit. The firm will maximize profit, when it attains equilibrium. The firm's equilibrium is the condition that, once achieved, tends to persist means that the firm has no tendency to change its behaviour. Thus, a firm is maximizing its profit when it is in equilibrium.

- There are two approaches to analyze firm's equilibrium or profit maximization. They are:

  1. Total revenue and total cost approach (TR-TC Approach)
  2. Marginal revenue and marginal cost approach (MR-MC Approach)

Total Revenue and Total Cost Approach (TR-TC Approach)

- In terms of total revenues and costs, the total profit (π) is the difference between total revenue (TR) and total cost (TC), i.e. $\pi =$ TR$-$TC.

- As total revenue (TR) = P $\times$ Q, and the total cost (TC) = AC $\times$ Q, given the per unit revenue (AR or P) and per unit cost (AC) in the short$-$run, the total profit depends on the quantity produced and sold (Q).

- Here, we assume all quantity produced by the firm is sold in the market. So, to achieve the goal of profit maximization, the firm has to seek a production or sales level that makes the largest positive difference between TR and TC.

- In other words, the total profit is maximized at the level of production or sale (Q) where the positive difference between TR and TC is maximum.

Maximum Profit (π) = TR $-$ TC

Total Revenue and Total Cost Approach (TR-TC Approach) Contd.

1. Short-run Equilibrium of a Firm under Perfect Competition Market by Using TR-TC Approach

- A perfectly competitive firm attains equilibrium or maximizes profit in the short-run at that level of output at which the positive difference between TR and TC, is maximum.

Total Revenue and Total Cost Approach (TR-TC Approach) Contd.

2. Short-run Equilibrium of Firm under Monopoly Market by Using TR-TC Approach

- According to the TR –TC approach, a monopoly firm attains equilibrium or maximizes its profit in the short-run at the level of output and price at which the positive total difference between TR and TC is maximum.
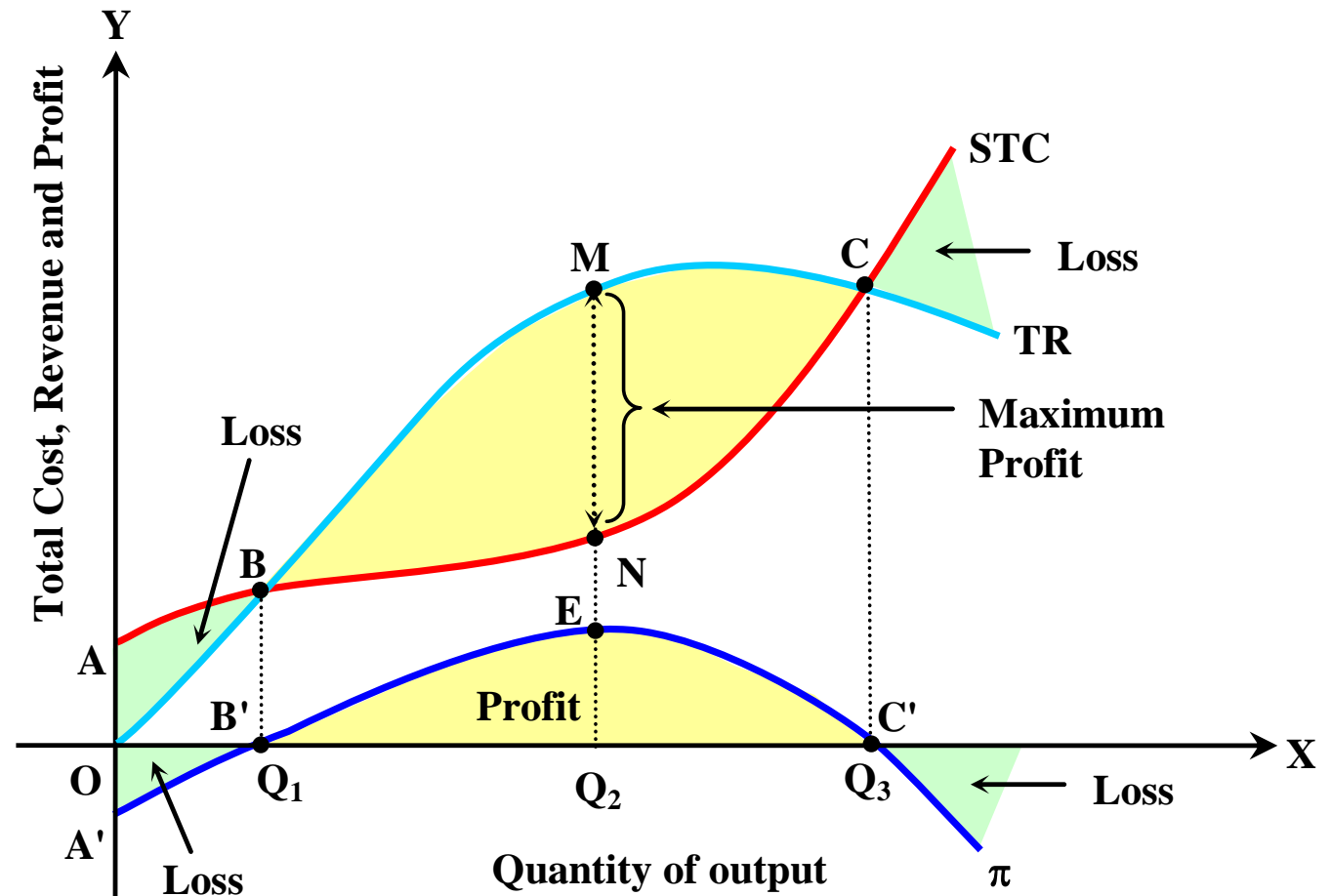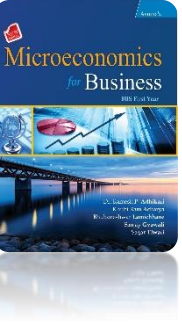
Marginal Revenue and Marginal Cost Approach (MR-MC Approach)

- The marginal revenue and marginal cost approach(MR–MC approach) is even more widely used to determine the equilibrium level of output or the profit maximizing level of output of the firm.

- A profit maximizing firm will be in equilibrium when the following two conditions are fulfilled:

  1. **Marginal revenue should be equal to marginal cost (MR = MC).** This condition is also known as necessary condition or first order condition.

  2. **Marginal cost (MC) curve must intersect marginal revenue (MR) curve from below.** In other words, slope of MC curve should be greater than slope of MR curve .This condition is also known as sufficiency condition or second order condition.

Marginal Revenue and Marginal Cost Approach (MR-MC Approach) Contd.

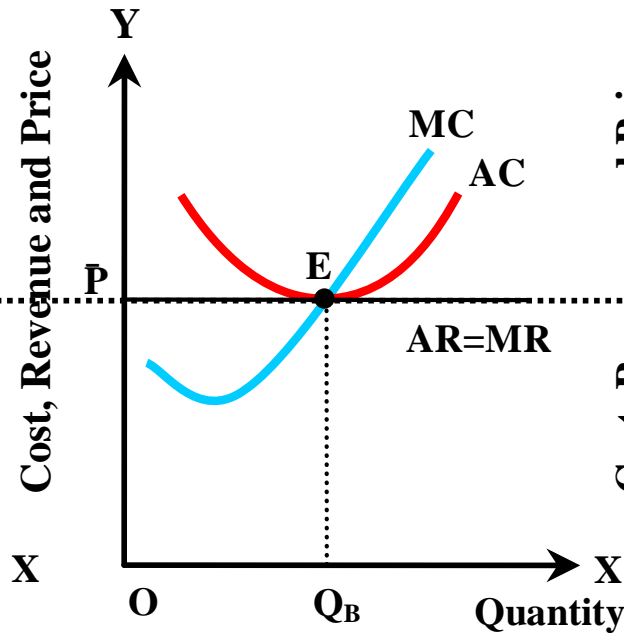1. **Short-run Equilibrium of a Firm under Perfect Competition by Using MR-MC Approach**

- Under perfect competition, marginal revenue and price (average revenue) are equal i.e. P = AR = MR, therefore marginal revenue curve coincides with AR curve.
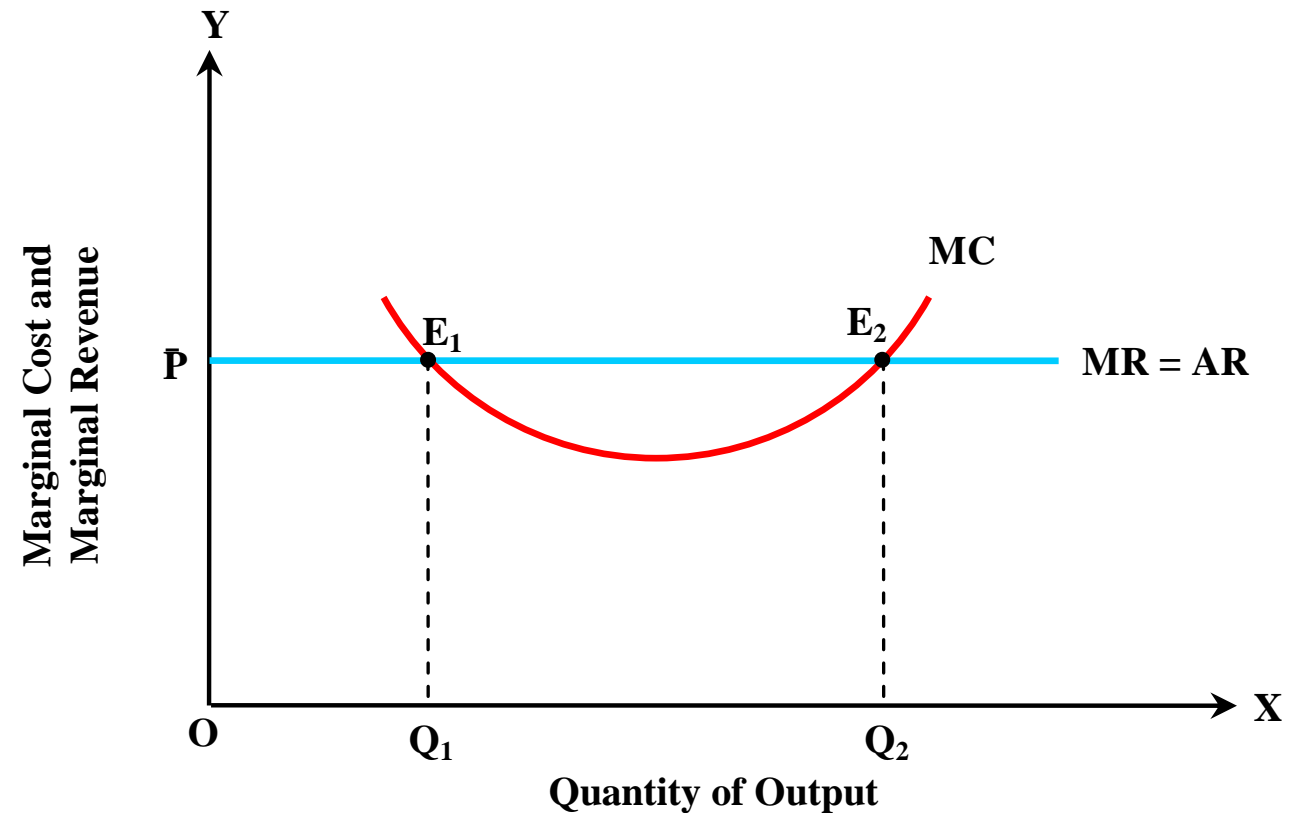
Marginal Revenue and Marginal Cost Approach (MR-MC Approach) Contd.

2. Short-run Equilibrium of Firm under Monopoly Market by Using MR-MC Approach

- The marginal revenue (MR) curve of the monopoly firm also slopes downward but it passes from the below of the average revenue curve.

- The marginal cost curve of the firm is roughly U-shaped.
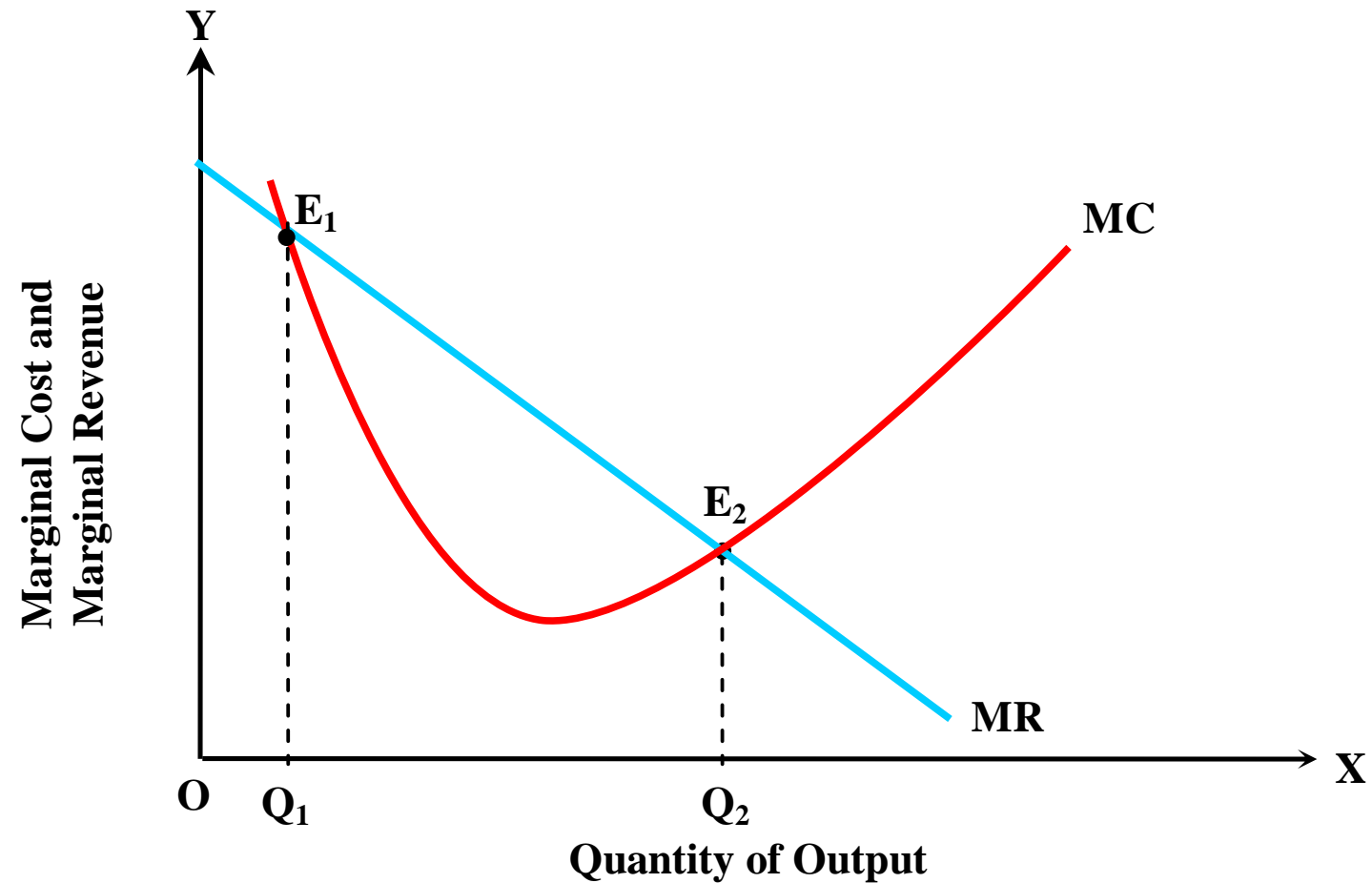
Price and Output Determination under Perfect Competition

- Under perfect competition, the industry or market determines the price of the product by the interaction of market demand and market supply curves and the firms under the industry accept the price determined by the industry.

