
NOTES ON MANAGERIAL
ECONOMICS

SUBJECT CODE: MGT103

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MODULE-1:- BASIC ECONOMIC CONCEPTS AND DECISION MAKING

Nature and Scope of Managerial Economics

Management is the guidance, leadership and control of the efforts of a group of people towards some common objective. It is coordination, an activity or an ongoing process, a purposive process and an art of getting things done by other people. Economics, on the other hand, is a social science, chiefly concerned with the way of society chooses its limited resources, which have alternative uses, to produce goods and services for present and future consumption, and to provide for economic growth. It is obvious from this definition that economics engaged in analyzing and providing answers to manifestation of the most fundamental problem of scarcity. Scarcity of resources results from two fundamental facts of life.

- i) Human wants are virtually unlimited and insatiable.
- ii) Economic resources to satisfy the human wants are limited.

Thus, we can't have everything we want; we must make choices broadly in regard to the following.

- a) What to produce?
- b) How to produce?
- c) For whom to produce?

The three choice problems have become the three central issues of an economy.

Managerial Economics can be viewed as an application of that part of economics that focuses on topics such as risk, demand production, cost, pricing, Market structure etc. Understanding these principles will help to develop a rational decision making perspective and will also sharpen the analytical framework that the executive must bring to bear on managerial decisions. The primary role of economics in management is making optimizing decisions where constraints apply. The application of principle of Managerial Economics will help manager ensure that resources are allocated efficiently within the firm and that the firm makes appropriate reactions to changes in the economic environment. Thus Managerial Economics is concerned with application of economic concepts and analysis the problem of formulating rational managerial decision.

Where π_t is profit in time period t , and r is an appropriate discount rate used to reduce future profits to their present value. Using the Greek letter Σ indicates that each of the terms on the right hand side of the given equation have been added together. Then, the objective function can be written as :

$$\text{Maximize: PV } (\pi) = \sum_{t=1}^n \frac{\pi^t}{(1+r)^t}$$

Theory of Demand

The theory and analysis of demand provides several useful insights for business decision making. Demand is one of the most important aspects of Business Economics, since a firm would not be established or survive if a sufficient demand for its product didn't exist or couldn't be created. That is, a firm could have the most efficient production techniques and the most effective management, but without a demand for its product that is sufficient to cover at least all production and selling costs over the long run, it simply would not survive.

Demand is the quantity of a good or service that consumers are willing and able to purchase during a specified period under a given set of economic conditions. The time frame might be an hour, a day, a month or a year. Conditions to be considered include the price of the good in question, prices and availability of related goods, expectations of price changes, consumers' incomes, consumers taste and preferences, advertising expenditures and so on. The amount of the product that consumers are prepared to purchase, its demand, depends on all these factors.

The ability of goods and services to satisfy consumer wants is the basis for consumer demand. This is an important topic in micro-economics because managers must know why consumers demand their products before demand can be met or created.

Consumer behavior theory rests upon three basic assumptions regarding the utility tied to consumption.

First, "More is better" :- Consumers will always prefer more to less of any good or service.

It is often being referred to as the "non satiation principle".

The following table gives one hypothetical Demand schedule for an individual consumer "A", showing different price levels of a commodity that A is interested in and their corresponding quantities demanded by A, ceteris paribly.

TABLE-1

DEMAND SCHEDULE OF A

Prices(Rs)	Quantity demanded(in units)
10	20
8	30
6	40
4	50

It is seen from the table that when the price of the commodity is Rs 10 per unit, "A" purchases 20 units of the commodity. When the price falls to Rs 8, he purchases 30 units of the commodity. Similarly, when the price further falls, quantity demanded by "A" goes on rising.

DEMAND CURVE:-

The graphical presentation of the Demand schedule of any commodity is known as the DEMAND CURVE. The Demand schedule of any commodity can be converted into a demand curve when the various price-quantity combinations are graphically plotted.

The graph in fig.1 uses the numbers from the table-1 to illustrate the law of demand. By convention, the prices of the commodity is on the vertical axis and the quantities demanded is on the horizontal axis. The downward sloping line relating price and quality demanded is called the DEMAND CURVE.

