

IARE '24 DISCORD TEAM

II-II

BEFA MODULE 2 SOLUTIONS

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PRODUCTION AND COST ANALYSIS



MODULE II

PRODUCTION AND COST ANALYSIS

PART-A

1. Which of the following statement best describe the general form of a production function?

- (a) It is purely technological relationship between quantities of input and quantities of output.
- (b) It represent the technology of an organization/sector of an economy.
- (c) Prices of inputs or of the output do not enter into the production function.
- (d) It is flow concept describing the transformation of inputs into output per unit of time.

Ans. all of the options correct.

PRODUCTION FUNCTION: It is an equation that expresses the relationship between the quantities of productive factors (such as labour and capital) used and the amount of product obtained. It states the amount of product that can be obtained from every combination of factors, assuming that the most efficient available methods of production are used.

The production function can thus answer a variety of questions. It can, for example, measure the marginal productivity of a particular factor of production (i.e., the change in output from one additional unit of that factor). It can also be used to determine the cheapest combination of productive factors that can be used to produce a given output.

REASON:

The elements of the production function are the inputs and output of the firm and how the former is changed into the later. It considers the technology available to the firm and the economic sector it operates in. It does not factor in the prices of inputs or

outputs, however the prices of inputs is considered in the iso-cost line and used alongside the production function.

2. Distinguish between short-run production function and long-run production function. The law of diminishing returns is sometimes known as the law of variable proportions. How? Explain the law with example and figure

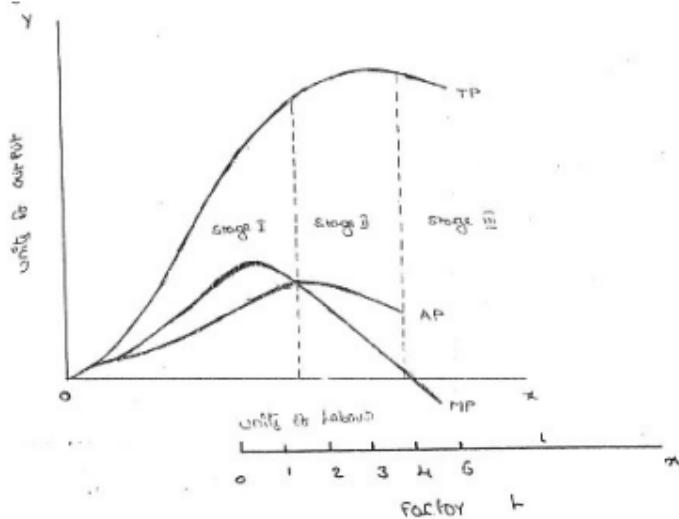
BASIS FOR COMPARISON	SHORT-RUN PRODUCTION FUNCTION	LONG-RUN PRODUCTION FUNCTION
Meaning	Short run production function alludes to the time period, in which at least one factor of production is fixed.	Long run production function connotes the time period, in which all the factors of production are variable.
Law	Law of variable proportion	Law of returns to scale
Scale of production	No change in scale of production.	Change in scale of production.
Factor-ratio	Changes	Does not change.
Entry and Exit	There are barriers to entry and the firms can shut down but cannot fully exit.	Firms are free to enter and exit.

Law of Variable Proportions or Returns to a Factor :

This law exhibits the short-run production functions in which one factor varies while the others are fixed. Also, when you obtain extra output on applying an extra unit of the input, then this output is either equal to or less than the output that you obtain from the previous unit.

The Law of Variable Proportions concerns itself with the way the output changes when you increase the number of units of a variable factor.

Hence, it refers to the effect of the changing factor-ratio on the output. In other words, the law exhibits the relationship between the units of a variable factor and the amount of output in the short-term. This is assuming that all other factors are constant. This relationship is also called returns to a variable factor.



The law states that keeping other factors constant, when you increase the variable factor, then the total product initially increases at an increasing rate, then increases at a diminishing rate, and eventually starts declining.

3. Explain the theoretical principles of production to explain the relative substitution of one input for another occurring as a result of the increased price of labour.

Isoquants are the curves, which represent the different combinations of inputs producing a particular quantity of output. Any combination on the isoquant represents the same level of output. For a given output level firm's production become. $Q = f(L, K)$ Where 'Q', the units of output is a function of the quantity of two inputs 'L' and 'K'. Thus an isoquant shows all possible combinations of two inputs, which are capable of producing equal or a given level of output. Since each combination yields same output, the producer becomes indifferent towards these combinations.

Assumptions: 1. There are only two factors of production, viz. labour and capital. 2. The two factors can substitute each other up to certain limit 3. The shape of the isoquant depends upon the extent of substitutability of the two inputs. 4. The technology is given over a period. 5. An isoquant may be explained with the help of an arithmetical example.

Combinations	Labour Units	Capital Units	Output Quintals
A	1	10	50
B	2	7	50
C	3	4	50
D	4	4	50
E	5	1	50

Combination 'A' represent 1 unit of labour and 10 units of capital and produces '50' quintals of a product all other combinations in the table are assumed to yield the same given output of a product say '50' quintals by employing any one of the alternative combinations of the two factors labour and capital. If we plot all these combinations on a paper and join them, we will get continues and smooth curve called Iso-product curve as shown below

4. Examine the importance of the law of diminishing returns. What do you think to be its causes and effects?

"Law of diminishing returns has played a vital role in the modern economics theory. Assume that a firms production function consists of fixed quantities of all inputs (land, equipment, etc.) except labour which is a variable input when the firm expands output by employing more and more labour it alters the proportion between fixed and the variable inputs. The law can be stated as follows:

"When total output or production of a commodity is increased by adding units of a variable input while the quantities of other inputs are held constant, the increase in total production becomes after some point, smaller and smaller"

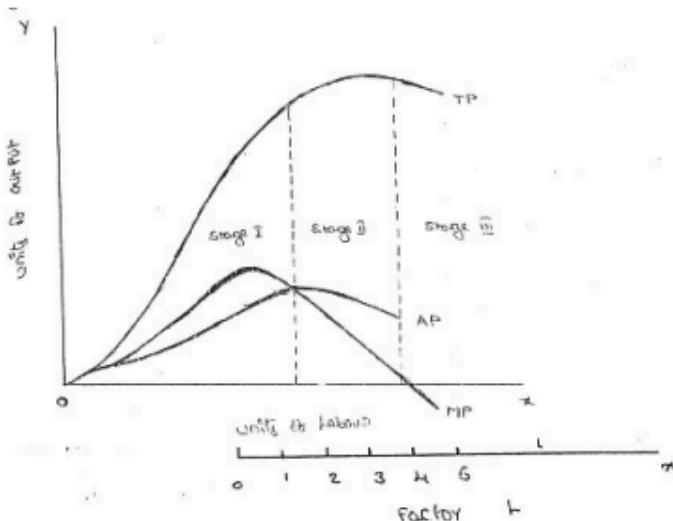
For example, a factory employs workers to manufacture its products, and, at some point, the company operates at an optimal level. With all other production factors constant, adding additional workers beyond this optimal level will result in less efficient operations.

CAUSES:

- 1.Fixed Costs
- 2.Lower levels of Productivity
- 3.Limited Demand
- 4.Impact on Working Environment

5. Short-run

Fixed Factor	Variable Factor Labour	Total Product	Average Product	Marginal Product	
1	1	100	100	-	Stage - I
1	2	220	120	120	
1	3	270	90	50	
1	4	300	75	30	
1	5	320	64	20	Stage - II
1	6	330	55	10	
1	7	330	47	0	Stage - III
1	8	320	40	-10	



5. "Technical and/or managerial indivisibilities cause increasing return to scale." Give your opinion.