- The firms determine only the level of output and they have to sell their products at the price determined by the industry.

- So the price for the firms is constant or fixed.

- Therefore, the firm under perfect competition faces horizontal straight lined demand curve (AR curve) which coincides with MR curve.

- Hence, under perfect competition, P = AR = MR, but the cost conditions of the firms under an industry may be different.

- Price and output determination or equilibrium of firm under perfect competition in the short-run and long-run is explained below.

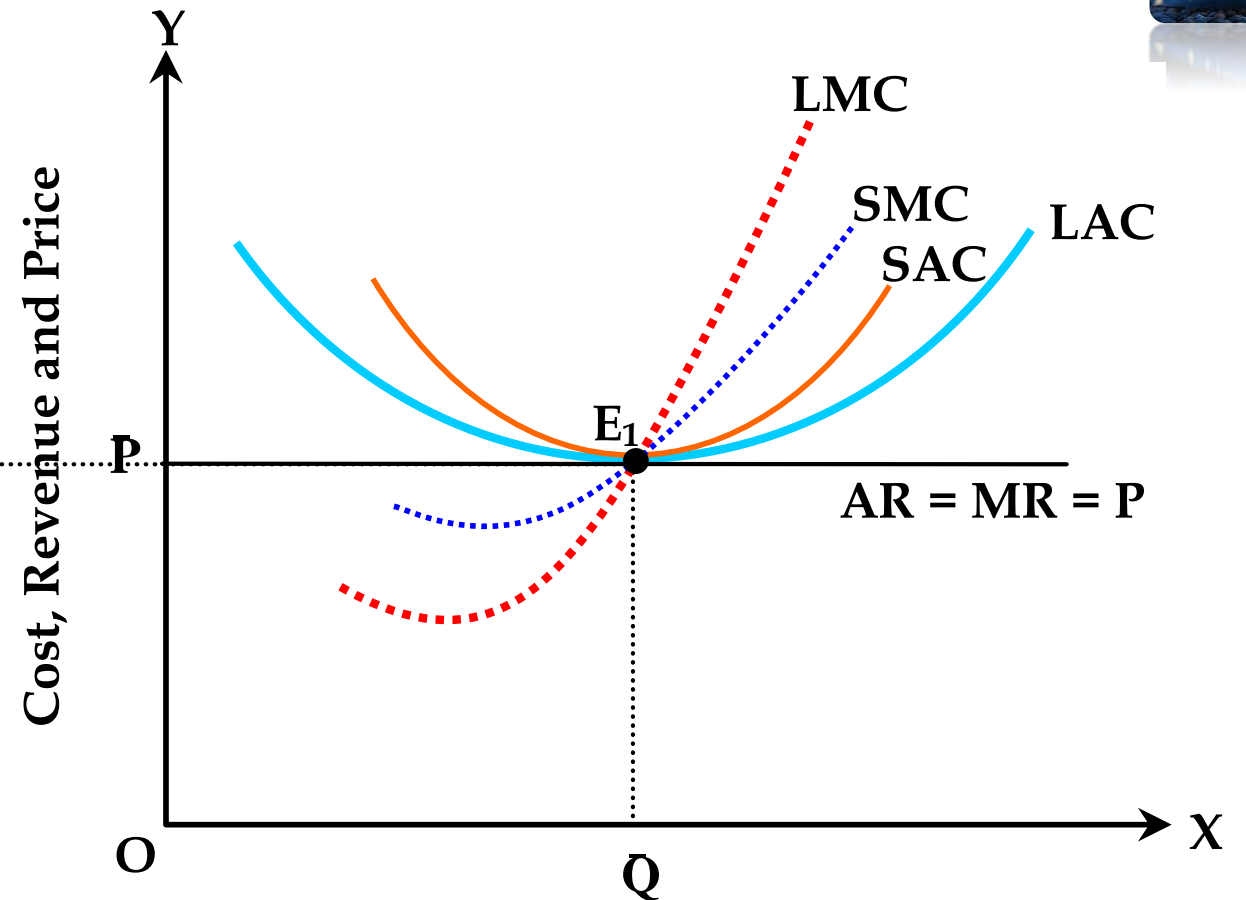# Price and Output Determination under Perfect Competition Contd.
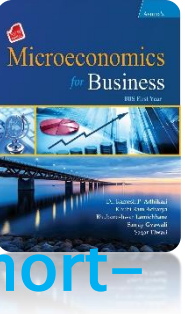
1. Price and output determination under perfect competition in the Short-run (Short-run equilibrium)

- Under perfect competition, marginal revenue and price (average revenue) are equal i.e. P=AR=MR, therefore marginal revenue curve coincides with average curve. The average and marginal cost curves of the firm are roughly U-shaped.

- The short-run equilibrium of a firm under perfect competition requires:

    1. Market supply should be equal to market demand

    2. Marginal revenue must be equal to marginal cost, i.e. MR = MC.

    3. MC curve must intersect MR curve from below. At equilibrium, the perfectly competitive firm may earn excess profit, normal profit or even bear loss in the short-run.

- As the price and the number of firms in the industry is fixed, the competitive firm's profit and loss depends on the short-run average cost.
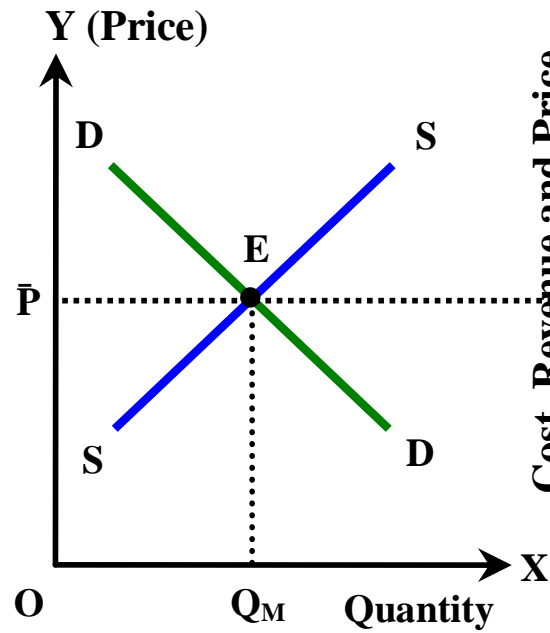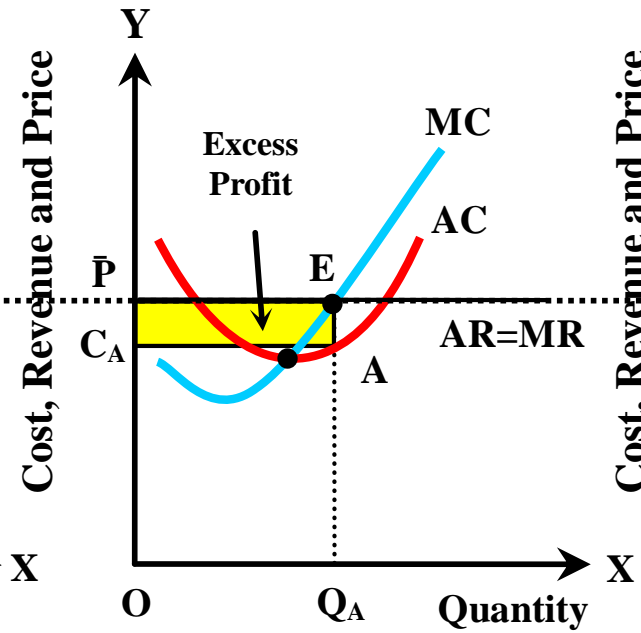
Y (Price)

Cost, Revenue and Price

D

S

E

P̄

S

D

O Q_M **Quantity**

X

Panel (a):
Industry's Equilibrium

Y

Cost, Revenue and Price

Excess
Profit

MC

AC

P̄

E

C_A

A

AR=MR

O Q_A **Quantity**

X

Panel (b): Short-run
Equilibrium of a firm
with Excess Profit

Y

Cost, Revenue and Price

MC

AC

P̄

E

AR=MR

O Q_B **Quantity**

X

Panel (c): Short-run
Equilibrium of a firm
with Normal Profit

Y

Cost, Revenue and Price

MC

AC

C_C

Loss

A

P̄

E

AR=MR

O Q_C **Quantity**

X
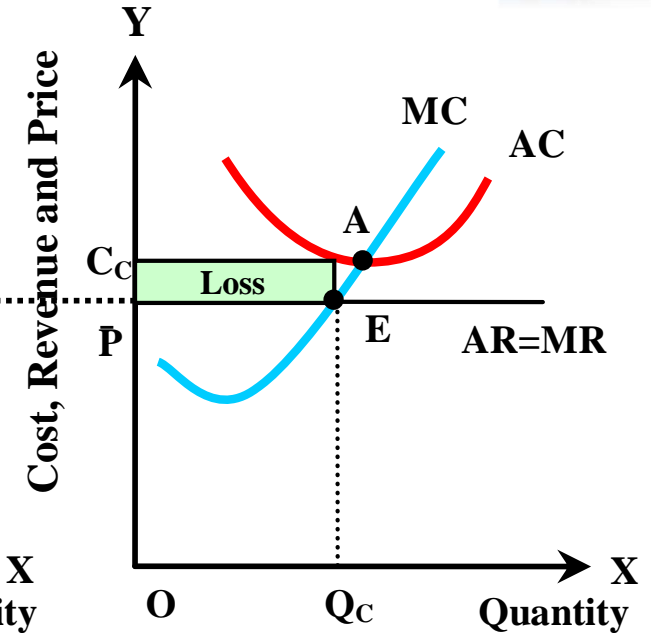
Panel (d): Short-run
Equilibrium of a firm
with Loss

Price and Output Determination under Perfect Competition Contd.
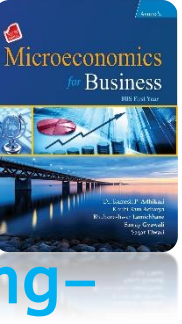
2. Price and output determination under perfect competition in the long-run (Long-run equilibrium)

- Under perfect competition, firms can easily enter into and exit out of the industry only in the long-run. And also existing firms have the option of adjusting the quantities of their fixed inputs in the long-run. Thus in the long-run, existing firms can make adjustments in their output and costs.

- Under perfect competition, the following conditions must be fulfilled for a firm in order to attain equilibrium in the long run:

    1.   Price (P) or average revenue (AR) or marginal revenue (MR) = long-run average cost (LAC) = long marginal cost (LMC) = short-run average cost (SAC) = short marginal cost (SMC)

    i.e. P = LAC = LMC = SAC = SMC

    2. LMC curve must intersect MR curve from below.

- Thus, under perfect competition market, whatever may be the profit loss situations (excess profit or normal profit or loss)in the short-run equilibrium, the firm earns just normal profit in the long-run

Y

Price

D

S

P .... E ....