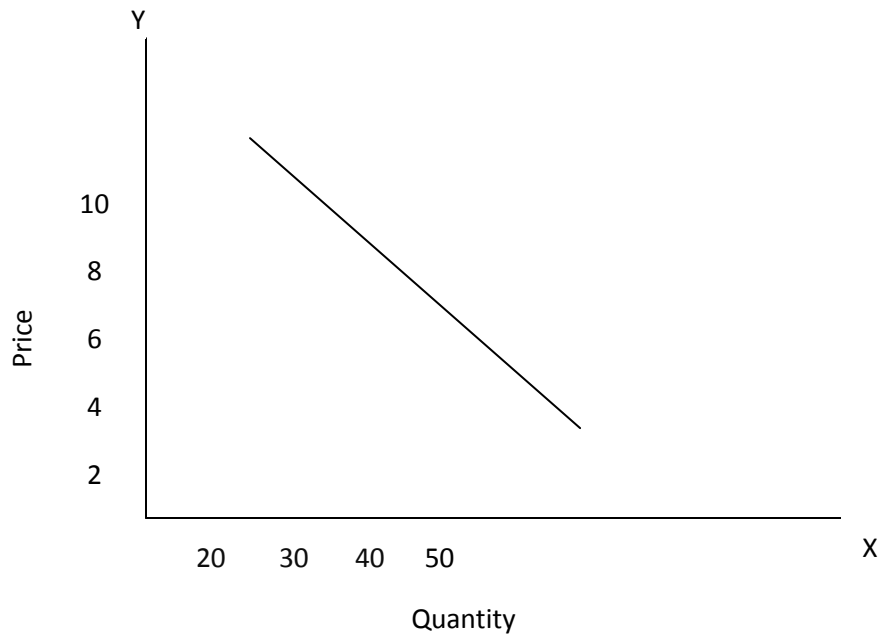


Fig-1

By plotting 20 units of the commodity against price Rs 10, we get a point in fig-1. Likewise, by plotting 30 units of the commodity demanded against price Rs 8, we get another point in fig-1. Similarly, other points are plotted representing other combinations of price and quantity demanded of the commodity and are shown in fig-1. By joining these various points, we get a curve DD, which is known as the Demand Curve. Thus, the Demand Curve is a graphic representation of quantities of a good which will be demanded by the consumer at various possible prices in a given period of time.

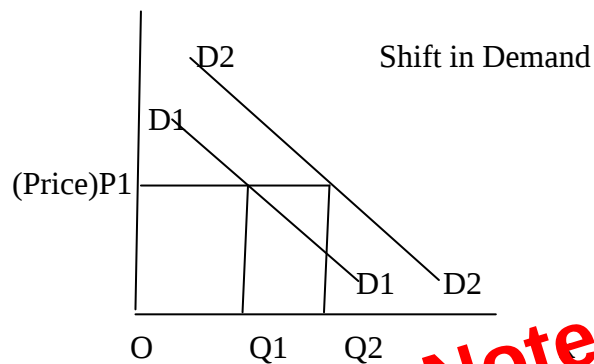
MARKET DEMAND CURVE:-

The quantity demanded in a market is the sum of the quantities demanded by all the buyers at each price. Thus, the market demand curve is found by adding horizontally the individual demand curves. In order to do so, we add the various quantities demanded by the number of consumers in the market. In this way, we can obtain the Market Demand Curve for the commodity which like the individual consumer's demand curve will sloped downward to the right. How this summation is done is illustrated in the fig-2.

2. Shifts

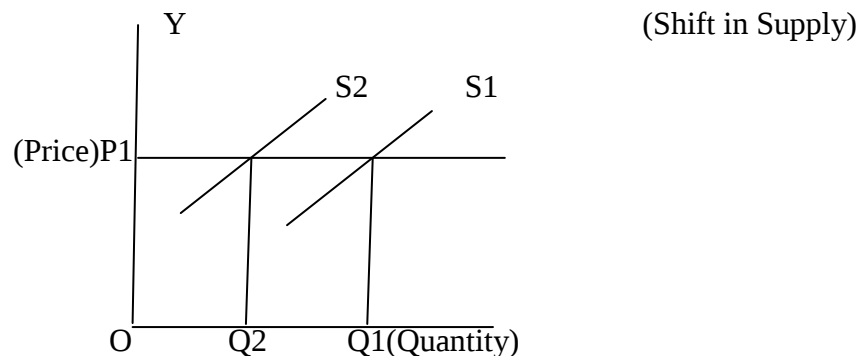
A shift in demand or supply curve occurs when a goods quantity demanded or supplied changes even though price remains the same. For instance, if the price for a bottle of milk was Rs 20 and the quantity of milk demanded increased from Q_1 to Q_2 , then there would be a shift in the demand for milk. Shifts in the demand curve imply that the original demand relationship has changed, meaning that quantity demanded is affected by a factor other than price.

Fig :-



Conversely if the price for a bottle of milk was Rs 20 and the quantity supplied decreased from Q_1 to Q_2 then there would be a shift in the supply of milk. Like a shift in the demand curve, a shift in the supply curve implies that the original supply curve has changed, meaning that the quantity supplied is affected by a factor other than price. A shift in the supply curve would occur if, for instance a natural disaster caused a mass shortage of cows, milk producers would be forced to supply less milk for the same price.

Fig :-



d: A change in

Arc price elasticity is denoted as E_p and can be calculated as follows:

$$E_p = \frac{\frac{Q_1 - Q}{\left(\frac{Q + Q_1}{2}\right)}}{\frac{P_1 - P}{\left(\frac{P + P_1}{2}\right)}} = \frac{Q_1 - Q}{\frac{Q + Q_1}{2}} \times \frac{P + P_1}{P_1 - P} = \frac{Q_1 - Q}{Q + Q_1} \times \frac{P + P_1}{P_1 - P}$$

Where P and Q are original price and quantity demand respectively; and P_1 , Q_1 are new price and new quantity demand.