Ans. Returns to scale, in economics, the quantitative change in output of a firm or industry resulting from a proportionate increase in all inputs. If the quantity of output rises by a greater proportion—e.g., if output increases by 2.5 times in response to a doubling of all inputs—the production process is said to exhibit increasing returns to scale. Such economies of scale may occur because greater efficiency is obtained as the firm moves from small- to large-scale operations. Decreasing returns to scale occur if the production process becomes less efficient as production is expanded, as when a firm becomes too large to be managed effectively as a single unit.

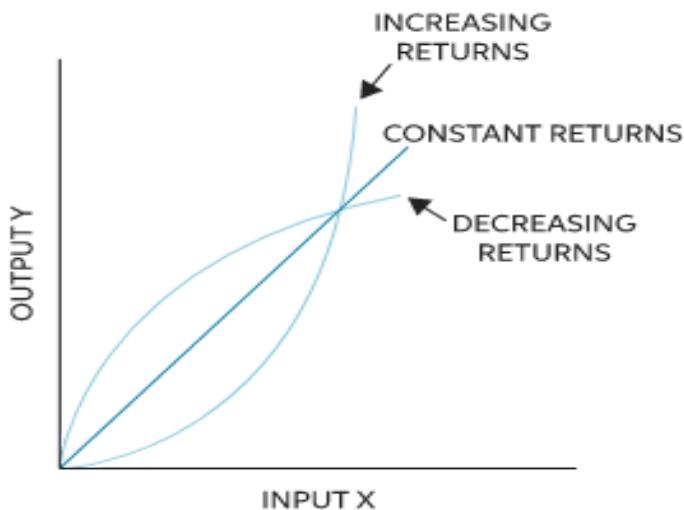
There are a number of factors responsible for increasing returns to scale. One of them is Technical and/or managerial indivisibilities.

Implies that there are certain inputs, such as machines and human resource, used for the production process are available in a fixed amount. These inputs cannot be divided to suit different level of production. For example, an organization cannot use the half of the turbine for small scale of production.

Similarly, the organization cannot use half of a manager to achieve small scale of production. Due to this technical and managerial indivisibility, an organization needs to employ the minimum quantity of machines and managers even in case the level of production is much less than their capacity of producing output. Therefore, when there is increase in inputs, there is exponential increase in the level of output.

6. List out the difference between increasing, decreasing and constant returns to scale with the help of suitable figures only

Ans:



Increasing Returns to Scale: Increasing returns to scale is closely associated with economies of scale (the downward sloping part of the long-run average total cost curve in the previous section). Increasing returns to scale occurs when a firm increases its inputs, and a more-than-proportionate increase in production results. For example, in year one a firm employs 200 workers, uses 50 machines, and produces 1,000 products. In year two it employs 400 workers, uses 100 machines (inputs doubled), and produces 2,500 products (output more than doubled).

Decreasing Returns to Scale:

Decreasing returns to scale is closely associated with diseconomies of scale (the upward part of the long-run average total curve). Decreasing returns to scale happens when the firm's output rises proportionately less than its inputs rise. For example, in year one, a firm employs 200 workers, uses 50 machines, and produces 1,000 products. In year two it employs 400 workers, uses 100 machines (inputs doubled), and produces 1,500 products (output less than doubled).

When input prices remain constant, decreasing returns to scale results in increasing long-run average costs (diseconomies of scale). An organization may become too big, thus creating too many layers of management, too many departments, and too much red tape. This leads to a lack of communications, inefficiency, delays in decision-making, and inefficient production.

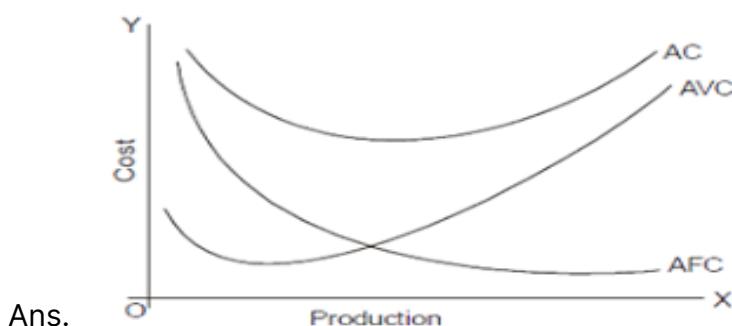
Constant Returns to Scale:

Constant returns to scale occurs when the firm's output rises proportionate to the increase in inputs.

Problem: In the example above, after doubling the inputs in year one, what would output have to be in year two for the firm to experience constant returns to scale?

Solution: 2,000 products. At 2,000 products, the output doubles. Because the inputs double, the increase in production is proportionate. By definition, this equates to constant returns to scale.

7. With the increase in output of the firms, their average total cost and average variable cost curves come closer and closer to each other but never meet. Why?



The difference between average total cost (ATC) and average variable cost (AVC) is average fixed cost (AFC) and average fixed cost can never be constant. Since AFC tends to decline with increase in output, the difference between ATC and AVC must reduce as output increases. So, average total cost and average variable cost never meets.

8. Distinguish between different Classifications of Cost.

Ans. 1] Classification by Nature :

This is the analytical classification of costs. Let us divide as per their natures. So basically there are three broad categories as per this classification, namely Labor Cost, Materials Cost and Expenses. These heads make it easier to classify the costs in a cost sheet. They help ascertain the total cost and determine the cost of the work-in-progress.

1. Material Costs: Material costs are the costs of any materials we use in the production of goods. We divide these costs further. For example, let's divide material costs into raw material costs, spare parts, costs of packaging material etc.

2. Labor Costs: Labor costs consists of the salary and wages paid to permanent and temporary employees in the pursuit of the manufacturing of the goods.

3. Expenses: All other expenses associated with making and selling the goods or services.

2] Classification by Functions :

This is the functional classification of costs. So the classification follows the pattern of basic managerial activities of the organization.

The grouping of costs is according to the broad divisions of functions such as production, administration, selling etc.

Production Costs: All costs concerned with actual manufacturing or construction of the goods

Commercial Costs: Total costs of the operation of an enterprise other than the manufacturing costs. It includes the admin costs, selling and distribution costs etc.

3] Classification by Traceability :

This aspect one of the most important classification of costs, into direct costs and indirect costs. This

classification is based on the degree of traceability to the final product of the firm.

Direct Costs: So these are the costs which are easily identified with a specific cost unit or cost centers.

Some of the most basic examples are the materials used in the manufacturing of a product or the labor involved with the production process.

Indirect Costs: These costs are incurred for many purposes, i.e. between many cost centers or units. So we cannot easily identify them to one particular cost center. Take for example the rent of the building or the salary of the manager.

We will not be able to accurately determine how to ascertain such costs to a particular cost unit.