S

D

O   Q$_M$ X
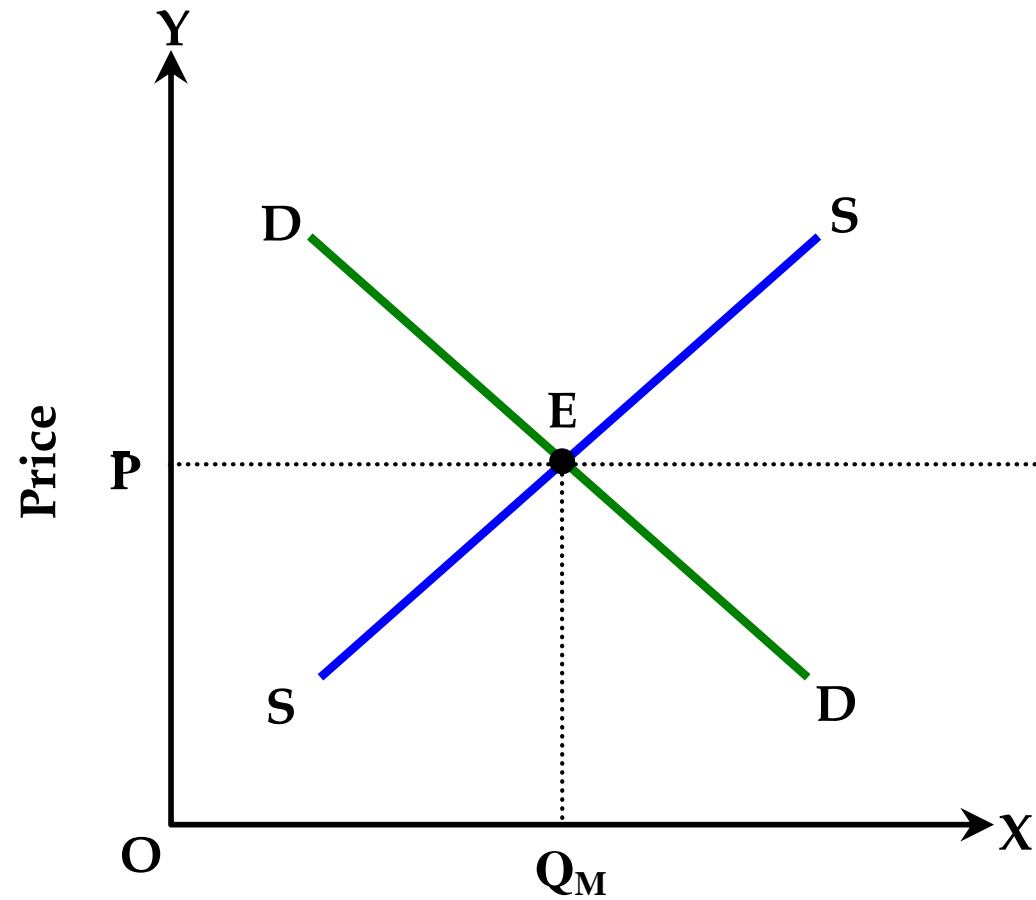
Quantity of Output
Panel (a): Industry's Equilibrium

Y

Cost, Revenue and Price

LMC

SMC

LAC

SAC

P .... E$_1$ .... **AR = MR = P**

O   Q   X

Quantity of Output
Panel (b): Long-run Equilibrium of
the firm with Normal Profit

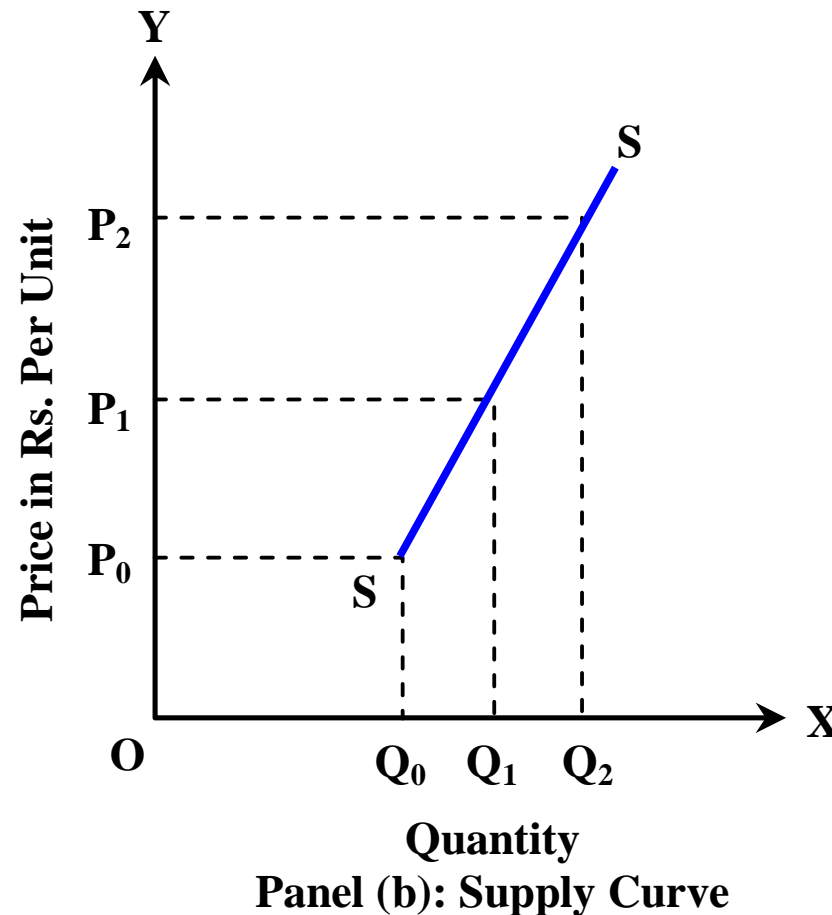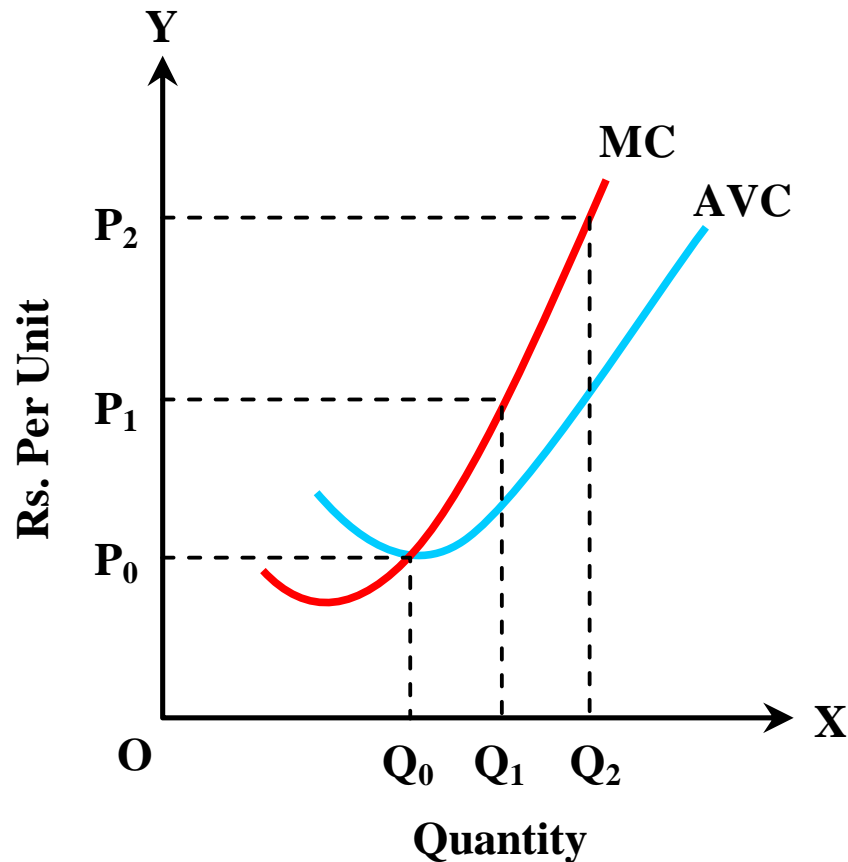# Derivation of Short-run Supply Curve of a Firm and an Industry under Perfect Competition
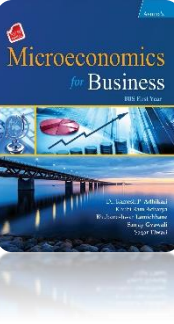
- The demand curve that a competitive firm faces for its output is almost horizontal line.

- Similarly, we know that the competitive firm in the short run will be in equilibrium or will maximize profit at the point where MR = MC and MC curve is rising.

- But for the firm the price is constant and, hence marginal revenue (MR) and average revenue(AR) are constant and equal to price(P).
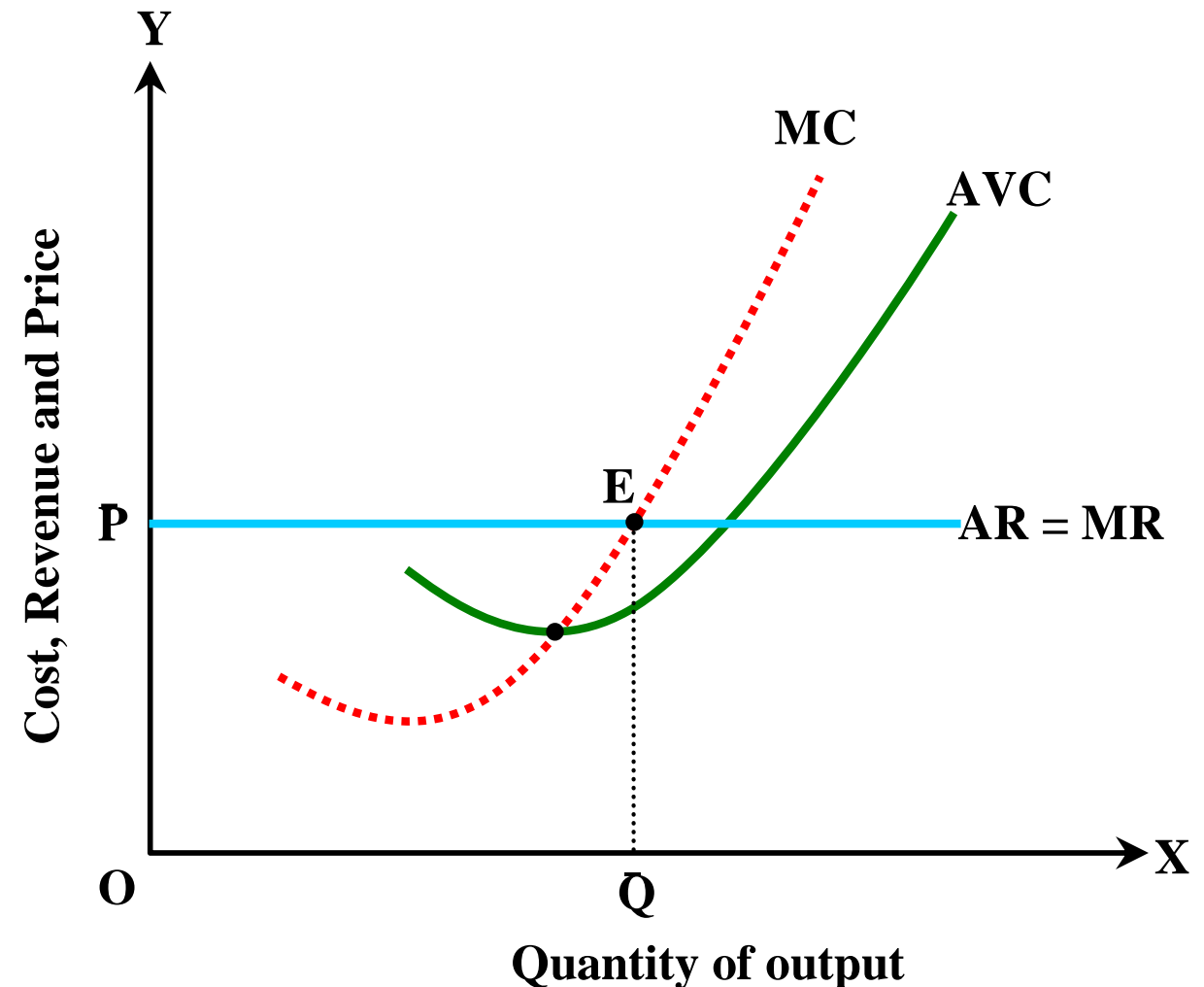
- Thus the short run

Derivation of Short-run Supply Curve of a Firm and an Industry under Perfect Competition Contd.
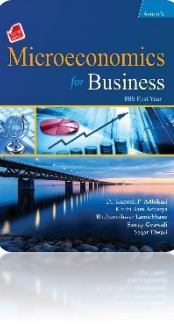
- If we vary the price (but, P > AVC), we get different level of output.
- The rising portion of firm's MC curve above the AVC curve gives the short run supply curve of the competitive firm.


Panel (a): MC and AVC Curves

Panel (b): Supply Curve

Derivation of Short Run Supply Curve of an Industry

- An industry, under perfect competition, can be defined as the group of firms producing homogeneous product.

- The short run supply curve of an industry is normally upward sloping and shows the positive relationship between price and quantity supplied by the industry.
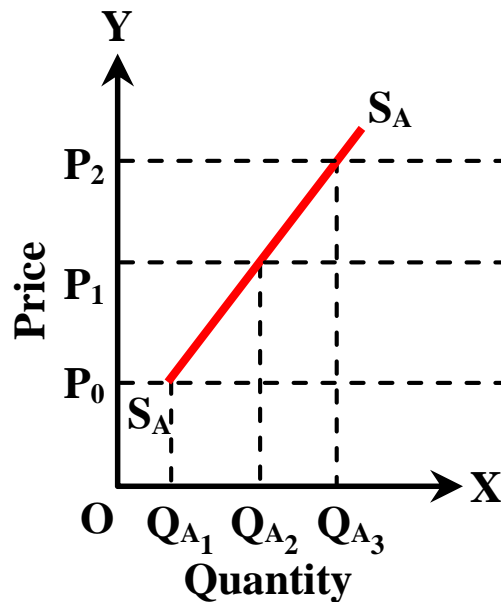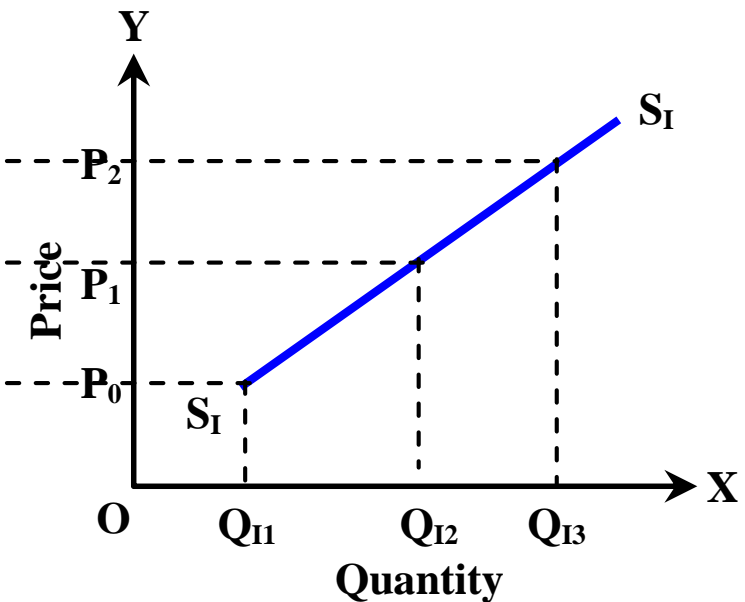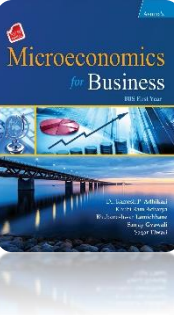