Consider the hypothetical prices of some product and the corresponding quantity demand, as given below:

Demand schedule to demonstrate price elasticities

Price (P) in Rs.	Quantity (Q) (In units)	Arc Elasticity (E_p)	Point Elasticity (C_p)
90	40	$ -4.00 $	$ -9.00 $
70	120	$ -1.50 $	$ -2.33 $
50	200	$ -0.67 $	$ -1.00 $
30	280	$ -0.25 $	$ -0.43 $
10	360		$ -0.11 $

output changes. If marginal cost rises sharply as output expands, quantity supplied is less responsive to price increases and is thus less elastic. Also, the longer the time period producers have to adjust to price changes, the more elastic the supply.

9 Describe other measures of elasticity

Income elasticity of demand measures the responsiveness of demand to changes in consumer income. Income elasticity is positive for normal goods and negative for inferior goods. The cross-price elasticity of demand measures the impact of a change in the price of one good on the demand for another good. Two goods are defined as substitutes, complements, or unrelated, depending on whether their cross-price elasticity of demand is positive, negative, or zero, respectively.

Numerical Problems (Theory of Demand and Supply)

1. Given the following market demand function for the commodity "A".

$$Q_A = f (P_A, P_B, P_C, I, T, A_d)$$

Where, P_A = Price of the commodity A

P_B = Price of a substitute commodity B

P_C = Price of commodity C which is complement of A

I = Level of per capital income of consumers

T = Tastes and Preferences of consumers

A_d = Advertisement expenditure by a firm producing A

How will the consumer demand for commodity A change?

- I. If the price of the commodity A rises,
- II. If the price of the substitute good B rises,
- III. If the price of commodity C rises,
- IV. Per capital income(I) of the consumer rises,
- V. The firm producing A increases its advertisement expenditure.

2. The demand for apples in a small town was 200 kg when the price was Rs 20 per kg. It expanded to 250 kg. When the price was reduced to Rs 18 per kg. What is the elasticity of demand for apples in the town?

- a) Producers are willing to offer more of a good at high prices
 - b) A higher price attracts resources from less valued uses
 - c) Producers must be compensated for the rising opportunity cost of additional output
 - d) The price of a good usually must fall to induce an increase in quantity supplied.
- Which of the following is the reason supply curves typically slope upward?
 - a) Opportunity cost of production increases as quantity supplied increases
 - b) Supply increases as opportunity cost decreases
 - c) Price increases as supply decreases
 - d) Quantity supplied is unrelated to price
 - If the supply curves for the following goods were plotted, they all would slope upward except one. Which is the exception?
 - a) Red corvettes
 - b) Yogurt
 - c) Diamond rings
 - d) original copies of the Mona Lisa
 - Saccharin and Aspartame are both low-calorie substitutes for sugar. If saccharin is found to cause cancer
 - a) The price of Aspartame will increase
 - b) The price of sugar will decrease
 - c) The price of saccharin will increase
 - d) The demand curves for Aspartame and sugar will shift leftwards.
 - Suppose a market is in equilibrium and then a price floor is established below the equilibrium price. Which of the following will happen?
 - a) Quantity demand will increase
 - b) A surplus will develop

CASE-II

Demand Function in the Indian Auto Industry

In an economy, growing with the rapid growth of the middle class, the consumption of consumer durables is an indicator of the level of urbanization, modernization and lifestyle. The purchase of automobiles, one of the most significant consumer durables, is an important indicator of consumer buying behaviour. Moreover, the contribution of auto-industry to the GNP has been increasing steadily ever since the sector had been delicensed in 1993. This adds around 3 to 5 per cent to the GNP. The size of the passenger car is about 4 lakh at present, which is miniscule when compared to the US, Europe or the Japanese market. The verdict, there is immense potentiality in this market, grab the opportunity. Global car manufactures are paying heed to it and have flocked to the country. But in order to establish themselves, they have specific tastes, preferences and other generic demand determinants. We will start our discussion with the greatly untapped market—the non-urban car market in India, which contrary to popular belief, has potential.

To begin with, since cars are still a high priced commodity (although the Maruti 800 has changed this perception) the level of income is presumably the most important determinant. More appropriately, per capita real GNP itself. Given that inflation is more or less under control, which in turn is because of the active support to agriculture by the government which sets floor prices for agricultural products and gives huge amounts of subsidies to buy fertilizers and electricity, making the non-urban sector a big, potential market. There has been a huge increase in the real per capita non-urban (specifically non-metro) income. Non-urban society thus becomes the next potential market for car manufacturers after the urban metros. But can we treat the whole non-urban/no-metro society as a uniform group exhibiting a similar kind of demand in the market? Certainly not, because the non-urban area is divided into rich farmers, plantation owners and absentee landlords who have diversified into other kinds of businesses, including exports. All three groups will form potential buyers for the passenger car. Thus we get the first kind of market segment, on the basis of income group, and within the segment the sub-segment, i.e. from where the income is generated, rural or urban area, local or global market, income is generated, rural or urban area, local global market. Logically, buying behaviour in terms of attitudes towards the price or price sensitivity, brand-consciousness and

The table shows that MPC remains constant throughout but APC goes on falling.