4] Classification by Normality :

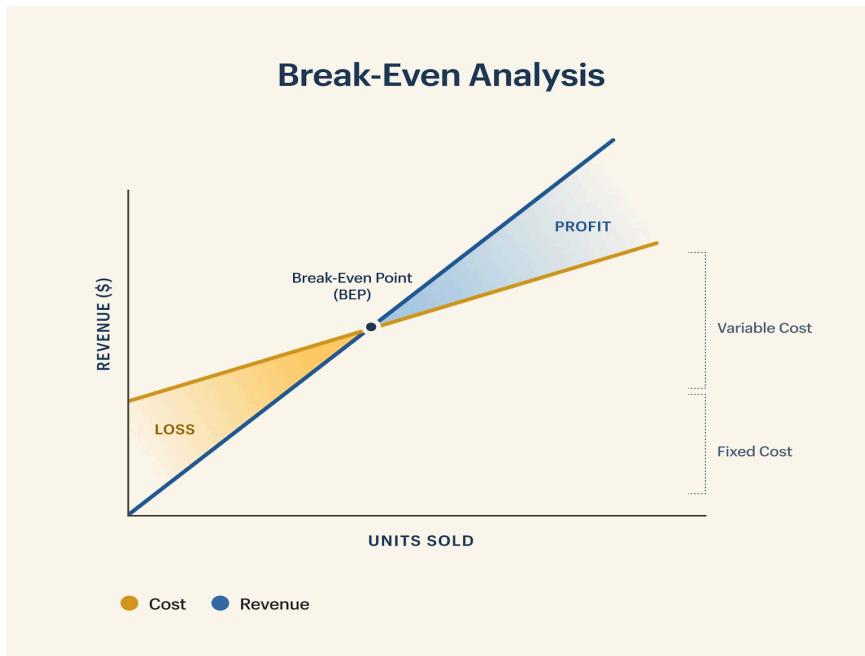
This classification determines the costs as normal costs and abnormal costs.

The norms of normal costs are the costs that usually occur at a given level of output, under the same set of conditions in which this level of output happens.

Normal Costs: This is a part of the cost of production and a part of the costing profit and loss. These are the costs that the firm incurs at the normal level of output in standard conditions.

Abnormal Costs: These costs are not normally incurred at a given level of output in conditions in which normal levels of output occur. These costs are charged to the profit and loss account, they are not a part of the cost of production.

9. Explain Break Even Analysis with the help of diagram.



Refer PART-B Q.No.4

10. Distinguish between internal and external economies of scale.

Refer PART-B Q.No.12

PART - B

1 Distinguish in detail the different types of production function with their formulas.

Ans) A production function gives the technological relation between quantities of physical inputs and quantities of output of goods.

There are different types of production functions that can be classified according to the degree of substitution of one input by the other.

1. Cobb-Douglas Production Function:

Cobb-Douglas production function refers to the production function in which one input can be substituted by other but to a limited extent. For example, capital and labor can be used as a substitute of each other, but to a limited extent only.

Cobb-Douglas production function can be expressed as follows:

$$Q = AK^{(a)}L^{(b)}$$

Where, A = positive constant

a and b = positive fractions

2. Leontief Production Function: Leontief production function uses fixed proportion of inputs having no substitutability between them. It is regarded as the limiting case for constant elasticity of substitution.

The production function can be expressed as follows:

$$q = \min(z_1/a, z_2/b)$$

Where, q = quantity of output produced

z_1 = utilized quantity of input 1

z_2 = utilized quantity of input 2

a and b = constants

For example, tyres and steering wheels are used for producing cars. In such case, the production function can be as follows:

$$Q = \min(z_1/a, z_2/b)$$

$Q = \min(\text{number of tyres used}, \text{number of steering used})$.

3. CES Production Function: CES stands for constant elasticity substitution. CES production function shows a constant change produced in the output due to change in input of production.

It can be represented as follows:

$$Q = A [aK^{\beta} + (1-a)L^{-\beta}]^{(-1/\beta)}$$

Or,

$$Q = A [aL^{-\beta} + (1-a)K^{\beta}]^{(-1/\beta)}$$

2 Define 'Cost'. How are costs classified? Explain any five important cost concepts useful for managerial decisions

The cost refers to the amount of payment made to acquire any goods and services. In a simpler way, the concept of cost is a financial valuation of resources, materials, risks, time and utilities consumed to purchase goods and services

The classification of cost is based on the nature of the expenditure, which are the three broad categories as per this, namely Labour Cost, Materials Cost and Expenses.

Costs can be classified as per

- 1) their nature like material, labour and overheads.
- 2) as per cost centre direct costs, direct material, direct labour, direct expense, indirect costs, indirect material, indirect labour, indirect expenses,
- 3) as per time like historical cost, predetermined cost, standard cost, Estimated cost

COSTS CONCEPTS

Fixed and variable costs

Fixed cost is that cost which remains constant for a certain level of output. It is not affected by the changes in the volume of production. (But fixed cost per unit decreases, when the production is increased.) Fixed costs include salaries, Rent, Administrative expenses, depreciation etc.

Variable is that which varies directly with the variation in output. An increase in total output results in an increase in total variable costs and decrease in total output results in a proportionate decline in the total variables costs. The variable cost per unit will be constant. Ex: Raw materials, labour, direct expenses, etc

Post and future costs

Post costs also called historical costs are the actual cost incurred and recorded in the book of account; these costs are useful only for valuation and not for decision making. Future costs are costs that are expected to be incurred in the future. They are not actual costs. They are the costs forecasted or estimated with rational methods. Future cost estimates are useful for decision making because decisions are meant for the future.

Traceable cost and common cost

Traceable costs, otherwise called direct cost, is one, which can be identified with a product's process or product. Raw material, labour involved in production are examples of traceable cost. Common costs are the ones that are attributed to a particular process or product. They are incurred collectively for different processes or different types of products. It cannot be directly identified with any particular process or type of product.

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3 Explain various economies of scale and diseconomies of scale that accumulate to the firm when it expands its operations?

Production may be carried on a small scale or a large scale by a firm. When a firm expands its size of production by increasing all the factors, it secures certain advantages known as economies of production. Marshall has classified these economies of large-scale production into internal economies and external economies.

Internal economies are those benefits, which are opened to a single factory or a single firm independently of the actions of other firms. They result from an increase in the scale of output of a firm and cannot be achieved unless output increases. Hence internal economies depend solely upon the size of the firm and are different for different firms.

External economies are those benefits, which are shared in by a number of firms or industries when the scale of production in an industry or groups of industries increases. Hence external economies benefit all firms within the industry as the size of the industry expands.

DISECONOMIES OF SCALE

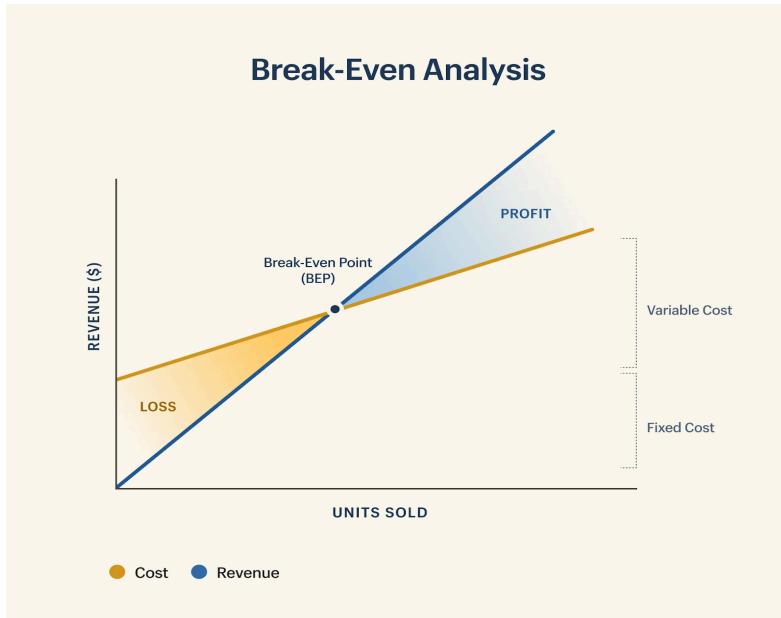
Internal and external diseconomies are the limits to large-scale production. It is possible that expansion of a firm's output may lead to rise in costs and thus result in diseconomies instead of economies. When a firm expands beyond proper limits, it is beyond the capacity of the manager to manage it efficiently. This is an example of an internal diseconomy. In the same manner, the expansion of an industry may result in diseconomies, which may be called external diseconomies. Employment of additional factors of production becomes less efficient and they are obtained at a higher cost. It is in this way that external diseconomies result as an industry expands.

