UNIT I INTRODUCTION TO ECONOMICS

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ECONOMICS

Definition : Prof. Lionel Robbins defines economics as “ Science which studies human behavior as a relationship between ends and scarce means which have alternative means”

Alfred Marshall defined economics as “ A study of mankind in the ordinary business life, it examines that part of individual and social actions which is most closely connected with the attainment and with the use of material requisites' of well being.

Simple Definition : A study of how limited resources are used to satisfy unlimited human wants

OBJECTIVES OF ECONOMICS

- A high level of employment
- Price stability
- Efficiency
- An equitable distribution of income
- Growth

FLOW IN AN ECONOMY

- The flow of goods, services, resources and money payments results in a simple economy

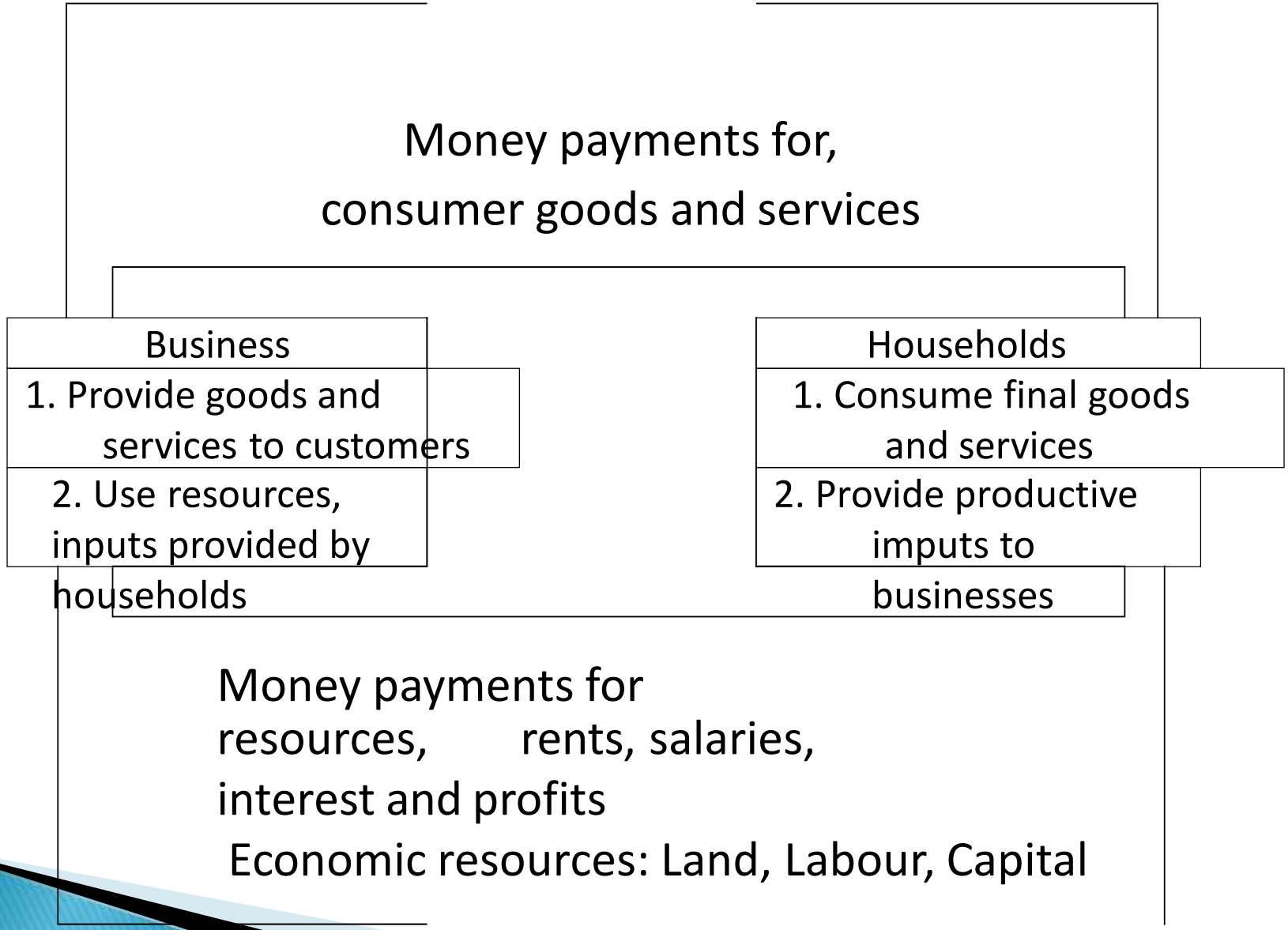
- Households and business firms are the two major entities in a simple economy.