Savings: It refers to that part of income which a consumer does not spend on the current purchase of final goods and services. It may also be seen as postponement of the current consumption. Therefore, savings constitute the Non-consumption part of income.

Average Propensity to Save (APS): It refers to the fraction of income which is saved. That is, it refers to the ratio between absolute savings (S) and absolute income (Y).

It's noted as $APS = \frac{S}{Y}$ ——— (4)

Marginal Propensity to Save (MPS): The fraction of any change in income that is saved is called MPS. That is, MPS is a ratio of the change in saving to the corresponding change in income. It's

noted as $MPS = \frac{\Delta S}{\Delta Y}$ ——— (5)

Determinants of Consumption:

The various factors that influence consumption function has been classified as subjective and objective factors.

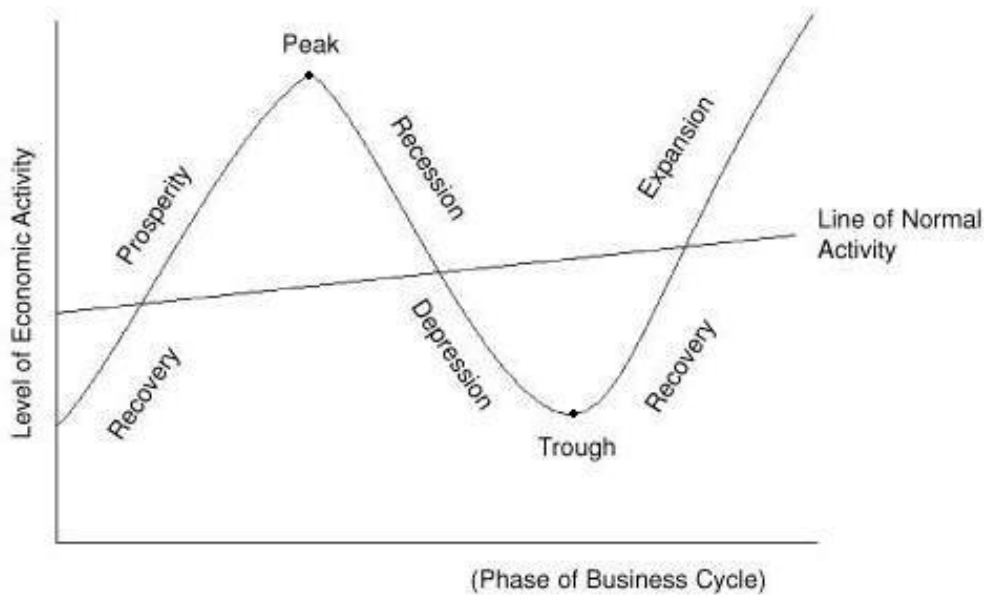
The subjective factors include all the factors related to human psychology, social arrangements and practices etc. The various such factors are as follows:

- 1) **Security Motives:** Families and individuals in modern society are greatly concerned with old age, sickness and other causes of economic insecurity. They are also concerned with family education, home ownership and other unforeseen contingencies. All these encourage them to save. Hence level of consumption falls. It shows that level of consumption depends much upon the feeling of insecurity.
- 2) **Conspicuous Consumption:** It refers to the type of consumption which are mostly determined by clever advertising and emulation of others. This influence an individual's desire for expenditure on goods consumed by others if those are superior to ones which he consumes.

- 3) Desire for Improvement: There is a common instinct to look forward to a gradually improving standard of living the stronger the instinct the higher the desire for improvement. It strengthens the desire to save and reduces consumption.
- 4) Financial Prudence: The motive for financial prudence mainly influences the propensity to save of corporation and other business units. Uncertainly regarding future, the quantity and quality of existing goods (equipments) and other conditions give rise to motives for withholding a part of current earning. Such prudence offsets the propensity to consume
- 5) Motive for precaution: It implies the desire of every individual to withhold some funds so as to face uncertain situations which may come in future.
- 6) Motive for Independence: When an individual tries to be self dependant he has to accumulate wealth. Wealth generates income which helps in fulfilling his varities of wants. But wealth is accumulated through his savings. Thus most of the individuals try to save so as to be independent. It reduces the level of consumption.
- 7) Motive for pride: If an individual want to maintain its pride of having influence in the society, it wants to save more to be a rich man in the society. It induces him to reduce consumption.

The objective factors are mostly external to the behavior or psychology, of individuals and influence their level of consumption.

- A) Distribution of Income: A community in which there is more equal distribution of income, the propensity to consume tends to be high. But in communities where there are large inequalities in the distribution of income, the propensity to consume remains low. If there is equality in the distribution of income, then the consumption of low income families will rise more than the fall in consumption of high income families. Thus, MPC will be higher.
- B) Corporate Financial Policies: Corporations are in the practice of retaining income, dividend payments and reinvestments. These mostly influence the level of consumption function in a no. of ways. If they save more, it reduces the disposable income of the share holders. Hence their level of consumption reduces.