Panel (a): Supply curve of firm A
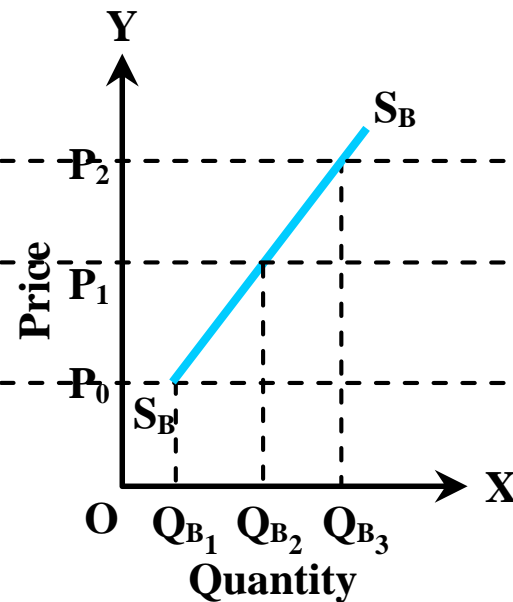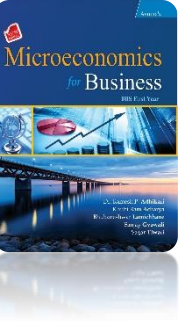
Panel (b): Supply curve of firm B
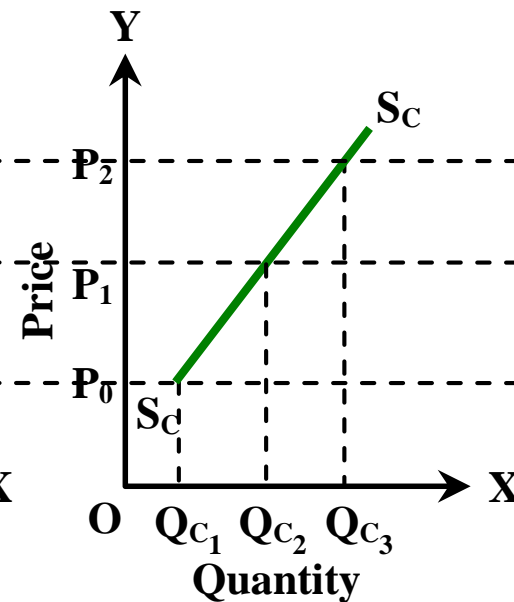
Panel (c): Supply curve of firm C

Panel (d): Supply curve of Industry

Price and Output Determination under Monopoly

- The demand curve facing the monopolist is the market demand curve which is downward sloping.

- The average revenue curve coincides with the demand curve.

- Because the average revenue curve slopes downward, the MR curve also slopes downward and passes from the below of average revenue curve because the monopolist charges a single price on all the units sold, MR is less than price.
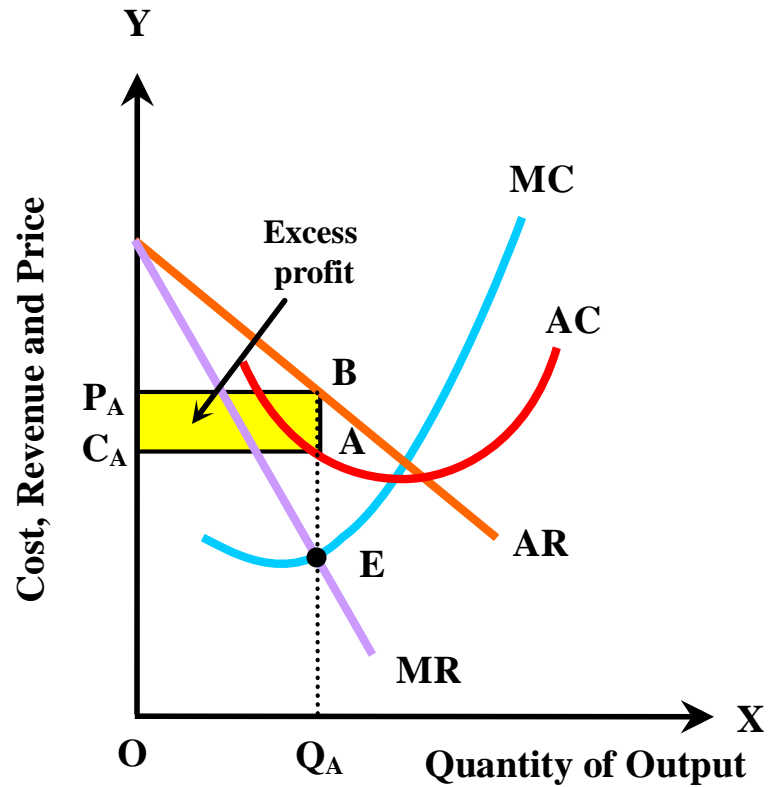
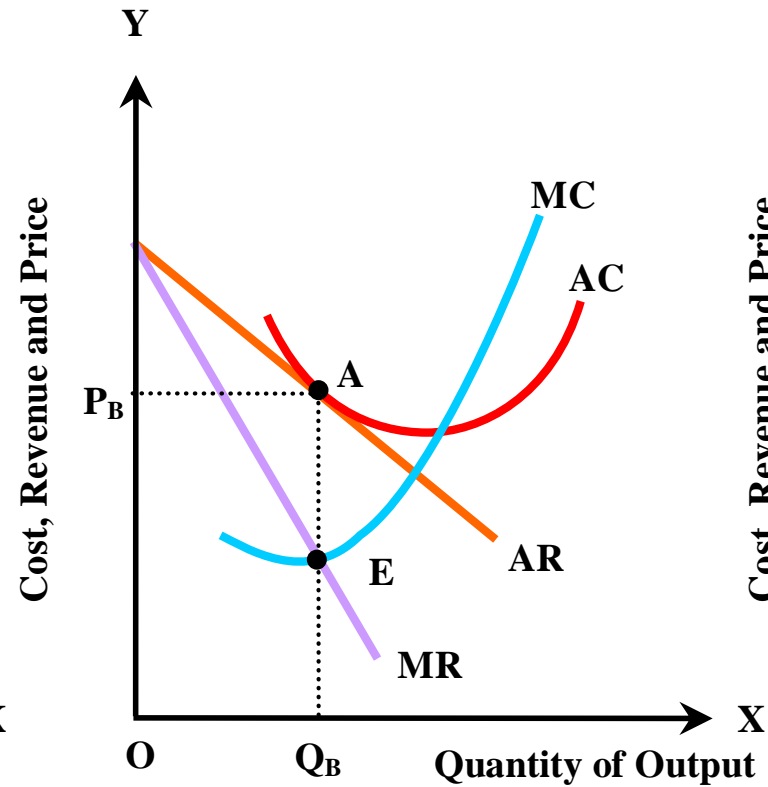# Price and Output Determination under Monopoly Contd.
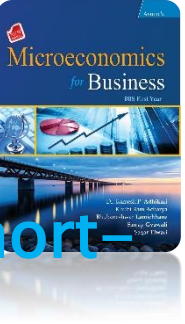
1. Price and output determination under monopoly in the short-run (Short-run equilibrium)

- Short-run refers to that period of time in which the monopolist cannot change the fixed factors like plant and machinery.

- However, the monopolist is free in making price decision due to the entry of new firms blocked and having no close substitutes of its products.

- It means that the monopolist sets the price of the product.

- The monopolist maximizes profit or attains equilibrium by selecting the output at the point where, MR = MC and MC curve is rising.

- The monopolist can charge the highest price that s/he can get for this output, according to the demand curve. But the equilibrium output does not imply that the monopolist can earn profit.

- The profit or loss situation depends on the cost structure of the firm.

- Thus, the short-run equilibrium of monopolist requires:

  1. Marginal revenue must be equal to marginal cost, i.e. MR = MC.
  2. MC curve must intersect MR curve from below.

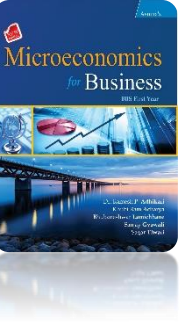**Panel (a): Short-run Equilibrium of a firm with Excess Profit**

Panel (b Short-run Equilibrium of a firm with Normal Profit
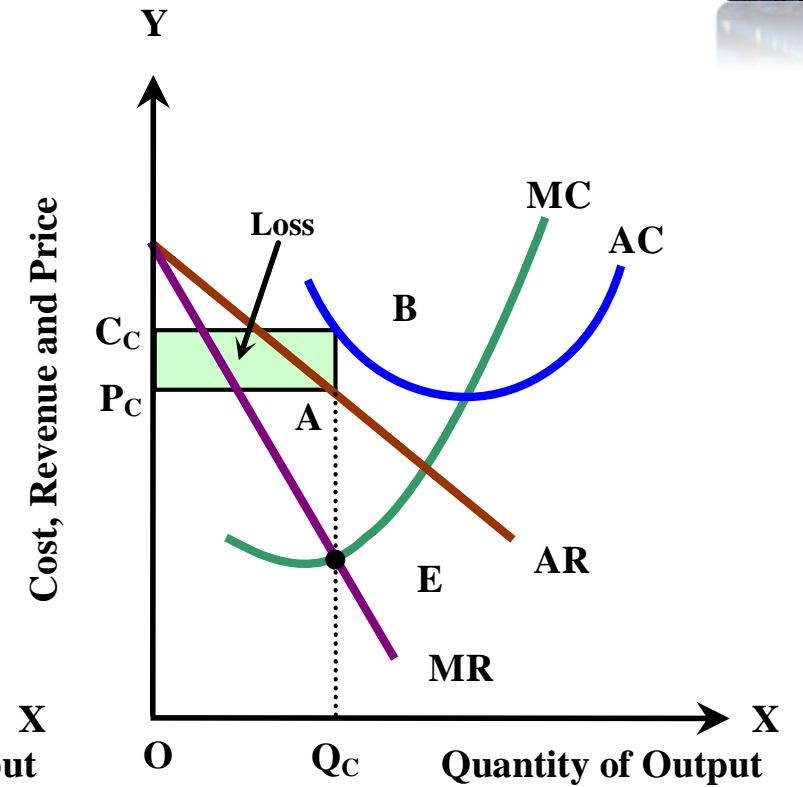
Panel (c): Short-run Equilibrium of a firm with Loss

Price and Output Determination under Monopoly Contd.

2. Price and output determination under monopoly in the long-run (Long-run Equilibrium)

- Long-run is a period of time in which a monopoly firm can rearrange its production techniques and size of production plant.

- Under the monopoly, as the entry of new firms blocked and there are no any close substitutes of the product, the firm will remain in the business if there is no loss in the long-run.

- The long-run equilibrium requires the following conditions:

  1. MR = LMC
  2. LMC curve must intersect MR curve from below.

Economic Effects of Monopoly

1.   **Adverse or negative economic effects of monopoly**
     a.   Allocative inefficiency
     b.   Productive inefficiency
     c.   Loss of social welfare and dead-weight loss
     d.   Contributes income inequality
     e.   Lacks to improve product/Reduce innovation
     f.   Cost inefficiencies
2.   **Positive economic effect of monopoly**
     a.   Promotes innovation
     b.   Benefit from the economies of scale
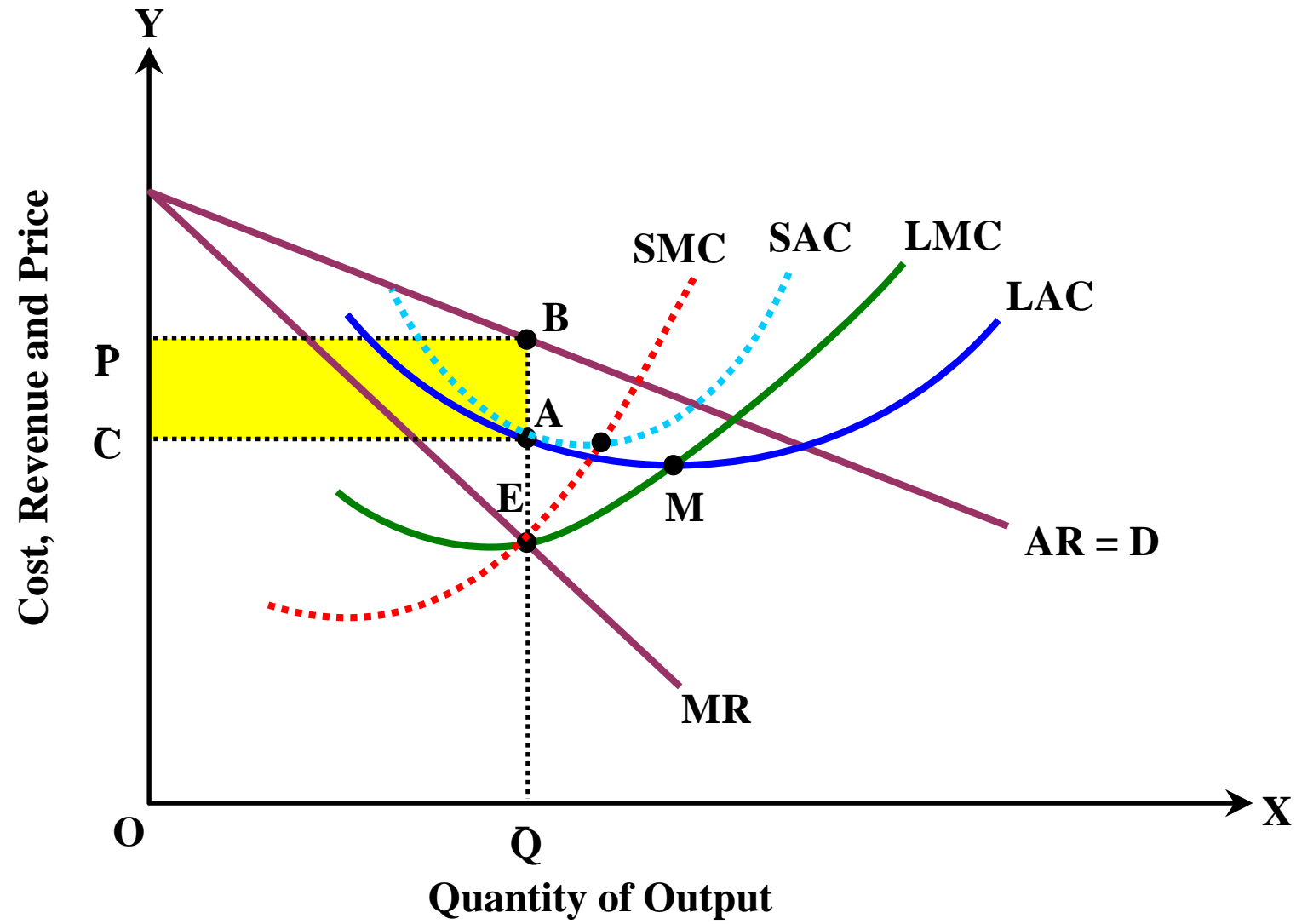
Economic Effects of Monopoly

c. **Loss of social welfare and dead–weight loss**

For the illustration of the loss of social welfare and dead–weight loss we assume a constant cost industry. The long run cost conditions of the both perfectly competitive firm and monopolist are same and shown by LAC = LMC curves. The revenue conditions of both the firms are different and shown by AR and MR curves. Here, illustration is made based on the long–run because long–run equilibrium is stable

Deadweight Loss or Social Cost

Monopolist's Profit

$LAC = LMC = AR = MR$

$AR = D$

MR

Cost, Revenue and Price

Quantity of Output

Price and Output Determination under Monopolistic Competition

1. **Price and output determination under monopolistic competition in the short-run (Short-run equilibrium)**

- The demand curve of the firm under the monopolistic competition is negatively sloped and highly price elastic as compared to that of the monopoly firm.