- Business organizations use various economic resources such as land, labour and capital which are provided by households to produce consumer goods and services which will be used by them.

- Business firms make payment to the money to the households for receiving various resources

- The households in turn make payments to the business organizations

FLOW IN AN ECONOMY

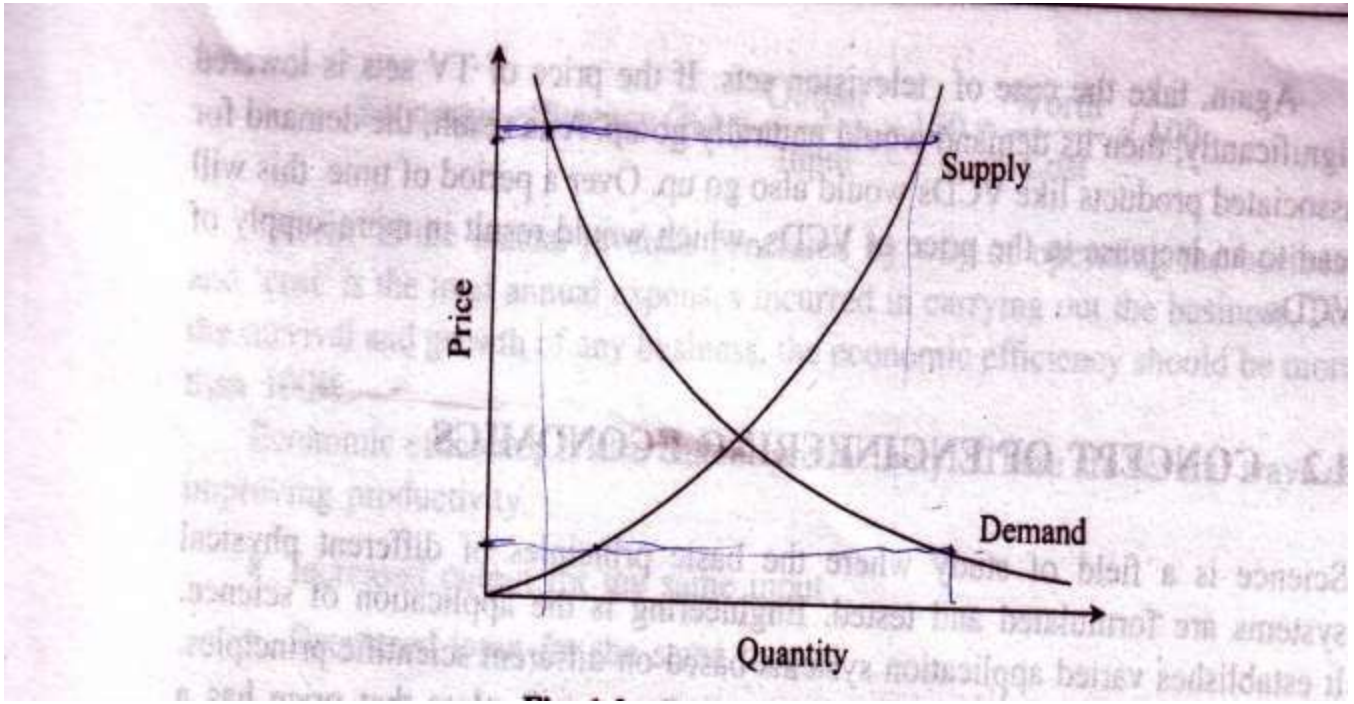


LAW OF SUPPLY AND DEMAND

Demand : The desire for a commodity backed by necessary purchasing power.

Supply : It represents how much a market can offer. It refers to the amount of certain producers willing to supply when receiving a certain price.

LAW OF SUPPLY AND DEMAND



LAW OF DEMAND

- The law of demand states that if all the other factors remain equal the higher the price of good the less people will demand that goods.