Causes of Business Cycle :

The general factors causing swings in Business activity are as follows:

- i) Banking operations by expanding and reducing credit creation, changing discount rates, and the ratio between deposits and cash reserves, the Banks can change the volume of money supply in the economy, and thus contribute to the cyclical phenomenon.
- ii) Changes in the proportion between capital goods and consumer goods production in the economy can also lead to shortage or surplus in commodity supply in the short run. This results in business cycles.
- iii) Purchasing Power: If the purchasing power does not correspond to the expansion or contraction of production, the market suffers from maladjustments and therefore cyclical fluctuations.
- iv) Profit motive: The profit mania of producer makes him to optimistic. He is under a constant illusion regarding the exact nature and volume of demand. The result is that if the retail trade is little high, the producer magnifies the tendency by expanding production considerably and himself causing a mild boom in the labour and raw material markets. If the retail trade reduces, the over-cautious producer immediately tends to reduce his output and cancels

- 5 (Limitations of National Income Accounting) Explain why each of the following should be taken into account when GDP data are used to compare the “level of well-being” in different countries:
- a. .Population levels
 - b. The distribution of income
 - c .The amount of production that takes place outside of markets
 - d. The length of the average work week
 - e .The level of environmental pollution

This question highlights some of the problems that accompany the indiscriminate use of GDP comparisons across countries or over long periods to compare welfare levels.

- a. GDP per capita is better for measuring well-being than the level of GDP is, and therefore GDP comparisons must be adjusted for population differences
- b. Distribution is ignored in calculating GDP, yet distribution is clearly relevant in using GDP to measure the degree to which the economy is meeting people’s needs.
- c. GDP includes only goods and services sold in markets (with minor exceptions). Yet goods produced informally also affect well-being. In countries where many goods and services are produced outside the official marketplace, the GDP will underestimate the true amount of annual production. Thus, comparing GDP figures can be problematic for countries at varying stages of development.
- d. GDP ignores the value of leisure in contributing to well-being. Increased leisure may lead to an improved quality of life
- e. GDP ignores production costs that are not included in the prices of items sold in markets. To the extent that rising GDP occurs with rising pollution levels, GDP statistics overstate the level of well-being.

- 6 (Consumer Price Index) Calculate a new consumer price index for the data in Exhibit 4 in this chapter. Assume that current year prices of Twinkies, fuel oil, and cable TV are \$0.95/package, \$1.25/gallon, and \$15.00/month, respectively. Calculate the current year’s

cost of the market basket and the value of the current year's price index. What is this year's percent change in the price level compared to the base year?

Good or Service	Quantity in Market Basket	Prices in Base Year	Cost of Basket in Base Year	Prices in Current Year	Cost of Basket in Current Year
Twinkies	365 packages	\$.89/ package	\$324.85	\$.95/ package	\$346.75
Fuel Oil	500 gallons	1.00/gallon	500.00	1.25/gallon	625.00
Cable TV	12 months	30.00/month	<u>360.80</u>	\$15.00/month	<u>180.00</u>
			\$1,184.85		\$1,151.75

Current expenditures now equal \$346.75 for Twinkies, \$625.00 for fuel oil, and \$180.00 for cable TV. Thus, the current year's cost of the market basket is \$1,151.75, and the new price index is 97—the average price level has fallen by 3 percent since the base year. The percentage change is equal to the change in the index (97–100) divided by the base year index (100) then multiplied by 100. The fall in the price of cable TV outweighed the effect of the increases in the prices of fuel oil and Twinkies.

- 7 (Consumer Price Index) Given the following data, what was the value of the consumer price index in the base year? Calculate the annual rate of consumer price inflation in 2011 in each of the following situations.

- The CPI equals 200 in 2010 and 240 in 2011.
- The CPI equals 150 in 2010 and 175 in 2011.
- The CPI equals 325 in 2010 and 340 in 2011.
- The CPI equals 325 in 2010 and 315 in 2011.

A price index always equals 100 in the base year.

- 20.0 percent
- 16.7 percent
- 4.6 percent
- 3.1 percent (the price level fell)

same time maintain the output at the same level without increasing one or more inputs. When economists use production function, they assume that production is technically efficient.

On the other hand, we say a firm is economically efficient, when it produces a given amount of output at the lowest possible cost for a combination of inputs provided the prices of the inputs are given. Therefore, when only input combinations are given, we deal with the problem of technical efficiency, i.e. how to produce maximum output. On the other hand, when input prices are also given in addition to the combination of inputs, we deal with the problem of economic efficiency, i.e. how to produce a given amount of output at the lowest possible cost.