- As the demand curve of the firm is negatively sloped, the corresponding marginal cost curve is also negatively sloped.

- The short-run equilibrium of monopolistically competitive firm requires:

    1.   Marginal revenue must be equal to marginal cost, i.e. MR = MC.

    2.   MC curve must intersect MR curve from below.

- At equilibrium, the monopolistically competitive firm may earn excess profit or normal profit or even bear loss (as long as P ≥
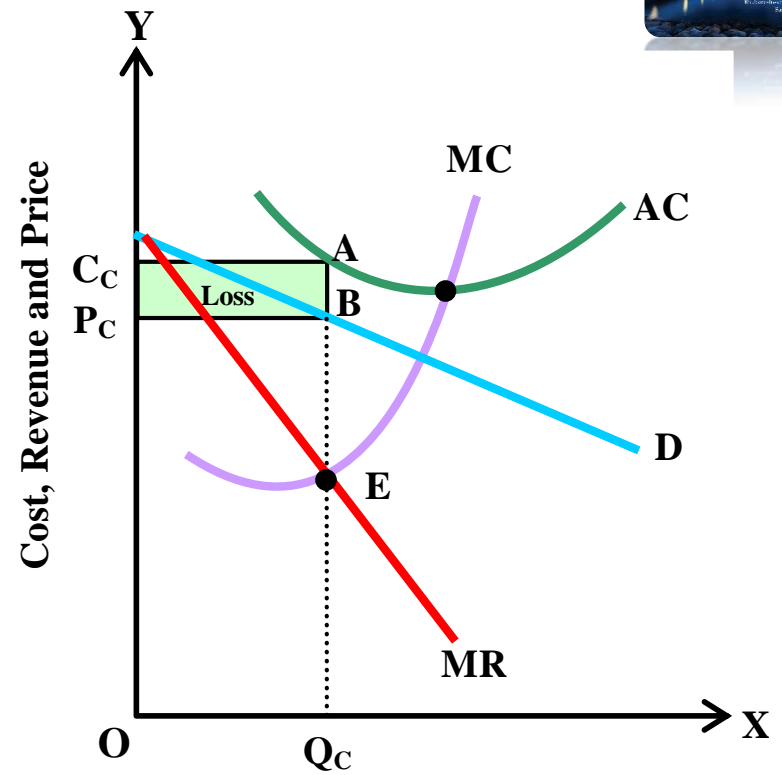
Quantity of Output
Panel (a): Short-run Equilibrium of a firm with Excess Profit
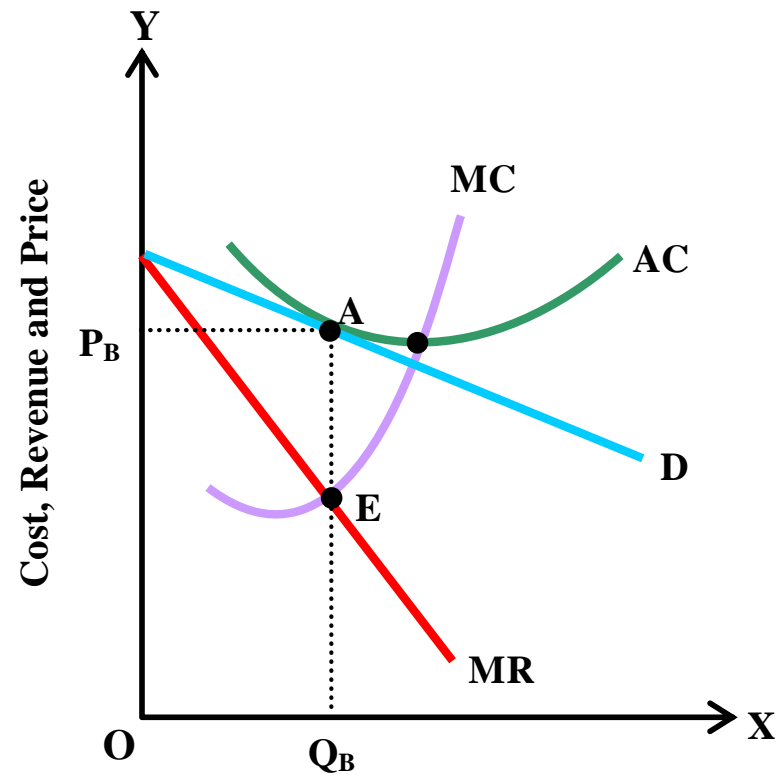
Quantity of Output
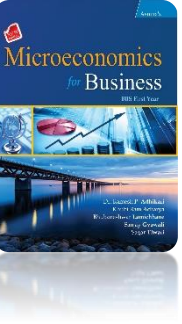**Panel (b): Short-run Equilibrium of a firm with Normal Profit**

Quantity of Output
Panel (c): Short-run Equilibrium of a firm with Loss

Price and Output Determination under Monopolistic Competition Contd.

2. Price and output determination under monopolistic competition in the long-run (Long-run equilibrium)

- In the monopolistic competition market, group of firms producing differentiated but closely substitutable goods is called 'production group' or simply 'group' but not 'industry' as in the perfect competition.

- In the monopolistic competition market, there is free entry into and exit from the 'production group'.

- So, if the existing firms in the production group are earning excess profit in short-run, other new firms will enter into the 'production group' in the long-run.

- As new firms enter into the 'production group', the price of the product falls due to the increase in supply.

- The average cost of production also increases due to increase in price of factors of production.

Price and Output Determination under Monopolistic Competition Contd.

- The cause of increase in prices of factors of production is the increased demand of factors of production due to the increase in number of firms.

- The fall in price of the product and increase in average cost of production reduces profit margin. Consequently, excess profit disappears.

- Similarly, if the existing firms are bearing losses in the short-run, they will leave the 'production group' in the long-run.

- Exit of the firms from the group will increase the price of the product as well as decrease the average cost of production.

- Hence, the existing firms will earn just normal profit in the long-run.

- The long-run equilibrium of monopolistically competitive firm requires:
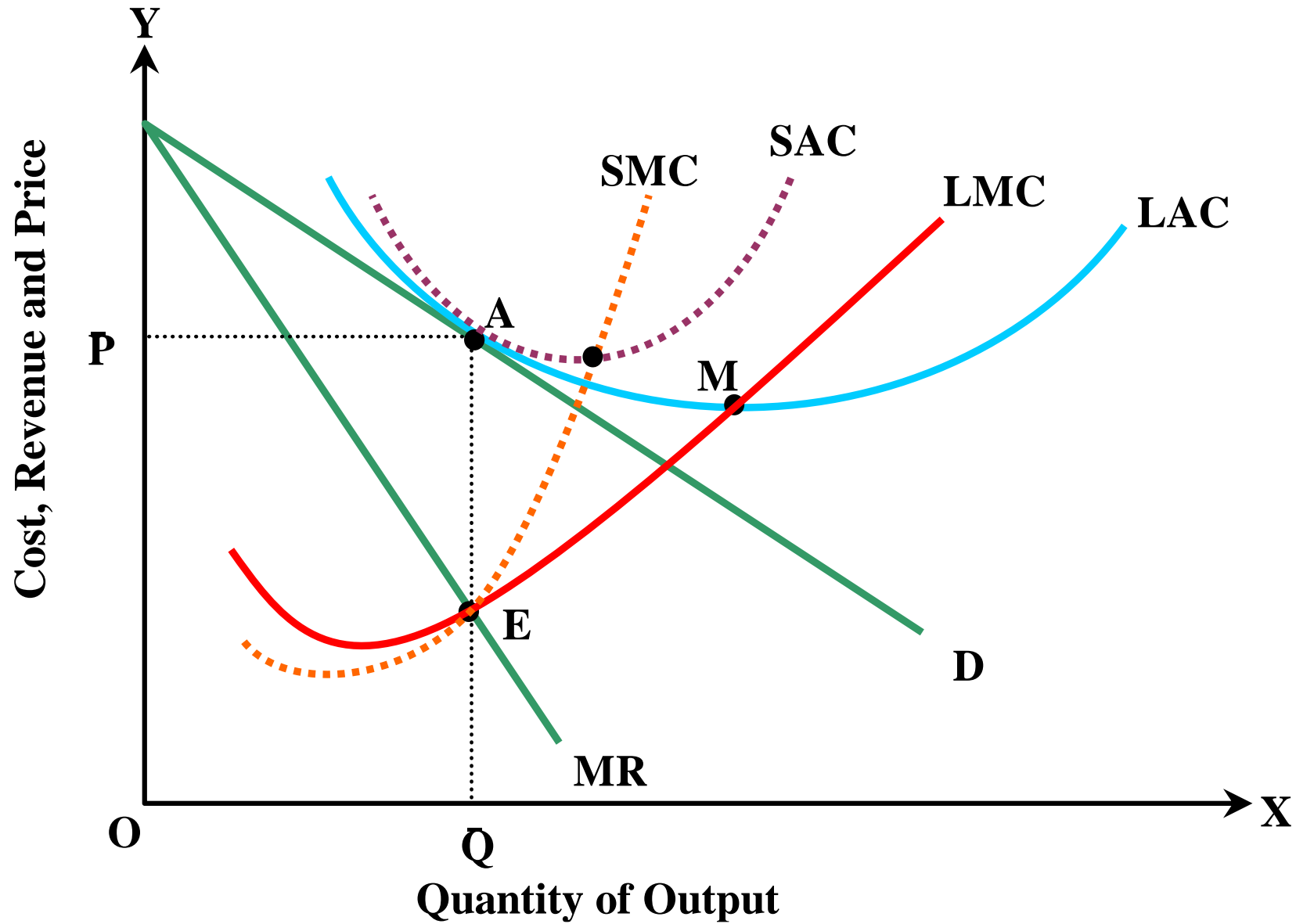
Monopolistic Firm's Equilibrium under Product Variation and Selling Expenses
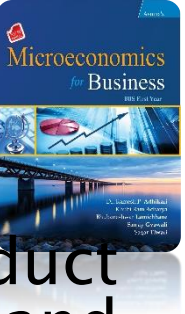
- A monopolistically competitive firm can spend more on product variation and selling efforts to increase the demand for its product and make it less price elastic.

- The competition based on the advertising and product differentiation rather than on price is known as non-price competition.

- Product variation refers to changes in some of the characteristics of product that a monopolistically competitive firm undertakes in order to make its product more attractive to the consumers.

- Selling expenses refers to all those expenses that the firm incurs to advertise the product, increase its sales force, provide better service for its product and so on.

- Product variation and selling expenses can increase the firm's sales and profits, but they also lead to additional costs.

- A firm should spend more on product variation and selling effort as long as the MR from these efforts exceeds the LMC and until MR = LMC.

- A monopolistically competitive firm can increase profit in the short-run
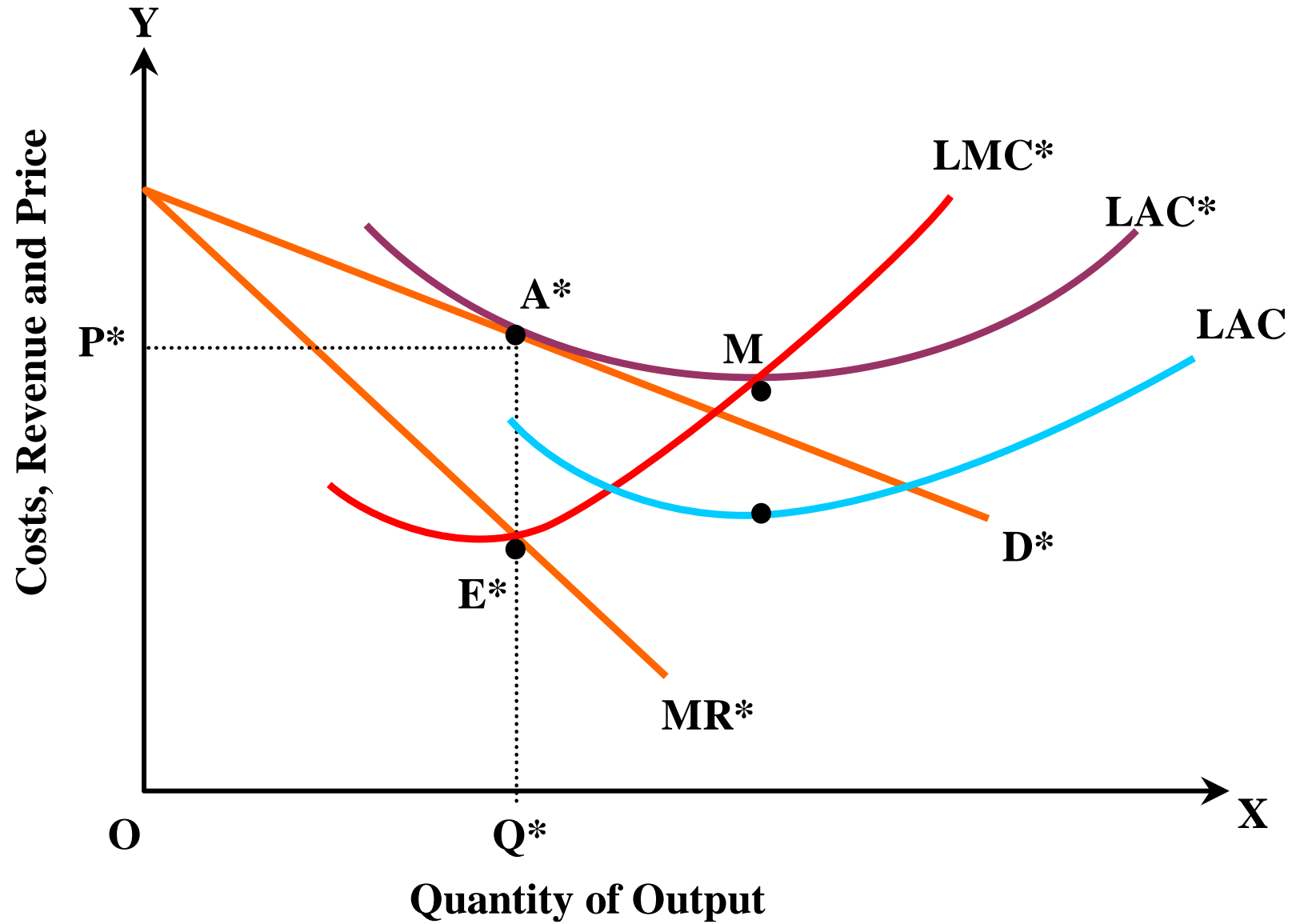
Cartels

- Cartel is defined as the formal organization of the collusive oligopoly firms in an industry with a purpose.