- The amount of goods the buyers purchase at higher price is less because as the price of a good goes up, so does the opportunity cost of buying that good.

- As a result people will naturally avoid buying a product that will force them to forgo the consumption of something else they value more.

LAW OF SUPPLY

- The supply relationship shows that if the price is low the producers restrain from releasing more quantities of the product in the market.

- Hence the supply of the product is decreased.
- From the above fig the point of intersection of supply curve and demand curve is called equilibrium point.

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- At this particular point the quantity of supply is equal to the quantity of demand

FACTORS INFLUENCING DEMAND

The shape of the demand curve is influenced by the following factors

- Income of the people
- Prices of related goods
- Tastes of consumers.
- If the income of the people increases the purchasing power increases.

For eg. If the cost of TV set is lowered its demand will go up, as a result the demand for its associated products such as VCD would increase.

Over a period of time the preference of the people for a particular product may increase, which in turn will affect the demand.

FACTORS INFLUENCING SUPPLY

The shape of the supply curve is influenced by the following factors

- Cost of the inputs
- Technology
- Weather
- Prices of related goods

If the prices of fertilizers and cost of labour increases the Profit margin per bag of paddy will be reduced.

Hence the farmers will reduce the area of cultivation and the supply of paddy will be reduced.

If there is an advancement in technology used to Manufacture the product then there will be reduction in the production cost of the product. Hence more quantity will be supplied.

Weather also plays a major role. During winter the demand for woolen products will increase.

So the producers will supply more woolen products during winter.

CONCEPT OF ENGINEERING ECONOMICS

Engineering Economics

It is defined as “A set of principles , concepts, techniques and methods by which alternatives within a project can be compared and evaluated for the best monetary return”.

Principles of Engineering Economics:

Develop the alternatives : Decisions are made from the alternatives. The alternatives need to be identified and then defined for the subsequent analysis.

Focus on the differences : Only the differences in expected future outcomes among the alternatives are relevant and should be considered for decision.

CONCEPT OF ENGINEERING ECONOMICS

Use a consistent view point:

The prospective outcomes of the alternatives, economic and other, should be consistently developed from a defined perspective.

Use of common unit of measure :

Common unit of measure to enumerate as many of the prospective outcomes as possible will make easier the analysis and comparison of alternatives.

CONCEPT OF ENGINEERING ECONOMICS CONT..

- **Consider all relevant criteria**: Selection of preferred alternative requires the use of criteria.
- **Make uncertainty explicit**: Uncertainty is inherent in projecting the future outcomes of the alternatives and should be recognized in their analysis and comparison.
- **Revisit your decisions** : Improved decision making results from an adaptive process, the initial projected outcomes of the selected alternatives should be subsequently compared with actual results achieved.

ENGINEERING ECONOMICS ANALYSIS PROCEDURE

- Problem recognition, formulation and evaluation.
- Development of feasible alternatives.
- Development of the cash flows for each alternative.
- Selection of criterion.
- Analysis and comparison of the alternatives.
- Selection of the preferred alternative.
- Performance monitoring and post evaluation results

ENGINEERING EFFICIENCY :

It is defined as the ratio of output to the input of a physical system. The physical system may be a diesel engine, shop floor, machine
working etc.,

ENGINEERING EFFICIENCY = OUTPUT / INPUT X 100

ECONOMIC EFFICIENCY :

It is defined as the ratio of output to the input of a business system.

ECONOMIC EFFICIENCY = OUPUT / INPUT X 100

ECONOMIC EFFICIENCY = WORTH / COST X 100

Worth is the annual revenue generated by the way of operating business and cost is the total annual expenses incurred in carrying out the business.

SCOPE OF ENGINEERING ECONOMICS

- Engineering economics plays a very major role in all engineering decisions.
- It is concerned with the monetary consequences, financial analysis of the projects, products and processes that engineers design.
- Engineering economics helps an engineer to assess and compare the overall cost of available alternatives for engineering projects.
- According to the analysis an engineer can take decision from the alternative which is more economic.

SCOPE OF ENGINEERING ECONOMICS CONT..