Short Run Analysis of Production Function:

Before a more detailed analysis of short run production function is undertaken, certain key terms used in the analysis must be clarified. These are total product (TP), Marginal product (MP) and Average product (AP). Total Product (TP) i.e. Q is the total amount of output resulting from the use of different quantities of inputs. If we assume labour (L) to be the variable input (Capital (K), held constant), then Marginal product of labour (MP_L) is defined as the change in the total product per unit change in labour, i.e.

$$MP_L = \frac{dQ}{dL} \text{ where } d = \text{A change in}$$

It means MP_L refers to the net addition to the total product as a result of use of an additional unit of labour. Marginal product can be found only when the factor input is a variable factor. Similarly, average product of labour (AP_L) may be defined as total product per unit of labour.

$$\text{So, } AP_L = \frac{Q}{L}$$

Law of variable proportions (Reproduction function with one variable input):

Under this law, we study the effect on output of variation in factor proportions. The law refers to, "The diminishing amount of extra output that we get when we successively add equal extra units of a varying input to a fixed amount of some other input", Therefore, the law stated that, "If we increase the quantity of one input which is combined with a fixed quantity of another

Stage III. It can, thus, be concluded that Stage II is the only relevant range for a “Rational Firm” in a competitive situation. However, it must be noted that, the exact number of labour units hired by the firm within stage II can be found out only when we have the corresponding data on wage rate.

Long Run production Function: A case of returns to scale:

A situation where all inputs are subject to variations is a case of Long-Run production function. We know that in the short Run, fixed inputs set an upper limit to the output because additional units of a variable factor, say, labour are not accompanied by a corresponding change in the fixed factors of production. Consequently, the contribution of the variable input declines. By definition, in the long run, such limitations do not exist. In the long run all inputs can change, let's consider two inputs, labour (L) and capital (K), these can change in two ways:

- 1) Both L and K can change in the same proportion, implying that (K/L) ratio or technique of production remains the same.
- 2) L and K change in different proportion, implying that K/L ratio or technique of production varies with change in output.

The percentage increase in output when all inputs vary in the same proportion is known as “Returns to Scale”. Obviously, Returns to Scale relate to greater use of inputs maintaining the same technique of production. When Returns to Scale occurs, three alternative situations are possible

- 1) Constant Returns to Scale – Output increases in the same proportion as the increase in inputs.
- 2) Increasing Returns to Scale – Output increases by a greater proportion than the increase in inputs.
- 3) Decreasing Returns to Scale – Output increases by a lesser proportion than the increase in inputs.

The three kinds of Returns to Scale can be illustrated with the help of the following table.

A Hypothetical Example to show returns to scale

2 Identify the elements that affect production in the short term

Output can be changed in the short run by adjusting variable resources, such as labor, but the size, or scale, of the firm is fixed in the short run. Firms experience increasing marginal returns when increasing a variable resource, but only to a certain point. Eventually, the law of diminishing marginal returns takes hold, thus restricting a firm's ability to affect production in the short term.

3 Explain how the costs of production vary with output in the short run

A fixed cost does not vary with output in the short run. Variable cost is the cost of variable resources, such as labor, that do vary with output in the short run. When the firm experiences increasing marginal returns, the marginal cost of output falls; when the firm experiences diminishing marginal returns, the marginal cost of output increases.

4 Describe how firms use the long-run average cost curve to make choices about production

For any given firm, the long-run average cost curve is formed by connecting the points on the various short-run average cost curves that represent the lowest per-unit cost for each rate of output. Each of the short-run average cost curves is tangent to the long-run average cost curve, or planning curve. These points of tangency represent the least-cost way of producing each particular rate of output.

If a firm experiences economies of scale, long-run average cost falls as output expands. A larger scale of operation allows a firm to use larger, more efficient techniques and machines and to assign workers to more specialized tasks. Diseconomies of scale may eventually take over as a firm expands its plant size, increasing long-run average cost as output expands.

SOME IMPORTANT TERMINOLOGIES IN PRODUCTION AND COST ANALYSIS:-

Fixed and Variable Resources

- Variable resources: Can be varied quickly to change the output rate.
- Fixed resources: Resources that cannot easily be altered.
- Short run: At least one resource is fixed; the size or scale of the firm is fixed.

Short-Run Profit Maximization

Total Revenue Minus Total Cost: The firm maximizes economic profit by finding the rate of output at which total revenue exceeds total cost by the greatest amount. □

Marginal Revenue Equals Marginal Cost in Equilibrium

- Marginal Revenue: The change in total revenue from selling another unit of output:
- $MR = \Delta TR / \Delta q$
- In perfect competition, marginal revenue equals market price.
- The firm increases output as long as marginal revenue exceeds marginal cost.
- Golden rule of profit maximization: The firm maximizes profit by producing where marginal cost equals marginal revenue.

Economic Profit in the Short Run

Market price = Marginal revenue = Average revenue

Minimizing Short-Run Losses

Short run: A period too short to allow existing firms to leave the industry.

- Fixed Costs and Minimizing Losses: If a firm shuts down, it must still pay fixed costs. A firm produces if total revenue exceeds the variable cost of production.
- Marginal Cost Equals Marginal Revenue: The firm produces rather than shuts down if there is some rate of output where the price at least covers average variable cost. This minimizes the short-run loss.
- Shutting Down in the Short Run: Shut down if average variable cost exceeds price at all rates of output since this minimizes loss.
- Fixed costs are a sunk cost in the short run

The Firm and Industry Short-Run Supply Curves

Short-Run Firm Supply Curve: That portion of a firm's marginal cost curve that intersects and rises above the low point on its average variable cost curve.