- Under cartels, the firms make agreement relating to price, market area and output levels.

- The main aim of the cartel is to reduce uncertainty arising from the mutual interdependence.

- In other words, a general purpose of cartels is to centralize certain managerial decisions and functions of individual firms in the industry with a view to promote common benefits.

- The cartel may be in the form of open or secret collusion.

- Whether the open or secret collusion, cartel agreements are explicit and formal.

- Therefore, cartels are regarded as the perfect form of collusion.

- There are mainly two types of cartels based on performing functions for its members, which are as follows:

    1. Cartels fixing price for Joint Profit Maximization (Joint Profit Maximization cartel or perfect cartel)

Pricing under Joint Profit Maximization Cartel

- The main objective of the joint profit maximizing cartel is to maximize joint profit of the firms under the industry.

- This model is analyzed under the pure oligopoly.

- Pure oligopoly means the market situation where firms produce homogeneous products.

- To maximize the joint profit, firms appoint a central agency which has authority to determine common price, industry output, production level of each member firms, distribute total profit of the industry among the member firms, etc.

- The joint profit maximization is possible when each individual firm can maximize profit.

- Thus, the conditions for joint profit maximization of a cartel (with two member firms A and B) can be expressed as

i. $MC_A = MC_B = MR$

where

MC_A = Marginal cost of firm A

MC_B = Marginal cost of firm B

MR   = Marginal revenue of industry

ii. ΣMC curve must cut MR curve from below.

where

Pricing under Joint Profit Maximization Cartel Contd.

Assumptions

The analysis of joint profit maximization model of a cartel is based on the following assumptions:

- There are only two firms (A and B) in the oligopolistic industry and that form cartel.

- Both firms produce homogeneous products.

- The cost curves of each firm are different and known to the central agency (cartel). The firm A produces at lower cost than the firm B.

- The market demand curve of the product is given and known to the cartel.

- The number of buyers of the product is large.

- The cartel aims at joint profit maximization

Pricing under Joint Profit Maximization Cartel Contd.

The member firms appoint a central agency (cartel) and delegate different authorities such as determination of common prices, total industry output and distribution of total profit of the industry among the member firms.

Panel (a): Equilibrium of Firm A

Panel (b): Equilibrium of Firm B

Panel (c): Equilibrium of Industry
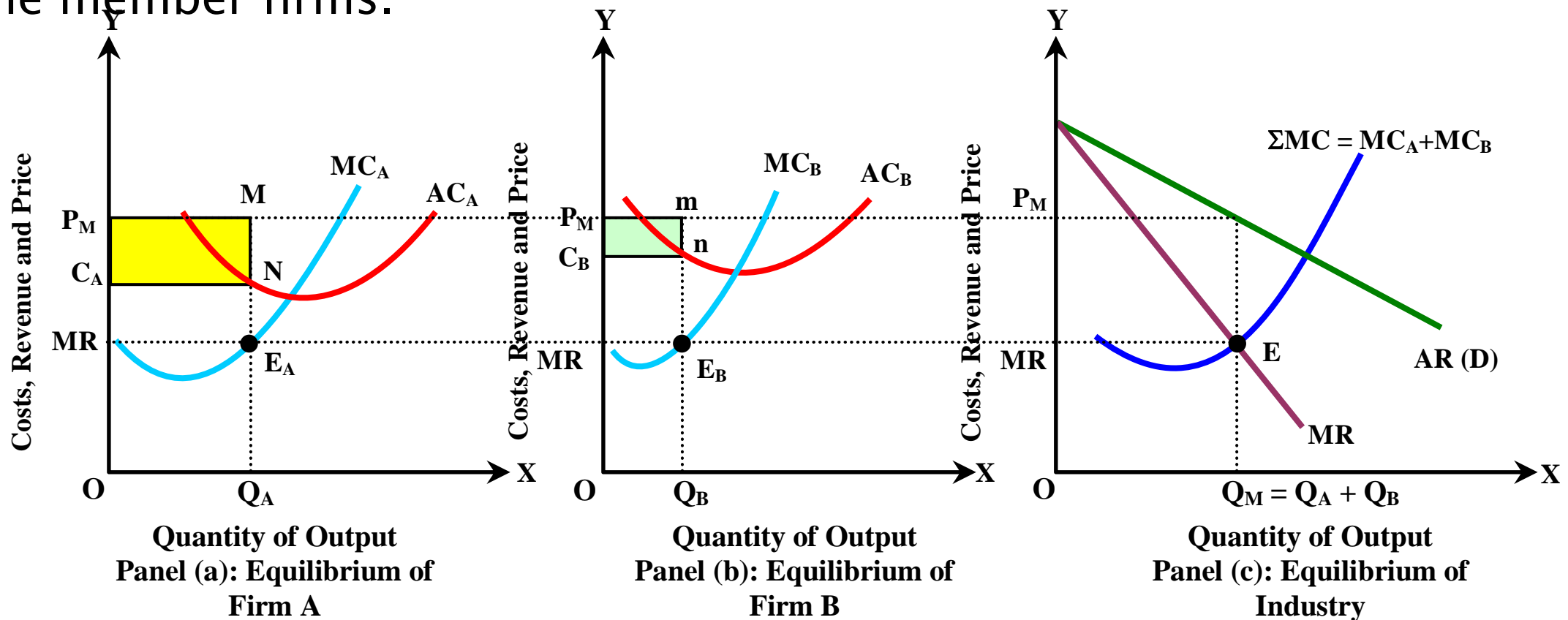
Market Sharing Cartels

- This is another type of cartel in collusive oligopoly market.
- In a market sharing cartel, the member firms agree only how to share the market.
- In other words, the firms agree to share the market but keep a considerable degree of freedom concerning the style of their products, selling activities and other decisions.
- There are mainly two method of market sharing which are also called the types of market sharing cartel. They are:
    1. Non-price competition agreements
    2. Sharing of market agreements on Quota System

Market Sharing Cartels Contd.

1. **Non-Price Competition Agreements**

   Non-price competition is a type of market sharing cartel, in which member firms agree on common price and each firm is allowed to sell as much as it can sell at the cartel price.

2. **Sharing of Market Agreements on Quota System**

   Sharing of Market Agreements on Quota System is another method of market sharing cartel.

   Under this system, the cartel fixes quota of market share for each firm.

Pricing Practices

- In a complex business world, business firms follow a variety of pricing rules and methods depending on the conditions faced.

- It also depends upon objective of the firm.

- In this part of the unit, we will discuss some important pricing strategies and practices such as price discrimination, cost plus pricing, incremental cost pricing, administered pricing, export pricing, predatory pricing, skimming pricing and penetration pricing.

Price Discrimination

- Price discrimination refers to selling same product at different prices to different customers or in different markets.

- Price discrimination is possible only in the monopoly because even though different buyers would know that they are differently charged, they have no alternative source of buying the product.

- The monopoly firm which adopts the policy of price discrimination is called discriminating monopoly.

- The main objective price discrimination is to maximize profit.

Condition for Price Discrimination

1. Monopoly power
2. Market must be divided into difference sub-markets
3. Different price elasticity of demand in different sub-markets
4. Reselling of the product must not be possible

Types/ Degrees of Price Discrimination

1. First Degree Price Discrimination

- In the first degree price discrimination, seller or monopolist charges highest price for each unit of a product that each consumer willing to pay rather than go without it.

- In other words, the monopolist charges each individual consumer the maximum price that the consumer is willing to pay, i.e. reservation price.

- Thus, first degree price discrimination can be defined as the situation in which monopolist sells each unit of output at different prices.

- In this case of price discrimination, consumer's surplus is totally taken away by monopolist or the monopolist obtains maximum possible revenue from each consumer.

- Therefore, this type of price discrimination is also known as the perfect price discrimination.

- In this case, market demand curve coincides with marginal revenue curve.
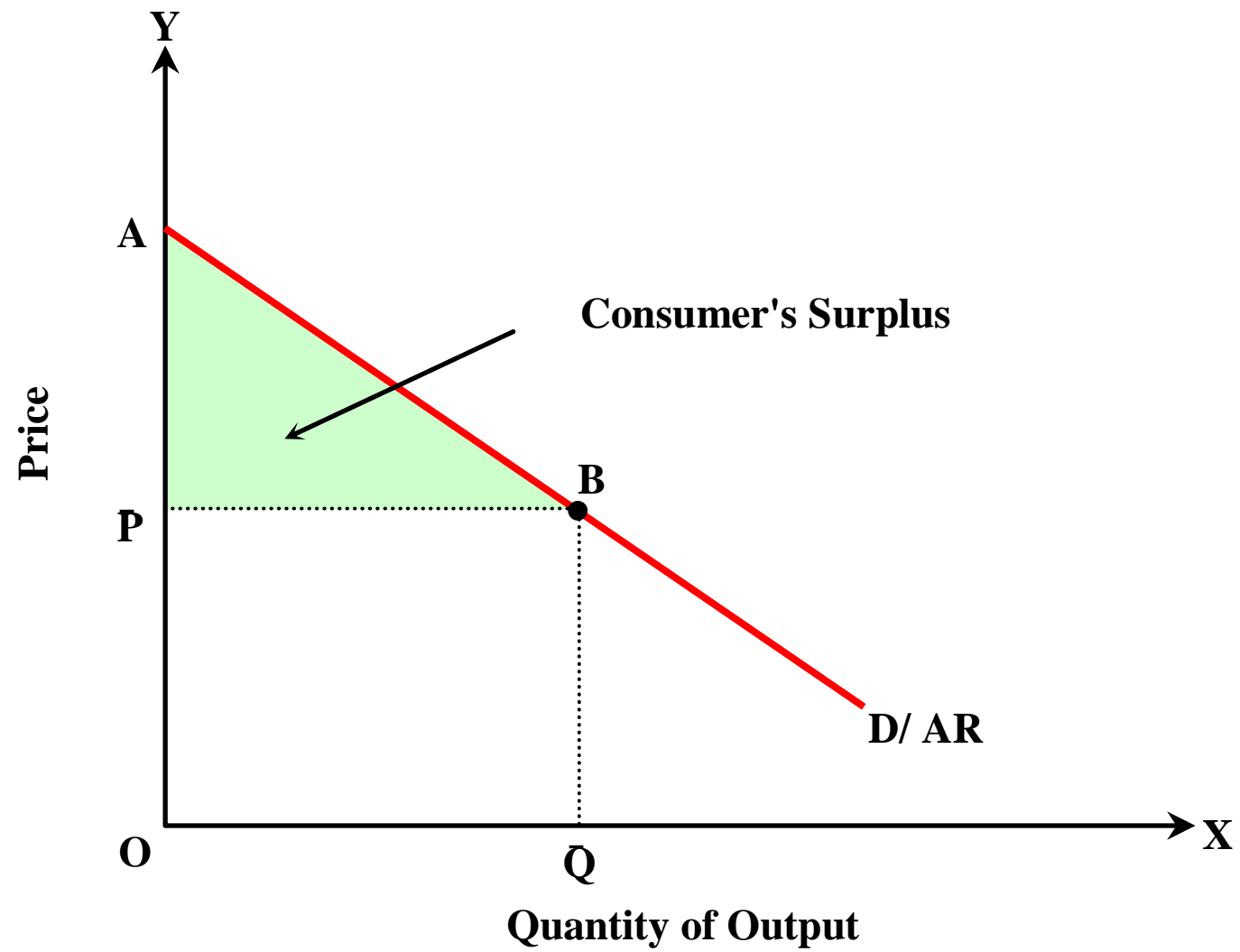
Types/ Degrees of Price Discrimination Contd.