1. Internal Diseconomies
 2. External Diseconomies
-
1. Internal Diseconomies

- (a) Financial diseconomies: For expanding business, the entrepreneur needs finance. But finance may not be easily available in the required amount at the appropriate time. Lack of finance retards the production plans thereby increasing costs of the firm.
- (b) Managerial diseconomies: There are difficulties of large-scale management. Supervision becomes a difficult job. Workers do not work efficiently, wastages arise, decision-making becomes difficult, coordination between workers and management disappears and production costs increase
- (c) Marketing diseconomies: As business is expanded, prices of the factors of production will rise. The cost will therefore rise. Raw materials may not be available in sufficient quantities due to their scarcity. Additional output may depress the price in the market. The demand for the products may fall as a result of changes in tastes and preferences of the people. Hence cost will exceed revenue.
- (d) Technical diseconomies: There is a limit to the division of labour and splitting down of production processes. The firm may fail to operate its plant to its maximum capacity. As a result, cost per unit increases. Internal diseconomies follow.
- (e) Diseconomies of risk taking: As the scale of production of a firm expands, risks also increase with it. Wrong decisions by the management may adversely affect production. If large firms are affected by any disaster, natural or human, the economy will be put to strains.

2. External Diseconomies When many firms get located at a particular place, the costs of transportation increases due to congestion. The firms have to face considerable delays in getting raw materials and sending finished products to the marketing centres. The localization of industries may lead to scarcity of raw material, shortage of various factors of production like labour and capital, shortage of power, finance and equipment. All such external diseconomies tend to raise cost per unit.

4 Simplify the concept and assumptions of Break-even analysis, with the help of diagram



Break-even analysis entails calculating and examining the margin of safety for an entity based on the revenues collected and associated costs. In other words, the analysis shows how many sales it takes to pay for the cost of doing business.

Assumptions:

1. All costs are classified into two – fixed and variable.
2. Fixed costs remain constant at all levels of output.
3. Variable costs vary proportionally with the volume of output.
4. Selling price per unit remains constant in spite of competition or change in the volume of production.
5. There will be no change in operating efficiency.
6. There will be no change in the general price level.
7. Volume of production is the only factor affecting the cost.
8. Volume of sales and volume of production are equal. Hence there is no unsold stock.
9. There is only one product or in the case of multiple products. Sales mix remains constant.

5 Explain the concept of Production function? Why is it useful in the analysis of firms' behaviour?

Ans) Production function can be defined as a technological relationship between the physical inputs (i.e., factors of production) and the physical output of the organisation

Inputs include the factors of production, such as land, labour, capital, whereas physical output includes quantities of finished products produced. The long-run production function (Q) is usually expressed as follows:

$$Q = f(LB, L, K, M, T, t)$$

Where, LB = land and building

L = labour

K = capital

M = raw material

T = technology

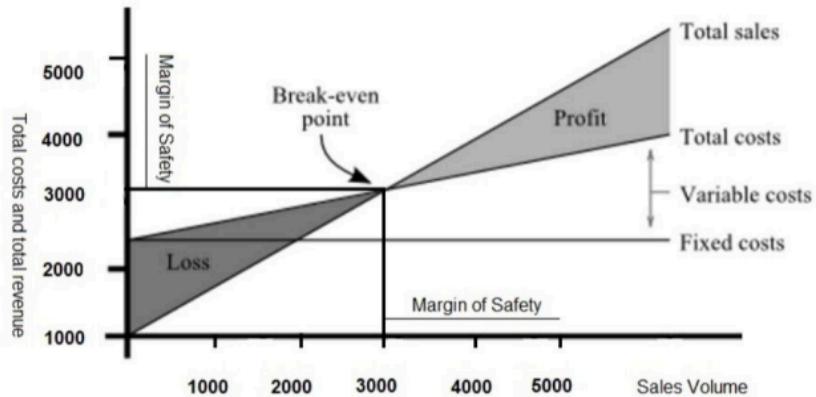
t = time

A firm's production function describes the relationship between the quantity of inputs and the quantity of outputs it produces. The relationship between the inputs employed by a firm and the maximum output it can produce with those inputs

- It is a useful **analysis of a firm's behaviour** since it defines the total 'amount of output' that can be obtained from a given '**number of inputs**' of factors of production.
- The production function helps the **business organizations** in making decisions regarding the manufacturing of their products.
- It depends on the **amount of commodity** that sells in the market and the '**demand for the products**'.
- It is dependent upon the **total production of goods** from the different factors of production and the **costs involved in the process**.

6 Illustrate the Break-even chart with the diagram and also write in what way it is useful to know the profit and loss of the company?

Ans) A break-even chart is a chart that shows the sales volume level at which total costs equal sales. Losses will be incurred below this point, and profits will be earned above this point. The chart plots revenue, fixed costs, and variable costs on the vertical axis, and volume on the horizontal axis. The chart is useful for portraying the ability of a business to earn a profit with its existing cost structure



- (1) It is customary to use the horizontal axis for units of output and vertical axis for monetary values like sales, revenue and total costs.
- (2) Sales revenue line makes an angle of 45° and start from (0,0).
- (3) As fixed costs remain the same at all output levels so fixed cost line is drawn across the chart as a straight line parallel to the horizontal axis.

- (4) The variable cost lines commences on the vertical axis from the same point where fixed cost line intersects the vertical axis. This is to show total cost on the chart.
- (5) On the chart, break even point represents the point at which total cost and total revenue lines cross each other.
- (6) The break-even point so determined tells the reader that the break-even point in terms of units of output on the horizontal axis and in terms of sales revenue and total costs on the vertical axis.
- (7) Shaded area below the break-even point indicates losses, whereas shaded area above the break-even point indicates profits.
- (8) Profit and loss on break even chart may be determined by looking at the vertical distance between the sales revenue and total cost line.
- (9) The difference between the prevailing sales and the break even sales represents margin of safety, both in terms of sales revenue and output level.
- (10) If break even point appears well over the right side of the chart then it would imply too high total fixed costs or low contribution. This will result in lower margin of safety.
- (11) If the break even point over to the left side of the chart coupled with a large angle of incidence then it would imply either lower total fixed costs or high contribution.

7 A firm starts its business with fixed expenses of Rs.60,000 to produce commodity X. Its variable cost is Rs.2 per unit. Prevailing market price of the product is Rs.6. How much should the firm produce to earn a profit of Rs.20,000 at this price?

