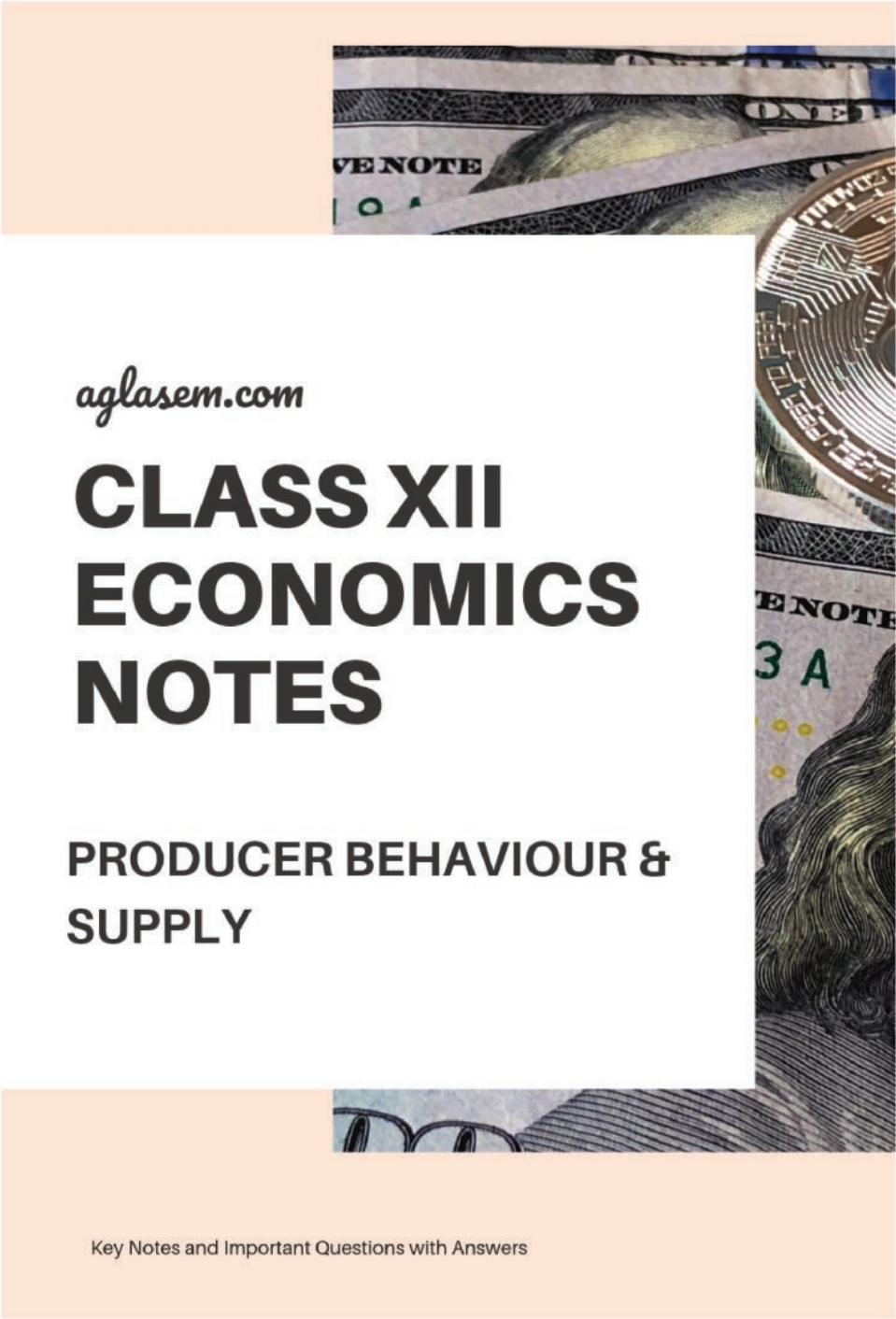


The background of the page features a collage of various currency notes and coins. On the right side, there is a vertical strip showing a close-up of a coin and parts of several banknotes, including one with the word 'ONE' and another with 'VE NOTE' and '3 A'. The rest of the background is a solid light orange color.