2. Second Degree Price Discrimination

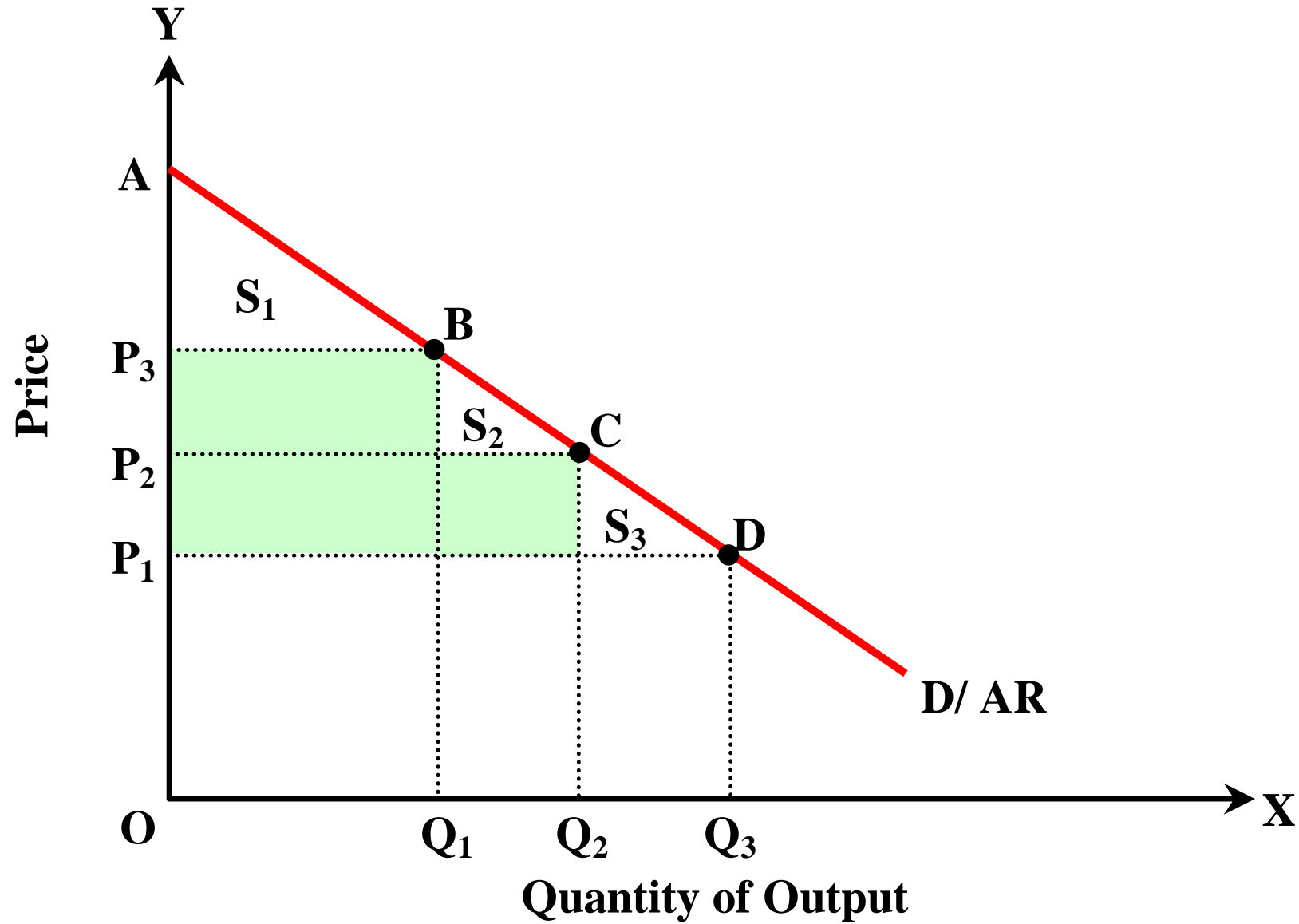In the second degree price discrimination, different prices are charged for different quantity purchased.

In other words, the second degree price discrimination is defined as the situation in which the monopolist charges different prices based on how much one buys.

Thus, in the case of second degree price discrimination, the monopolist charges a lower price for each additional batch or block of the commodity.

Such type of price discrimination is common in case of public utilities like telephone and electricity.

In these public utilities, the price for the first hundred units may differ from the price of second hundred units and so on.

By doing so, the monopolist captures some part of consumer's surplus but not as in the case of first degree price discrimination.

Types/ Degrees of Price Discrimination Contd.

3.   Third Degree Price Discrimination

- The profit maximizing monopoly firm sets different prices in different markets each having different elasticity of demand of the product. In this case, monopolist charges different prices for the same commodity in the different sub-markets.

- The examples of third degree price discrimination are: different prices for students and common people in bus, aeroplanes, and train tickets; Coca-Cola company charging different prices to the consumers of Kathmandu valley and out of the Kathmandu valley in Nepal, etc.

- The aim of the third degree price discrimination is to increase total revenue and profit.

- Under third degree price discrimination, the monopolist charges a higher price for a product in the market with less elastic demand in such a way as to equalize the MR of the last unit of the product sold in the two markets.

Types/ Degrees of Price Discrimination Contd.

In order to maximize profit by the price discriminating monopolist with two sub-markets, the following conditions must be fulfilled:

i. The marginal revenues in two submarkets should be equal, i.e.

$MR_A = MR_B$

where

MR_A = Marginal revenue of the market A

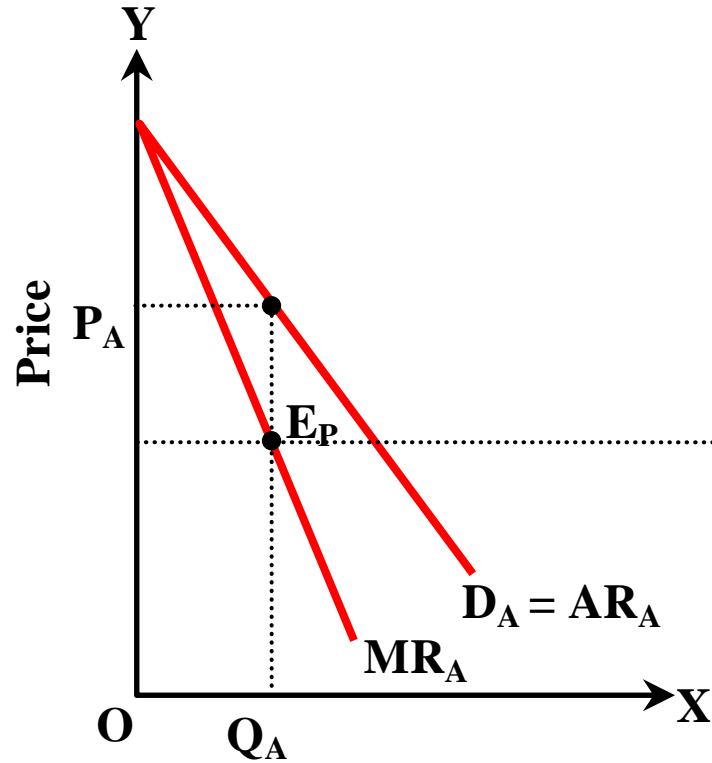MR_B = Marginal revenue of the market B

ii.   The marginal revenue received from each market should be equal to marginal cost (MC) of the monopolist, i.e.
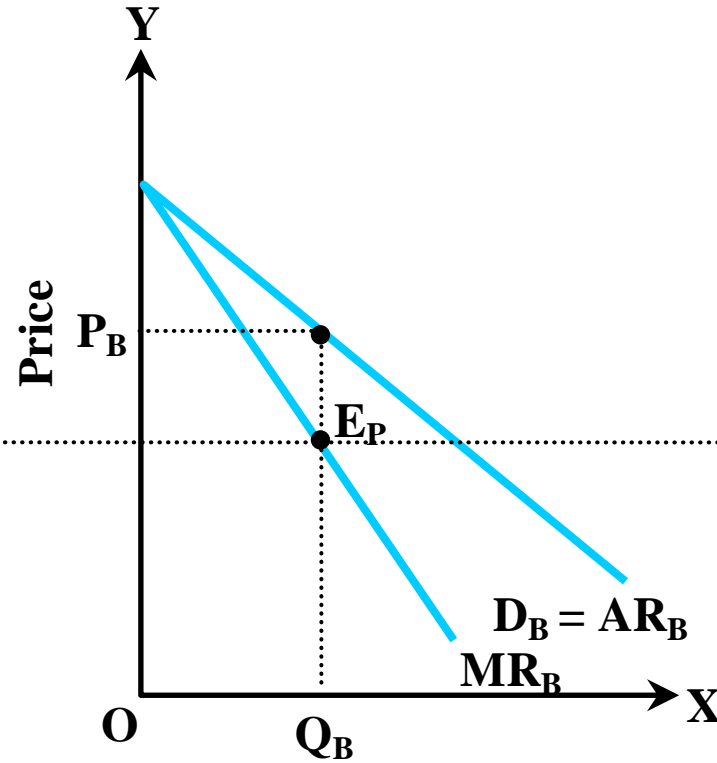
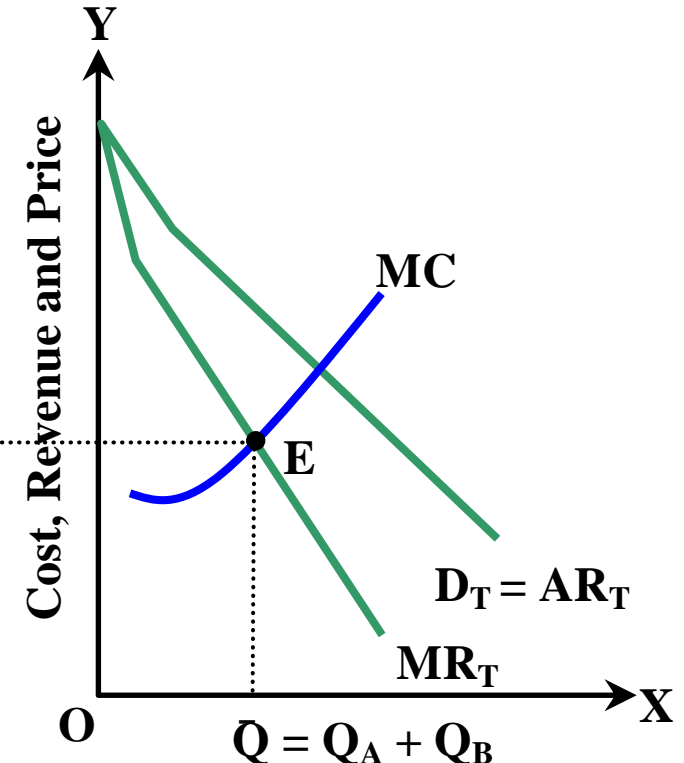**$MR_A = MR_B = MC$**

or, $MR_A = MC$

or, $MR_B = MC$

iii. The monopolist's MC curve must cut the MR_T curve from below.

Y

Price

P_A

E_P

$D_A = AR_A$

MR_A

O Q_A **X**

Quantity of Output
Panel (a):
Sub-market A

Y

Price

P_B

E_P

$D_B = AR_B$

MR_B

O Q_B **X**

Quantity of Output
Panel (b):
Sub-market B

Y

Cost, Revenue and Price

MC

E

$D_T = AR_T$

MR_T

O $Q = Q_A + Q_B$ **X**

Quantity of Output
**Panel (c):**
Whole Market

Cost Plus Pricing

- According to traditional theory, the price of a product is determined with the help of the MR–MC approach.

- But this approach is not practical because it is very difficult to find out data on marginal cost and marginal revenue.

- Therefore, most of the firms fix prices without considering MR and MC concepts.

- The most popular and short cut method of pricing is the cost–plus pricing method.

- This method is also called **mark–up pricing** or **full cost pricing** or **average cost pricing**.

- In this method, the price of the product is determined by adding a fixed mark–up on average variable cost.

- The mark–up is set sufficiently high to cover average variable and fixed costs and also provide a profit margin for the firm.

- The mark–up varies depending on the industry and demand conditions. Mark–up means the percentage of profit based on cost.

- The general practice under this method is to add a fair percentage

Cost Plus Pricing Contd.

The formula for setting the price is given by

P = AVC + AVC(m)   ...(i)

where

AVC = Average variable cost m   = Mark-up percentage

AVC(m) = Gross profit margin(GPM) P   = Price

The mark-up percentage (m) is fixed to cover the average fixed cost (AFC) and a net profit margin(NPV). Thus,

AVC (m) = AFC + NP   ...(ii)
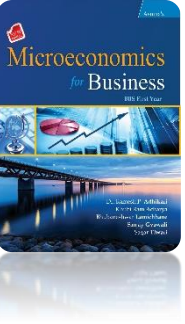
Incremental Cost Pricing

- It is a method of pricing a product based on incremental cost.

- Incremental cost refers to the total additional cost associated with the decisions to expand the output or add a new plant to the existing capacity, add a new variety of products to the product line, etc.

- In this method, the price of all additional units produced after all direct and indirect fixed costs of production have been met, are based on variable costs rather than the total cost incurred in production.

- This method is different from the regular pricing method.

- In the regular pricing method, the selling price of each product includes per–unit fixed cost, per unit variable cost and profit margin.

- But in the incremental cost pricing method, the selling price of the product is based on the per–unit variable cost and profit margin only.
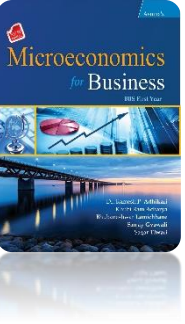
Administered Pricing

- The pricing strategy in which the price of a product is established by the conscious decision of some individual or agency rather than by the market forces of demand and supply is called administered pricing.

- The independent agency may be the government or the management of a firm having considerable market share or monopoly in the market.

- Administered pricing is generally possible where good is sold by a monopoly firm or public body.

- Administered prices are generally above or below the equilibrium prices.

- These prices are also called controlled prices i.e price ceiling or price floor often set by the government.

- A price ceiling is a maximum price that can be charged for a product, e.g. setting a price ceiling for house rent.

- Similarly, the price floor is the minimum price that can be charged for a product, e.g. setting a price floor as minimum wages of labour

Export Pricing

- Export pricing is a method of fixing the price of products which the exporter intends to export and sell in the international markets.

- Export pricing is a much more difficult task than domestic pricing.

- The exporter must take into account the cost of production as well as the conditions prevailing in the international market that influences the price of the product.

- Hence, export pricing is not only a calculation of the cost of production but also a practical exercise based on the international market situation.

- There are additional costs that are incurred and need to be incorporated when setting export prices.

- These costs are given below:
  1. Costs before Exporting
  2. Costs at Country of Destination
  3. Costs related to the Marketing or Selling Structure in Target Country

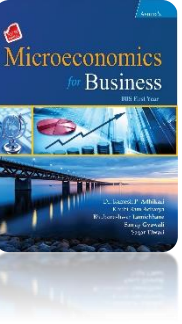- The marginal cost pricing of export goods is determined as
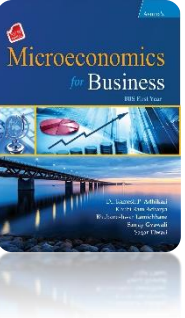
Predatory Pricing

- It is the deliberate pricing strategy of a business firm in which the price of a product or service is charged at very low (or P<AC or even P< AVC).