8 A manufacturer has a sale of Rs.15,000 at a profit of Rs.400. If he sells Rs.19, 000, he makes a profit of Rs.1,200. Find out Contribution margin ratio, BEP a) Sale for a profit of Rs. 4,400

Data is inadequate to solve. BEP requires Selling Price/Variable Cost to calculate.

9 Examine the significance of Break-Even Analysis. State the assumptions and limitations of Break Even Analysis

Break-even analysis entails calculating and examining the margin of safety for an entity based on the revenues collected and associated costs. In other

words, the analysis shows how many sales it takes to pay for the cost of doing business. Analysing different price levels relating to various levels of demand, the break-even analysis determines what level of sales are necessary to cover the company's total fixed costs. A demand-side analysis would give a seller significant insight into selling capabilities.

Assumptions:

1. All costs are classified into two – fixed and variable.
2. Fixed costs remain constant at all levels of output.
3. Variable costs vary proportionally with the volume of output.
4. Selling price per unit remains constant in spite of competition or change in the volume of production.
5. There will be no change in operating efficiency.
6. There will be no change in the general price level.
7. Volume of production is the only factor affecting the cost.
8. Volume of sales and volume of production are equal. Hence there is no unsold stock.
9. There is only one product or in the case of multiple products. Sales mix remains constant.

LIMITATIONS (SUBHEADINGS MAY BE SUFFICIENT)

1. Costs are constant

A significant disadvantage of break-even analysis is considering the same price assumption for calculation purposes. The constant cost concept is irrelevant since as the company increases its production volume, economies of scale will lower the input cost. Thus, all businesses benefit by way of lower cost of purchase with increased volumes.

Assuming that the sale price remains unchanged, reducing costs will lower the unit break-even volume from the original analysis.

2. Unchanged Sales Price

The analysis also assumes that the unit sales price remains the same. The sale price of any product is market-driven, and a company's management may have to adopt a dynamic pricing policy to survive the market's uncertainties.

3. Single product

The break-even model suits businesses with a single product. The model does not function accurately for multi-product calculations as it assumes the relative proportion of each product produced and sold to be constant.

4. The complexity of cost heads

There are many semi-variable costs. For a multi-product company, it is difficult to apportion the cost product-wise; the break-even calculation becomes complex and unreliable.

5. Does not factor Inventory

The analysis considers that the quantity produced equals the quantity sold in the case of a business enterprise.

In reality, however, there is always an opening and closing inventory of goods to be considered. For example, goods produced at the beginning of the analysis period and the closing stock at the end of the study period will impact the real situation.

10 What is meant by Cost? Explain in detail about the concept of cost and nature of cost?

The cost refers to the amount of payment made to acquire any goods and services. In a simpler way, the concept of cost is a financial valuation of

resources, materials, risks, time and utilities consumed to purchase goods and services

NATURE OF COST

Fixed and variable costs Fixed cost is that cost which remains constant for a certain level of output. It is not affected by the changes in the volume of production. But fixed cost per unit decreases, when the production is increased. Fixed costs include salaries, Rent, Administrative expenses, depreciation etc. Variable is that which varies directly with the variation in output. An increase in total output results in an increase in total variable costs and decrease in total output results in a proportionate decline in the total variables costs. The variable cost per unit will be constant. Ex: Raw materials, labour, direct expenses, etc

Post and future costs Post costs also called historical costs are the actual cost incurred and recorded in the book of account these costs are useful only for valuation and not for decision making. Future costs are costs that are expected to be incurred in the future. They are not actual costs. They are the costs forecasted or estimated with rational methods. Future cost estimates are useful for decision making because decisions are meant for the future.

traceable cost and common cost Traceable costs, otherwise called direct cost, is one, which can be identified with a product's process or product. Raw material, labour involved in production are examples of traceable cost. Common costs are the ones that are attributed to a particular process or product. They are incurred collectively for different processes or different types of products. It cannot be directly identified with any particular process or type of product.

Avoidable cost and unavoidable cost Avoidable costs are the costs, which can be reduced if the business activities of a concern are curtailed. For example, if some workers can be retrenched with a drop in a product – line, or volume or production the wages of the retrenched workers are escapable costs

The unavoidable costs are otherwise called sunk costs. There will not see be any reduction in this cost even if reduction in business activity is made. For example cost of the ideal machine capacity is unavoidable cost.

1. opportunity cost and outlay cost
2. Explicit and implicit costs
3. Historical and replacement costs
4. shortrun and longrun costs
5. outof pocket and book costs
6. Fixed and variable costs
7. Past and future costs
9. Avoidable cost and unavoidable cost
10. controllable cost and uncontrollable cost

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OR

VISIT [Different Cost Concepts \(An Overview\)](#)

11 Define Cobb Douglas production function? Explain the production function with one variable input?

Production function of the linear homogenous type was invented by Junt wicksell and first tested by C. W. Cobb and P. H. Dougles in 1928. This famous statistical production function is known as Cobb-Douglas production function. Originally the function is applied to the empirical study of the American manufacturing industry. Cobb – Douglas production function takes the following mathematical form.

$$Y = (AK^x L^{1-x})$$

Where Y=output

K=Capital

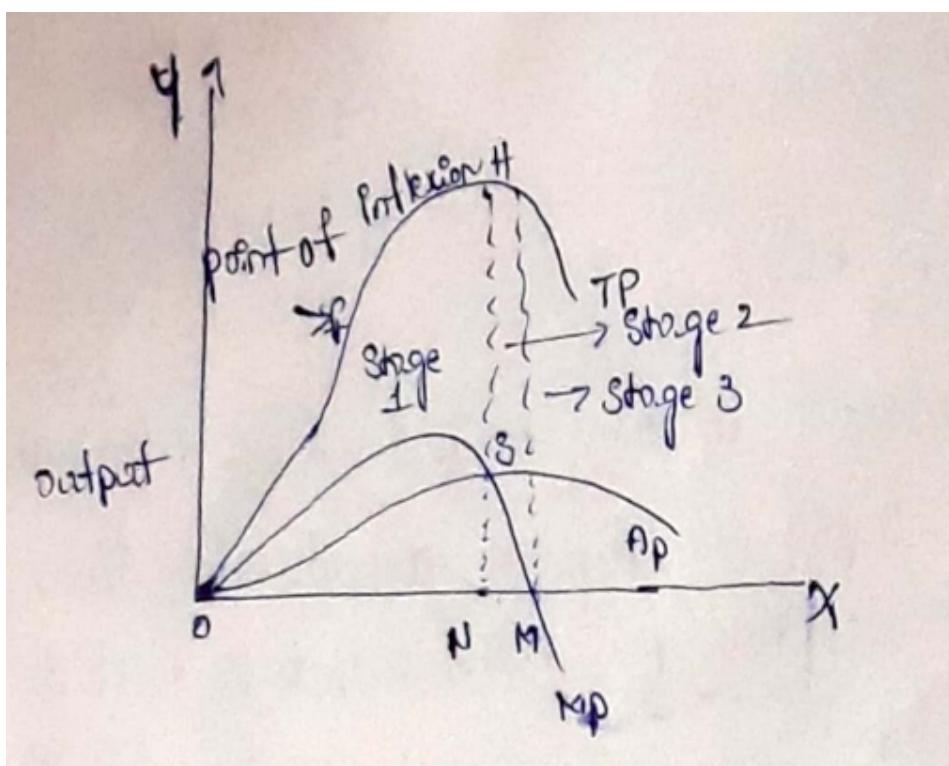
L=Labour

A, ∞ =positive constant

ONE VARIABLE INPUT

production factor with one variable input

The laws of returns state that when at least one factor of production is fixed and other all other factors are varied, the output in the initial stage will increase at an increasing rate and after reaching certain level of output the total output will increase at declining stage.