Short-Run Industry Supply Curve: Sums horizontally each firm's short-run supply curve.

Firm Supply and Market Equilibrium: Each perfectly competitive firm selects the short-run output that maximizes profit or minimizes loss.

New Entry into the Industry: New entrants increase market supply, thus driving prices down. Therefore, a cartel's success depends on barriers that block entry of new firms.

Cheating: Powerful temptation to cheat on agreement undermines cartels.

—Price Leadership: A price leader is a firm whose price is adopted by the rest of the industry.

—Obstacles:

—violates U.S. antitrust laws;

—the greater the product differentiation, the less effective price leadership is;

—no guarantee other firms will follow;

—profitable prices attract new entrants so barriers to entry are needed; and,

—temptation to cheat.

Game Theory: a model that analyzes oligopolistic behavior as a series of strategic moves and countermoves by rival firms.

- Prisoner's Dilemma: a game that shows why players have difficulty cooperating even when both players would benefit from cooperation.
- Strategy: In game theory, the operational plan pursued by a player.
- Payoff matrix: In game theory, a table listing the payoffs that each player can expect based on the combination of strategies that each player pursues.
- Dominant-strategy equilibrium: the outcome achieved when each player's choice does not depend on what he thinks the other player will do.
- Price-Setting Game: Applies the prisoner's dilemma to pricing strategies.

One shot versus repeated games

One shot: Prisoner's dilemma strategy.

Repeated game: Tit for Tat Strategy.

Coordination Game: Nash equilibrium

Summary of Oligopoly Models: Each model helps explain a phenomenon observed in oligopolistic markets.

Comparison of Oligopoly and Perfect Competition: There is no single model of oligopoly.

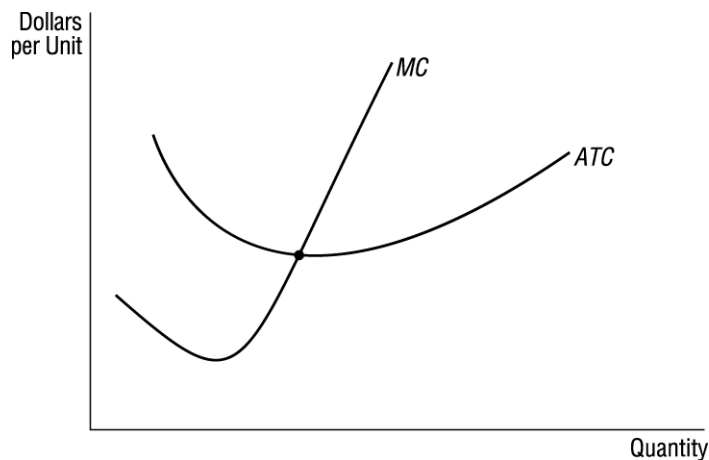
<u>Output</u>	<u>Price</u>	<u>FC</u>	<u>VC</u>	<u>TC</u>	<u>TR</u>	<u>Profit/Loss</u>
0	\$100	\$100	\$ 0	_____	_____	_____
1	90	_____	50	_____	_____	_____
2	80	_____	90	_____	_____	_____
3	70	_____	150	_____	_____	_____
4	60	_____	230	_____	_____	_____
5	50	_____	330	_____	_____	_____
6	40	_____	450	_____	_____	_____
7	30	_____	590	_____	_____	_____

- Complete the table.
- What is the highest profit or lowest loss available to this firm?
- Should this firm operate or shut down in the short run? Why?
- What is the relationship between marginal revenue and marginal cost as the firm increases output?

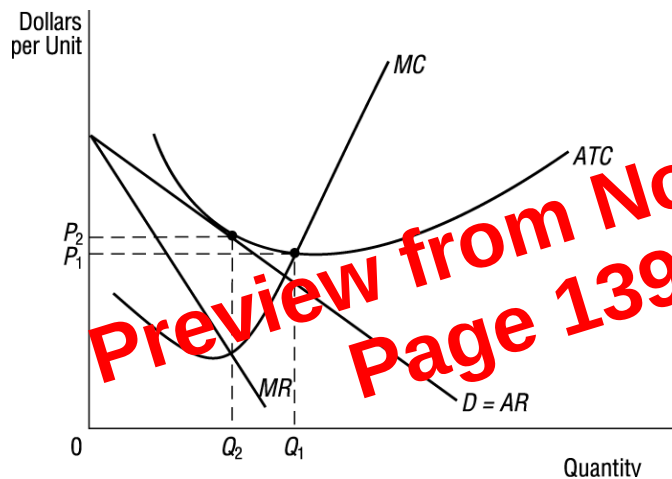
a.	<u>Output</u>	<u>Price</u>	<u>FC</u>	<u>VC</u>	<u>TC</u>	<u>TR</u>	<u>Profit/Loss</u>
	0	\$100	\$100	\$ 0	\$100	\$ 0	-\$100
	1	90	100	50	150	90	-60
	2	80	100	90	190	160	-30
	3	70	100	150	250	210	-40
	4	60	100	230	330	240	-90
	5	50	100	330	430	250	-180
	6	40	100	450	550	240	-310
	7	30	100	590	690	210	-480