- The predator (dominant seller) sets a very low price with the aim of attracting new customers or driving competitors out of the market or create barriers to entry for potential new competitors so that the predator can charge considerably higher price later.

- The predator is willing to sell at a loss for a period in the hope that its rivals either go bust or decide to stop selling that product.

- The predatory pricing strategy kicks out competitors and increases the monopoly power and profits of the firm.

- But it will be bad for the consumers because it will lead to abnormally high prices in the long term as well as a lack of choice.

- Dumping (exporting goods at a lower price than the domestic price or cost of production) is an example of predatory pricing.
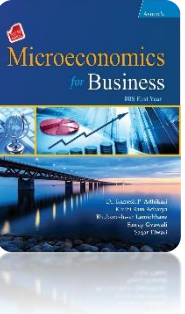
Skim Pricing

- The skim pricing, also known as price skimming is a product pricing strategy by which a firm charges the highest initial price for a product or service that customers will pay.

- As the demand of the first customers is satisfied, the firm lowers the price to attract another, more price–sensitive segment or layer of the consumers.

- The objective of a price skimming strategy is to capture the consumer surplus and earn maximum revenue or profit in the shortest time possible rather than maximum sales.

- This model encourages the entry of competitors.

- When other firms see the high margin available in the industry, they will quickly enter.

- Price skimming can be considered as a form of price discrimination.

Penetration Pricing

- In contrast, to skim pricing, penetration pricing involves reverse strategy.

- It is a pricing strategy used by new entrants to enter into the market with new products for which substitutes are available, usually by setting a very low price.

- Pricing is one of the easiest ways to differentiate new entrants among existing producers or sellers in the market.

- An extreme form of penetration pricing is called predatory pricing.

- Penetration pricing strategy is used to capture the market share, create brand trustworthiness, switch customers from competitors, generate significant demand and utilize economies of scale and drive competitors out of the market.

- This pricing strategy effectively works in situations when there is little product differentiation, the demand for the product is price-

Numerical Examples 1

Consider the following table:

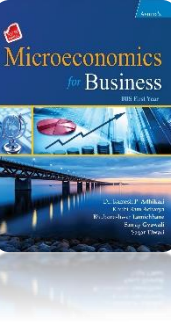| Price (Rs.) (P)	Quantity (Q)	Total Cost (TC)	Marginal Cost (MC)	Total Revenue (TR)	Marginal Revenue (MR)	Profit (π)
11	0	10				
10	1	12				
9	2	17				
8	3	21				
7	4	26				
6	5	33				
5	6	43				
4	7	60				
3	8	80				

a.   Complete the above table.

b.   Derive the TR curve, TC curve and profit (π) curve based on the completed table.

c.   Identify the profit maximizing level of output and total profit at that level of output.
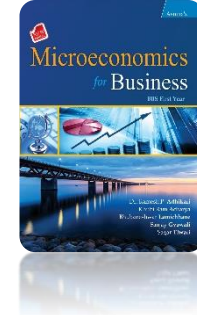
SOLUTION

a.

Price (Rs.)	Quantity	Total Cost	Marginal Cost	Total Revenue	Marginal Revenue	Profit = TR – TC
11	0	10	-	0	-	−10
10	1	12	2	10	10	− 2
9	2	17	5	18	8	1
8	3	21	4	24	6	3
7	4	26	5	28	4	2
6	5	33	7	30	2	− 3
5	6	43	10	30	0	− 13
4	7	60	17	28	-2	− 32
3	8	80	20	24	-4	− 56

b.

c. Total profit = Rs. 3 and profit maximizing output level is 3 units.

d. This indicates imperfect competition (monopoly or monopolistic competition) because there is inverse relationship between price and quantity of output sold or both price and MR are falling.
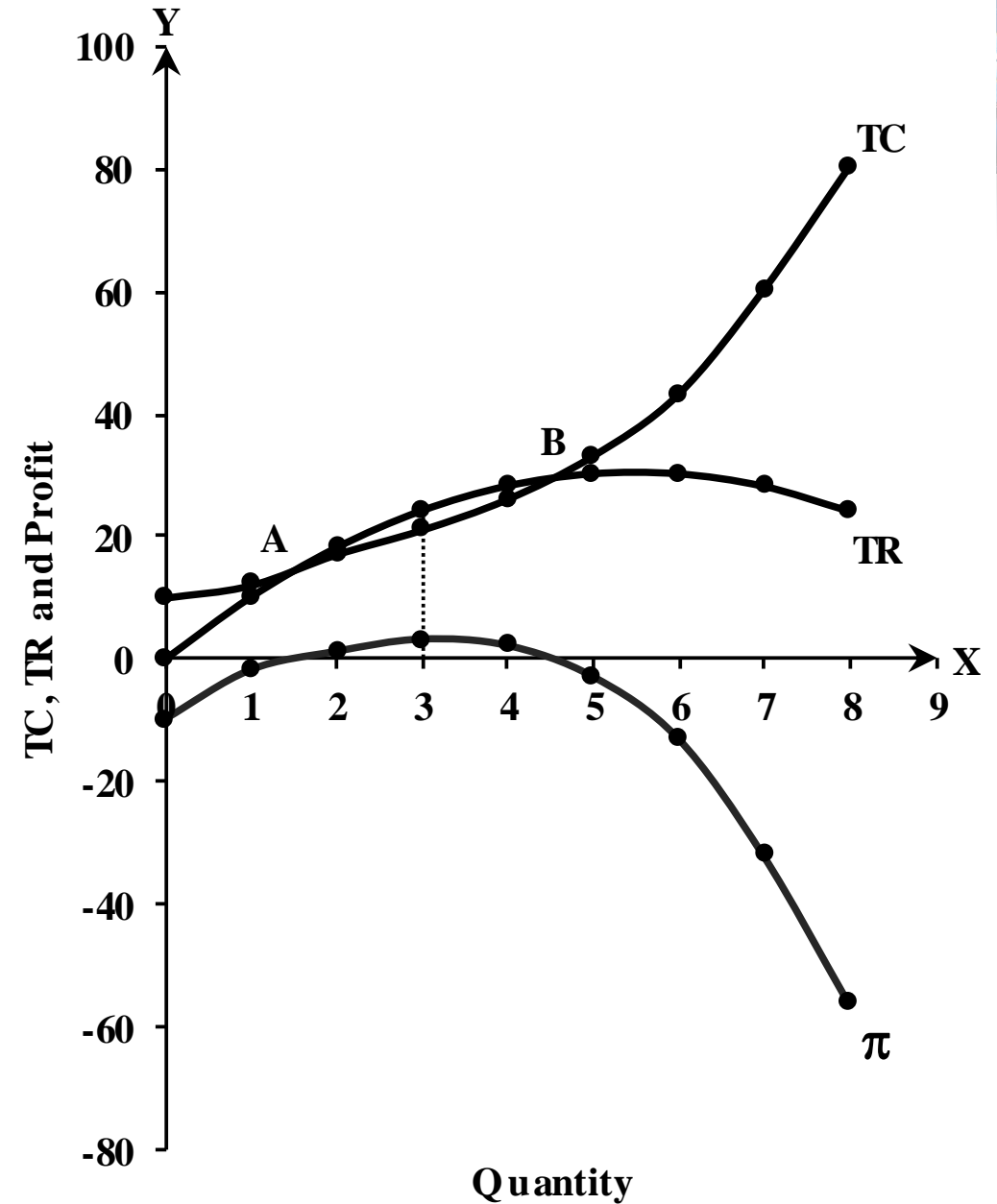
Numerical Examples 2

Consider the following table and solve the questions given below.

Output (Q)	0	1	2	3	4	5	6	7	8
Total Revenue (TR)	0	110	200	270	320	350	360	350	320
Total Cost (TC)	200	220	236	248	264	300	360	448	560
Profit (π)									

a. Complete the above table.

b. Graph TR, TC and profit (π) curves and explain the equilibrium condition using TR–TC approach.

c. Which market does it indicate and why?

SOLUTION

a.

Output	TR	TC	Profit
0	0	200	-200
1	110	220	-110
2	200	236	-36
3	270	248	22
4	320	264	56
5	350	300	50
6	360	360	0
7	350	448	-98
8	320	560	-240

b.
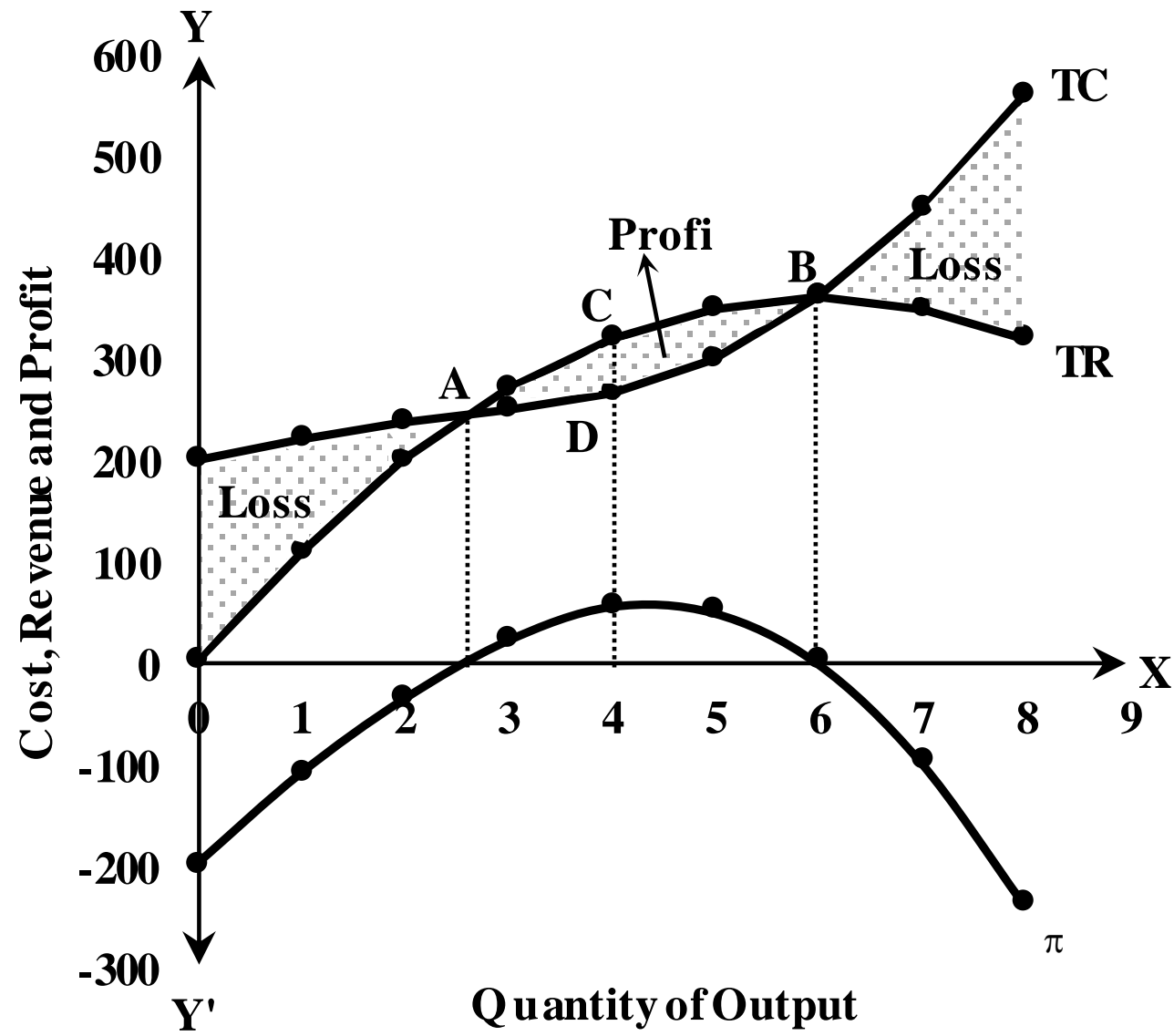
In the above figure, X-axis represents quantity of output and Y-axis represents total cost and total revenue and profit. The curves TC, TR and π represent total cost curve, total revenue curve and total profit curve respectively. These curves has been derived based on the completed table. Thus, TR and TC curves are intersecting each other at point A and B. At points A and B, TC and TR are equal. Therefore, these points are called break-even points. Before point A and beyond point B, TC > TR. Therefore, there is loss. Between point A and B, there is profit because TR > TC. At 4th unit of output, there is maximum profit or maximum difference between TR and TC. Therefore, the firm is equilibrium at 4th unit of output. At this level of output, the firm's total profit is equal to Rs. 56.

c. This shows or indicates imperfect competition (monopoly or monopolistic competition) because total revenue is increasing at the decreasing rate upto point B and their after it is failing.

Numerical Examples 3

The total revenue and total cost functions of a perfectly competitive firm are given as:

TR = 10Q

TC = $100 + 2Q + 0.01Q^2$

Determine level of output that maximizes profit and find the total profit at that level of output.

SOLUTION

We have,

TR = 10Q

TC = 100 + 2Q + 0.01Q²

Here,

$$MR = \frac{d}{dQ}(TR) = \frac{d}{dQ}(10Q) = 10$$

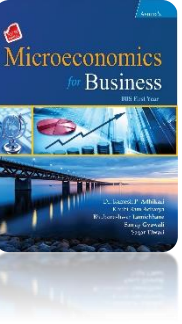$$MC = \frac{d}{dQ}(TC) = \frac{d}{dQ}(100 + 2Q + 0.01Q^2) = 2 + 0.02Q$$

Condition for profit maximization

MC = MR

2 + 0.02Q = 10

or, 0.02Q = 8

or, Q = 400 units

Total profit (π) = TR – TC

$\quad\quad\quad\quad$ = 10Q – (100 + 2Q + 0.01Q^2)

$\quad\quad\quad\quad$ = 10Q – 100 – 2Q – 0.01Q^2

$\quad\quad\quad\quad$ = – 100 + 8Q – 0.01Q^2

$\quad\quad\quad\quad$ = – 100 + 8 × 400 – 0.01 × 400^2

$\quad\quad\quad\quad$ = – 100 + 3200 – 1600

$\quad\quad\quad\quad$ = Rs. 1500

Hence, total profit is maximized at Q = 400 units and total profit = Rs. 1500

Thank You