12 Define Economies of Scale explain different types of External Economies and Internal Economies

Production may be carried on a small scale or on a large scale by a firm. When a firm expands its size of production by increasing all the factors, it secures

certain advantages known as economies of production. Marshall has classified these economies of large-scale production into internal economies and external economies. Internal economies are those, which are opened to a single factory or a single firm independently of the actions of other firms. They result from an increase in the scale of output of a firm and cannot be achieved unless output increases. Hence internal economies depend solely upon the size of the firm and are different for different firms.

1. Indivisibilities: Many fixed factors of production are indivisible in the sense that they must be used in a fixed minimum size. For instance, if a worker works half the time, he may be paid half the salary. But he cannot be chopped into half and asked to produce half the current output. Thus as output increases the indivisible factors which were being used below capacity can be utilised to their full capacity thereby reducing costs. Such indivisibilities arise in the case of labour, machines, marketing, finance and research.

2. Specialisation: Division of labour, which leads to specialisation, is another cause of internal economies. Specialisation refers to the limitation of activities within a particular field of production. Specialisation may be in labour, capital, machinery and place. For example, the production process may be split into four departments relating to manufacturing, assembling, packing and marketing under the charge of separate managers who may work under the overall charge of the general manager and coordinate the activities of the four departments. Thus specialisation will lead to greater productive efficiency and to reduction in costs.

External economies are those benefits, which are shared in by a number of firms or industries when the scale of production in an industry or groups of industries increases. Hence external economies benefit all firms within the industry as the size of the industry expands.

(a) Economies of concentration: When an industry is concentrated in a particular area, all the member firms reap some common economies like skilled

labour, improved means of transport and communications, banking and financial services, supply of power and benefits from subsidiaries. All these facilities tend to lower the unit cost of production of all the firms in the industry.

(b) Economies of information: The industry can set up an information centre which may publish a journal and pass on information regarding the availability of raw materials, modern machines, export potentialities and provide other information needed by the firms. It will benefit all firms and reduce their costs.

(c) Economies of welfare: An industry is in a better position to provide welfare facilities to the workers. It may get land at concessional rates and procure special facilities from the local bodies for setting up housing colonies for the workers. It may also establish public health care units, educational institutions both general and technical so that a continuous supply of skilled labour is available to the industry. This will help the efficiency of the workers.

(d) Economies of Disintegration: The firms in an industry may also reap the economies of specialisation. When an industry expands, it becomes possible to split up some of the processes which are taken over by specialist firms. For example, in the cotton textile industry, some firms may specialise in manufacturing thread, others in printing, still others in dyeing, some in long cloth, some in dhotis, some in shirting etc. As a result the efficiency of the firms specialising in different fields increases and the unit cost of production falls. Thus internal economies depend upon the size of the firm and external economies depend upon the size of the industry.

13 A Company is operating at a fixed cost of Rs. 1,00,000 and variable cost of Rs. 50 each and sales volume is 10,000 units and selling price is Rs. 80 per unit. Calculate PVR, BEP, MS, Sales to earn a profit of Rs. 3,00,000 and profit on sales of Rs. 15,00,000.

$$2. F = 1,00,000$$

v = 50 each

Sales vol = 10,000 units

$$\therefore v = 50 \times 10,000$$

$$v = 500,000$$

Total sales S = ₹ 80 × 10,000

$$= \underline{\underline{80,00,000}}$$

$$\text{Now, } C = S - V = 8L - 5L = 3L$$

$$P = C - F = 3L - 1L = 2L$$

$$PVR = \frac{C}{S} \times 100 = \frac{3L}{8L} \times 100 = \underline{\underline{37.5\%}}$$

$$BEP = \frac{P}{PVR} \Rightarrow \frac{1,00,000}{37.5} \times 100$$

$$= \underline{\underline{2,66,666.67}}$$

$$MS = \frac{P}{PVR} = \frac{2,00,000}{37.5} \times 100 = \underline{\underline{5,33,333.33}}$$

STDP for DP = ₹ 3,00,000

$$= \frac{F + DP}{PVR} = \frac{1,00,000 + 3,00,000}{37.5} \times 100$$

$$= \underline{\underline{10,66,666.67}}$$

PWS for DS = ₹ 15,00,000

$$= (DS \times PVR) - F$$

$$= \left(15,00,000 \times \frac{37.5}{100} \right) - 1,00,000$$

$$= 562500 - 1,00,000$$

$$= \underline{\underline{462500}}$$

14 Outline the significance of Break-Even Analysis. State the assumptions and limitations of Break Even Analysis

SAME AS part b 9TH QUESTION

15 Explain the assumptions in Break -even analysis. Explain how Break –even analysis is used by the manager in their day-to-day operations?

Same as part b 4th question

Such analysis gives managers a quantity to compare to the forecast of demand. If the break-even point lies above anticipated demand, implying a loss on the product, the manager can use this information to make a variety of decisions

The first is to classify your costs according to how they behave (are they fixed or variable). The second is to calculate what your breakeven is, and the third is to use this information as a tool to make better business decisions whether you are setting sales prices, managing costs or planning for profit.

16 If sales is 10,000 units and selling price is Rs 20 per unit, variable cost Rs. 10 per unit and fixed cost is Rs. 80,000. Find out BEP in units and in sales revenue. What is the profit earned? What should be the sales per earning a profit of Rs. 60,000?

16, 19) Sales = 10000
 $SP = 20/\text{unit}$
 $VC = 10/\text{unit}$
 $FC = 80000$

$$BEP = \frac{FC}{SP - VC} = \frac{80000}{10} = \underline{\underline{8000 \text{ units}}}$$

$$BEP (\text{Sales}) = 8000 \times SP = 8000 \times 20 = \underline{\underline{160000}}$$

PROFIT:

$$(SP - VC) \text{ Sales} - FC = \text{Profit}$$

$$(20 - 10) \times 10000 - 80000 = \text{Profit}$$

$$100000 - 80000 = \underline{\underline{20000}}$$

IF PROFIT = 60000 :

$$(20 - 10) \times \text{Sales} - FC = 60000$$

$$10 \times \text{Sales} = 80000 + 60000$$

$$10 \times \text{Sales} = 140000$$

$$\underline{\underline{\text{Sales} = 14000}}$$

Alternate Solution just for reference below:

(16)

$$S - V = C = F + P$$

Sales Revenue = sales \times selling price
 $= 10,000 \times 20$
 $= 200,000$

Variable cost = sales \times variable cost per unit
 $= 10,000 \times 10$
 $= 100,000$

S = sales revenue V = variable cost C = contribution F = fixed cost P = profit
--

contribution = sales revenue - variable cost
 $= 200,000 - 100,000$
 $= 100,000$

Profit = contribution - fixed cost
 $= 100,000 - 80,000$
 $= 20,000$

$$BEP = \frac{F}{PVR} = \frac{80,000}{50/100} = \frac{80,000 \times 100}{50} = 1,60,000$$

$$PVR(\text{Profit volume ratio}) = \frac{C \times 100}{SR} = \frac{1,00,000 \times 100}{2,00,000} = 50$$