- Engineering economics concepts are used in the fields for improving productivity, reducing human efforts, controlling and reducing cost.
- Engineering economics helps to understand the market conditions general economic environment in which the firm is working.
- It helps in allocating the resources.
- Engineering economics helps to deal with the identification of economic choices, and is concerned with the decision making of engineering problems of economic nature.

ELEMENTS OF COST

- Cost is defined as the amount, measured in money or cash expended or other property transfer capital stock issued, service performed, or liability incurred in consideration of goods or services received or to be received.
- Cost may be defined as the total of all expenses incurred whether paid or outstanding in the manufacture and sale of a product

Prime Cost	=	Direct Materials + Direct Labours + Direct expenses
Factory Cost	=	Prime cost + Indirect expenses
Cost of Production	=	Factory cost + Administrative expenses
Cost of Sales	=	Cost of production + Selling and Distribution expenses

OTHER COST AND REVENUE

MARGINAL COST : It is cost of producing an additional unit of that product.

MARGINAL REVENUE : It is the incremental revenue of **selling an additional unit of that product.**

SUNK COST : It is the past cost of an equipment/asset. This cost is not considered for any analysis.

OPPORTUNITY COST : The expected return or benefit foregone in rejecting one course of action for another. When rejecting one course of action the rejected alternative becomes the opportunity cost for the alternative accepted.

CONTRIBUTION & P/V RATIO

CONTRIBUTION : It is the difference between the sales and marginal cost of sales.

CONTRIBUTION = FIXED COST+PROFIT
CONTRIBUTION = SALES-MARGINAL COST
CONTRIBUTION = SALES-VARIABLE COST

PROFIT VOLUME RATIO = CONTRIBUTION/SALES
PROFITVOLUME RATIO= FIXED COST/BREAK EVEN POINT

BREAK EVEN ANALYSIS

Break even analysis : It implies that the total revenue equals the total cost at some point of operation.

Break even point : It is where there will be neither profit nor loss.

BREAK EVEN CHART : It shows the relation between costs and revenue at a given time.

TC = Total cost

FC = Fixed cost VC = Variable cost

Q= Volume of production s = selling price/unit

v = variable cost per unit

Total cost = Fixed cost + Variable cost

TC = FC + v Q

The total revenue (S) is given by S = s Q

BREAK EVEN ANALYSIS

The linear plots of the total cost and total sales revenue are shown in the fig.

The intersection point of the above two lines is called break even point & the corresponding quantity in the X axis is the break even quantity.

For any production quantity which is less than the break even quantity the firm will make loss because total cost > total revenue.

For any production quantity which is more than the break even quantity the firm will make profit because total revenue > total cost.

BREAK EVEN ANALYSIS

PROFIT = SALES – (FIXED COST + VARIABLE COST)
= s Q – (FC +vQ)