- The lowest loss is \$30.
 - The firm should continue to produce up to and including 2 units because marginal revenue still exceeds marginal cost. [See answer to part (d).] In addition, at that quantity, price exceeds average variable cost. Operating in that range allows the firm to cover at least a portion of the fixed costs (\$100) that would not be covered at all if the firm shut down. Specifically, the firm should produce 2 units.
 - Through 2 units of output, marginal revenue exceeds marginal cost. Beyond 2 units, marginal cost exceeds marginal revenue.
22. (Monopolistic Competition and Perfect Competition Compared) Illustrated below are the marginal cost and average total cost curves for a small firm that is in long-run equilibrium.
- Locate the long-run equilibrium price and quantity if the firm is perfectly competitive.
 - Label the price and quantity p_1 and q_1 .
 - Draw in a demand and marginal revenue curve to illustrate long-run equilibrium if the firm is monopolistically competitive. Label the price and quantity p_2 and q_2 .
 - How do the monopolistically competitive firm's price and output compare to those of the perfectly competitive firm?

e. How do long-run profits compare for the two types of firms?



(a), (b), and (c)



(d) The monopolistically competitive firm's price is higher and its output is lower.

(e) Both types of firms earn zero long-run economic profits.

23. (Varieties of Oligopolies) Do the firms in an oligopoly act independently or interdependently? Explain your answer.

Firms in an oligopoly act interdependently. This means that the demand for one firm's output depends on the actions of its rival firms. This makes decision making difficult regarding price and output levels. Oligopolists try to reduce uncertainty about their demand by engaging in behavior that makes their rivals' actions more predictable (colluding, forming cartels, using price leadership) or by assuming certain actions by their rivals.

- d. \$8,000. Under the matching assumption (If Ford and Chevrolet both charge \$4,000, the profits would be \$8; if they both charge \$8,000, the profits are \$10; and if they both charge \$12,000, the profits will be \$7), Ford's profits of \$10 million are higher than those for any other price.
- e. If Ford charges \$8,000, Chevrolet maximizes its profits (\$12 million) by charging \$4,000.
- f. If Chevrolet is charging \$4,000 and Ford is charging \$8,000, Ford's profit is \$6 million.
- g. Both companies would set the price at \$8,000, making total profits of \$20 million that would be split equally between them. Any other price combination lowers joint profit.
- h. Chevrolet could increase its profits to \$12 million by cutting its price to \$4,000 (if undetected). Ford could also increase profits to \$12 million by cutting its price to \$4,000 (if undetected).
28. (Game Theory) While grading a final exam, an economics professor discovers that two students have virtually identical answers. She is convinced the two cheated but cannot prove it. The professor speaks with each student separately and offers the following deal: Sign a statement admitting to cheating. If both students sign the statement, each will receive an "F" for the course. If only one signs, he is allowed to withdraw from the course while the other student is expelled. If neither signs, both receive a "C" since the professor does not have sufficient evidence to prove cheating.
- a. Draw the payoff matrix.
- b. Which outcome do you expect? Why?

a. The payoff matrix is

	Student A signs	Student A does NOT sign
Student B signs	A gets an F; B gets an F	A is expelled; B withdraws
Student B does NOT sign	A withdraws; B is expelled	A gets a C; B gets a C

- b. While it would be best for both students if each refused to sign, the most likely outcome is that both students sign and receive an "F." This is because failure to sign could lead to expulsion. Unless each student can somehow ensure the other will not sign, the threat of expulsion will most likely lead to each signing the statement.
29. (Market Structures) Determine whether each of the following is a characteristic of perfect competition, monopolistic competition, oligopoly, and/or monopoly:

- a. A large number of sellers
 - b. Product is a commodity
 - c. Advertising by firms
 - d. Barriers to entry
 - e. Firms that are price makers
-
- a. Perfect competition and monopolistic competition
 - b. Perfect competition
 - c. Monopolistic competition and oligopolies with differentiated products; some monopolies
 - d. Oligopoly and monopoly
 - e. Monopolistic competition, oligopoly, and monopoly

PRICING STRATEGIES:-

Pricing decisions are equally important for a new product and an existing product, for entering into a new market or a new market segment and are affected by a host of factors like objective of the firm, cost of production, market structure, competitor's strategy, elasticity of demand, government policy, etc.

COST BASED PRICING:-

Under cost plus pricing, price of the product is the sum of cost plus a profit margin.

- i. Cost plus or Mark up pricing

Price = $AC + m$ where $AC = TC/Q$, m is the percentage of mark up

- ii. Marginal cost pricing

This is used when demand is slack and market is highly competitive. Under marginal cost pricing price of the product is the sum of variable cost plus a profit margin. This method is used by firms to enter into a new market as well as to beat competitors. As this method ignores the element of fixed cost, it cannot be adopted as a long term strategy.

- iii. Target Return Pricing

This method of pricing is the same as the previous ones but for the fact that margin is decided on the basis of target rate of return, determined on the company's experience, consumer's paying capacity, risk involved, and similar other factors.