Sales to earn a profit of 60,000

$$\text{Sales Revenue} = \frac{F + \text{Profit to be made}}{PVR} = \frac{80,000 + 60,000}{50/100}$$

$$= \frac{80,000 + 60,000 \times 100}{50} = 2,80,000$$

$$\text{Sales} = \frac{\text{Sales Revenue}}{\text{Selling Price}} = \frac{2,80,000}{20} = 14,000$$

17 Define and Explain Iso-quants. What are the properties of Iso-quants?

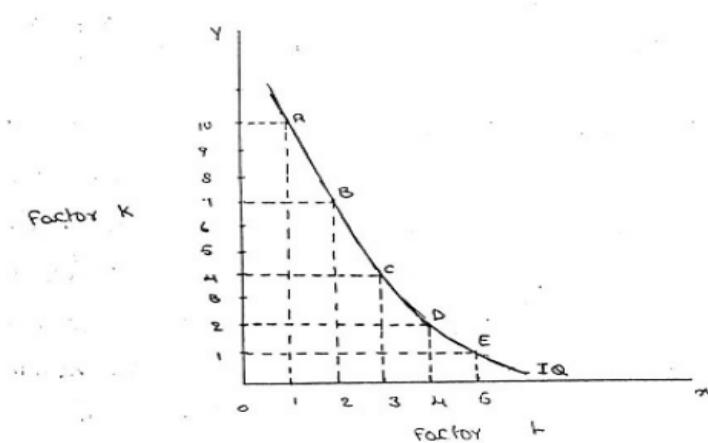
Explain the producer's equilibrium with the help of Iso-quants.

A)Isoquants are the curves, which represent the different combinations of inputs producing a particular quantity of output. Any combination on the isoquant represents the same level of output. For a given output level firm's production become. $Q = f(L, K)$ Where 'Q', the units of output is a function of the quantity of two inputs 'L' and 'K'. Thus an isoquant shows all possible combinations of two inputs, which are capable of producing equal or a given level of output. Since each combination yields same output, the producer becomes indifferent towards these combinations.

An isoquant curve is a concave-shaped line on a graph, used in the study of microeconomics,

Properties of Isoquants

1. An isoquant lying above and to the right of another isoquant represents a higher level of output.
2. Two isoquants cannot cut each other
3. Isoquants are convex to the origin
4. No isoquant can touch either axis
5. Isoquants are negatively sloped
6. Isoquants need not be parallel
7. Each isoquant is oval-shaped



PRODUCER EQUILIBRIUM: The term producer's equilibrium is the counterpart of consumer's equilibrium. Just as the consumer is in equilibrium when he secures maximum satisfaction, in the same manner, the producer is in equilibrium when he secures maximum output, with the least cost combination of factors of production. The optimum position of the producer can be found with the help of an iso-product curve. The Iso-product curve or equal product curve or production indifference curve shows different combinations of two factors of production, which yield the same output. This is illustrated as follows. Let us suppose. The producer can produce the given output of paddy, say 100 quintals by employing any one of the following alternative combinations of the two factors: labour and capital computation of least cost combination of two inputs.

It is clear from the above that 10 units of 'L' combined with 45 units of 'K' would cost the producer Rs. 20/-.

L Units	K Units	Q Output	L&LP (3 Rs.) Cost of Labour	KXKP (4Rs.) Cost of Capital	Total Cost
10	45	100	30	180	210
20	28	100	60	112	172
30	16	100	90	64	154
40	12	100	120	48	168
50	8	100	150	32	180

its of 'L' combined with 45 units of 'K' would cost the producer Rs. 20/-. But if 17 units reduce 'K' and 10 units increase 'L', the resulting cost would be Rs. 172/-. Substituting 10 more units of 'L' for 12 units of 'K' further reduces cost pf Rs. 154/-. However, it will not be profitable to continue this substitution process further at the existing prices since the rate of substitution is diminishing rapidly. In the above table the least cost combination is 30 units of 'L' used with 16 units of 'K' when the cost would be minimum at Rs. 154/-. So this is the stage "the producer is in equilibrium".

18 "Most of the cost concepts are overlapping and repetitive". Do you agree with this statement? Simplify your answer and

Ans)Cost accounting is defined as "a systematic set of procedures for recording and reporting measurements of the cost of manufacturing goods and performing services in the aggregate and in detail. It includes methods for recognizing, classifying, allocating, aggregating and reporting such costs and comparing them with standard costs." Often considered a subset of managerial accounting, its end goal is to advise the management on how to optimize business practices and processes based on cost efficiency and capability. Cost accounting provides the detailed cost information that management needs to control current operations and plan for the future.

Cost accounting information is also commonly used in financial accounting, but its primary function is for use by managers to facilitate their decision-making.

These categories are flexible, sometimes overlapping as different cost ...

19 If sales are 10,000 units and selling price is Rs 20 per unit, variable cost Rs 10 per unit and fixed cost is Rs. 80,000. Find out BEP in units and in sales revenue. What is the profit earned? What should be the sales per earning a profit of Rs. 60,000?

SAME AS 16TH QUESTION

20 Explain how cost - output relationship helps the enterprise or entrepreneurs in expansion decisions.

A proper understanding of the nature and behavior of costs is a must for regulation and control of cost of production. The cost of production depends on money forces and an understanding of the functional relationship of cost to various forces will help us to take various decisions. Output is an important factor, which influences the cost. The cost-output relationship plays an important role in determining the optimum level of production. Knowledge of the cost-output relation helps the manager in cost control, profit prediction,

pricing, promotion etc. The relation between cost and its determinants is technically described as the cost function.

$C = f(S, O, P, T \dots)$ where C= Cost (Unit or total cost) S= Size of plant/scale of production O= Output level P= Prices of inputs T= Technology Considering the period the cost function can be classified as (a) short-run cost function . (b) long-run cost function. In economics theory, the short-run is defined as that period during which the physical capacity of the firm is fixed and the output can be increased only by using the existing capacity allows to bring changes in output by physical capacity of the firm.

PART - C

1 Recall the meaning of Margin of Safety.

Margin of safety is the excess of sales over the break even sales. It can be expressed in absolute sales amount or in percentage. It indicates the extent to which the sales can be reduced without resulting in loss. A large margin of safety indicates the soundness of the business.

2 Explain the meaning of production function

The production function expresses a functional relationship between physical inputs and physical outputs of a firm at any particular time period. The output is thus a function of inputs. Mathematically, the production function can be written as $Q = f(A, B, C, D)$

3 Outline how explicit cost varies from implicit costs.

Explicit costs are those expenses that involve cash payments. These are the actual or business costs that appear in the books of accounts. These costs include payment of wages and salaries, payment for raw-materials, interest on borrowed capital funds, rent on hired land, Taxes paid etc

IMPLICIT COSTS are the costs of the factor units that are owned by the employer himself. These costs are not actually incurred but would have been incurred in the absence of employment of self – owned factors. The two normal implicit costs are depreciation, interest on capital etc. A decision maker must consider implicit costs too to find out appropriate profitability of alternatives. Put simply, an implicit cost comes from the use of an asset, rather than renting or buying it.