BREAKEVENQUANTITY

= *FIXEDCOSTS* / *SELLINGPRICE* / *UNIT* - VARIABLE COST / UNIT

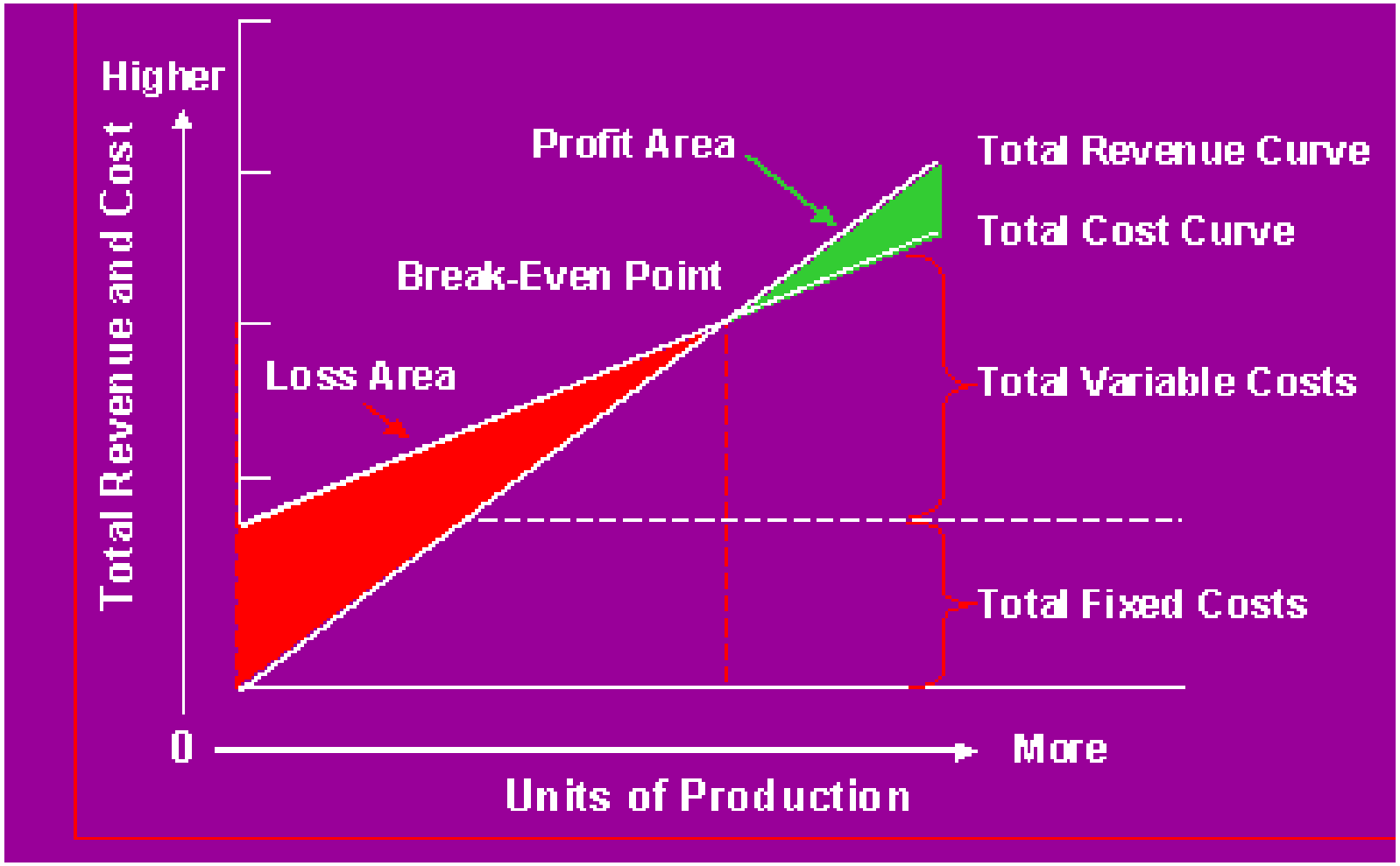
$$BEQ = FC / s - v$$

MARGIN OF SAFETY:
It is defined as the difference between the actual sales and sales at the break even point.

Margin of safety = Actual sales – Sales at BEP

= *PROFIT* / *P* / *VRATIO*
=Profit / Contribution x Sales

BREAK EVEN CHART



ELEMENTARY ECONOMIC ANALYSIS

In manufacturing engineering economic decision making is involved in each and every stage of production from the design to shipping stage. The primary tasks for engineers is to plan for

- Material selection for a product
- Design selection for a product
- Building material selection for constructions.
- Process Selection.

MATERIAL SELECTION FOR A PRODUCT

Material : materials are commodities which are used directly or indirectly in producing a product.

Material Selection:

Material Properties: Expected level of performance from the material

Material Cost : Material must be available at a cheaper price

Material availability: Should be easily available

Processing : Should be easily machinable.

Environment : The environmental factors should not affect the raw material

MATERIAL SELECTION PROCEDURE

Translation : Express design requirements as constraints and objectives.
Example : Tie rod
Function : Support the tensile load Objective : Minimize mass Constraints : Required length, load carrying capacity.
Screening : Eliminate materials that cannot do the job.
Ranking : Find the materials that can do the job best. **Selection :** Select and verify the supporting materials

PROCESS PLANNING

Process : It is defined as a group of actions instrumental to the achievement of the output of an operating system

Process Planning : It is the systematic determination of the methods by which a product is to be manufactured economically and competitively.

Process Planning procedure:

Analyze the part drawing to get an overall picture on what is required.

Consult with product engineers on product design changes.

List the basic operations required to produce the part to the drawing or specifications

Determine the most economical manufacturing method and form or tooling required to complete the product.

Devise the best way of combine the operations and put them in sequence.

Specify the gauging required for the process.