4 Define Profit Volume Ratio.

Usually called P. V. ratio. The ratio of contribution to sales is the P/V ratio. It may be expressed in percentage. Therefore, every organisation tries to improve the P. V. ratio of each product by reducing the variable cost per unit or by increasing the selling price per unit. The concept of P. V. ratio helps in determining break even-point, a desired amount of profit etc.

$$\text{ProfitVolumeRatio} = (\text{Contribution}/\text{Sales}) \times 100$$

5 Write short note on Angle of Incidence

This is the angle between sales line and total cost line at the Break- even point. It indicates the profit earning capacity of the concern. Large angle of incidence indicates a high rate of profit; a small angle indicates a low rate of earnings. To improve this angle, contribution should be increased either by raising the selling price and/or by reducing variable cost. It also indicates to what extent the output and sales price can be changed to attain a desired amount of profit.

6 What are the assumptions of BEA?

Assumptions:

1. All costs are classified into two – fixed and variable.
2. Fixed costs remain constant at all levels of output.
3. Variable costs vary proportionally with the volume of output.
4. Selling price per unit remains constant in spite of competition or change in the volume of production.
5. There will be no change in operating efficiency.
6. There will be no change in the general price level.
7. Volume of production is the only factor affecting the cost.
8. Volume of sales and volume of production are equal. Hence there is no unsold stock.
9. There is only one product or in the case of multiple products. Sales mix remains constant.

7 What is the production function and how is it formatted?

The production function of an enterprise is an association between inputs utilised and output manufactured by an enterprise. For various quantities of inputs utilised, it gives the utmost quantity of output that can be manufactured.

8 Summarise the meaning of Margin of Safety.

Margin of safety is the excess of sales over the break even sales. It can be expressed in absolute sales amount or in percentage. It indicates the extent to which the sales can be reduced without resulting in loss. A large margin of safety indicates the soundness of the business. Margin of safety can be improved by taking the following steps.

1. Increasing production

2. Increasing selling price
3. Reducing the fixed or the variable costs or both

9 List out the assumptions of Break-Even Analysis.

SAME AS 6TH QUESTION

10 Outline the exceptions of law of diminishing marginal utility

Exceptions of Law of Diminishing Marginal Utility:

There are some exceptions or limitations to the law of diminishing utility.

- (i) Case of intoxicants: Consumption of liquor defies the law for a short period. The more a person drinks, the more they like it. However, this is true only initially. A stage comes when a drunkard too starts taking less and less liquor and eventually stops it.
- (ii) Rare collection: If there are only two diamonds in the world, the possession of the 2nd diamond will push up the marginal utility.
- (iii) Application to money: The law equally holds good for money. It is true that more money a man has, the greedier he is to get additional units of it. However, the truth is that the marginal utility of money declines with richness but never falls to zero.

11 List out the Internal Economies of scale.

1. Indivisibilities: Many fixed factors of production are indivisible in the sense that they must be used in a fixed minimum size. For instance, if a worker works half the time, he may be paid half the salary. But he cannot be chopped into half and asked to produce half the current output. Thus as output increases the indivisible factors which were being used below

capacity can be utilised to their full capacity thereby reducing costs. Such indivisibilities arise in the case of labour, machines, marketing, finance and research.

2. specialisation: Division of labour, which leads to specialisation, is another cause of internal economies. Specialisation refers to the limitation of activities within a particular field of production. Specialisation may be in labour, capital, machinery and place. For example, the production process may be split into four departments relating to manufacturing, assembling, packing and marketing under the charge of separate managers who may work under the overall charge of the general manager and coordinate the activities of the four departments. Thus specialisation will lead to greater productive efficiency and to reduction in cost.

12 List out the External Economies of scale.

(a) Economies of concentration: When an industry is concentrated in a particular area, all the member firms reap some common economies like skilled labour, improved means of transport and communications, banking and financial services, supply of power and benefits from subsidiaries. All these facilities tend to lower the unit cost of production of all the firms in the industry

(b) Economies of information: The industry can set up an information centre which may publish a journal and pass on information regarding the availability of raw materials, modern machines, export potentialities and provide other information needed by the firms. It will benefit all firms and reduce their costs.

(c) Economies of welfare: An industry is in a better position to provide welfare facilities to the workers. It may get land at concessional rates and procure special facilities from the local bodies for setting up housing colonies for the workers. It may also establish public health care units, educational institutions both general and technical so that a continuous supply of skilled labour is available to the industry. This will help the efficiency of the workers

(d) Economies of Disintegration: The firms in an industry may also reap the economies of specialisation. When an industry expands, it becomes possible to split up some of the processes which are taken over by specialist firms. For example, in the cotton textile industry, some firms may specialise in manufacturing thread, others in printing, still others in dyeing, some in long cloth, some in dhotis, some in shirting etc. As a result the efficiency of the firms specialising in different fields increases and the unit cost of production falls. Thus internal economies depend upon the size of the firm and external economies depend upon the size of the industry.

13 Illustrate the formula for Contribution.

Contribution is the difference between sales and variable costs and it contributes towards fixed costs and profit. It helps in sales and pricing policies and measuring the profitability of different proposals. Contribution is a sure test to decide whether a product is worthwhile to be continued among different products.

$$\text{Contribution} = \text{Sales} - \text{Variable cost}$$
$$\text{Contribution} = \text{Fixed Cost} + \text{Profit}.$$

15 Interpret the formula for P/V Ratio.

The PV ratio or P/V ratio is arrived at by using the following formula.

$$\text{P/V ratio} = (\text{contribution} / \text{sales}) * 100$$

(*Contribution means the difference between sale price and variable cost).

Here contribution is multiplied by 100 to arrive the percentage

16 Recall the formula for Break-Even Point (in value)

$$\text{Break even (sales value \$)} = \frac{\text{Total fixed costs}}{\text{Contribution ratio}}$$

Contribution ratio is calculated as:

$$\text{Contribution ratio} = \frac{\text{Contribution}}{\text{Sales}}$$

Contribution ratio may be improved by:

Increasing the sale price.

Reducing the variable costs.

Switching production to products with higher contribution rate.

17 Explain the formula for Break-Even Point (in units)

To calculate the break-even point in units use the formula: Break-Even point (units) = Fixed Costs ÷ (Sales price per unit – Variable costs per unit) or in sales dollars using the formula: Break-Even point (sales dollars value) = Fixed Costs ÷ Contribution Margin

18 Summarise the features of production function

Features of Production Function

1. Substitutability
2. Complementarity
3. Speconstant

19 Write a short note on Direct and indirect costs.

Traceable costs, otherwise called direct cost, is one, which can be identified with a product's process or product. Raw material, labour involved in production are examples of traceable cost.

Common costs are the ones that are attributed to a particular process or product. They are incurred collectively for different processes or different types of products. It cannot be directly identified with any particular process or type of product.

20 Explain Managerial use of production function

The managerial use of the production function

It may be used to compute the least-cost combination of inputs for a given output.

It may be used by the manager to obtain the most appropriate combination of input. Which yields the maximum level of output with a given level of cost.

$$1. PVR = \frac{C}{S} \times 100 \text{ } \& \text{ } \frac{S-V}{S} \times 100 ; \frac{F+P}{S} \times 100$$

contribution w.r.t sales. PVR ratio

2. BEP (Break even point)

$$= \frac{F}{PVR} = \frac{F \times S}{S-V} \times \frac{1}{100} = \frac{F \times S}{F+P} \times \frac{1}{100}$$

$$3. PMS = \frac{P}{PVR} \text{ } i.e. (TS - BEP \text{ sales})$$

Margin of safety

TS - Total Sales

$$4. STDP = \frac{F+DP}{PVR}$$

$$5. PWS = [(DS \times PVR) - F]$$

DS - Desired sales