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CLASS XII ECONOMICS NOTES

PRODUCER BEHAVIOUR & SUPPLY

Key Notes and Important Questions with Answers

UNIT III

PRODUCER BEHAVIOUR & SUPPLY

Points to Remember

❖ Production

- ❑ **Production Function :** Production function is purely a technical relation between physical inputs and physical output.

It can be expressed as $Q = (I_1, I_2, I_3 \dots I_n)$. Where Q = Physical output of a good; $I_1, I_2, I_3, \dots, I_n$ = Physical inputs. Technology remains constant

- ❑ **Types of Production Function :**

There are two types of Production Function.

1. **Short-run Production Function :** In this production function one factor of production is variable and all others are fixed. So, law of return to a factor is applied. It is also called law of variable proportion.
2. **Long-run Production Function :** In this production function all the factors of production are variable. So, law of returns to scale is applied. It is also called constant proportion type production function.

- ❑ **Total production (TP)** refers to total amount of a good which is produced by a firm in a given period of time.

- ❑ **Average production (AP)** is the per unit output of variable factor (labour) employed.

$$AP = \frac{TP}{\text{Units of Variable input}}$$

- ❑ **Marginal product (MP)** is the change in total product resulting from employing one additional unit of variable input.

$$MP = \frac{\Delta TP}{\Delta L} \text{ or } MP_n = TP_n - TP_{n-1}$$

❑ **Relation between Total Product (TP) and Marginal Product (MP)**

1. So long as marginal product rises, total product increases with increasing rate.
2. When marginal product starts falling but remains positive, total product rises with diminishing rate.
3. When $MP = 0$, TP is maximum.
4. When marginal product becomes negative, then total product starts falling.

❑ **Relation between MP & AP :**

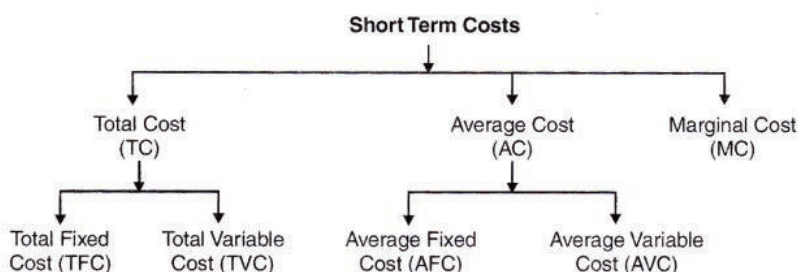
- (i) When $MP > AP$, AP rises.
- (ii) When $MP = AP$, AP is maximum and constant.
- (iii) When $MP < AP$, AP falls.

❑ **Law of variable proportion :** The law states that as we increase the quantity of only one variable input, keeping other inputs fixed, the total product increases at increasing rate in the beginning, then increases at decreasing rate and finally TP falls. According to this law, change in TP and MP are classified into three phases.

- ❑ **Phase I : TP increases at increasing rate :** In the initial phase as more and more units of variable factor are employed with fixed factor total physical production increases at increasing rate, MP increases.
- ❑ **Phase II : TP increases at decreasing rate :** As more and more units of variable factors are employed with fixed factors then total product increases at diminishing rate, MP decreases but remains positive. At the end of this phase TP maximum and MP becomes zero.
- ❑ **Phase III : TP falls :** As more and more units of variable factors are employed with fixed factors, total production starts decreasing and marginal product becomes negative.

❖ Cost

- ❑ **Cost** : It is the sum of direct (explicit cost) and indirect cost (implicit cost).
- ❑ **Cost** : Explicit cost + implicit cost
- ❑ **Explicit Cost** : Actual money expenditure incurred by a firm on the purchase and hiring the factor inputs for the production is called explicit cost. For example-payment of wages, rent, interest, purchases of raw materials etc.
- ❑ **Implicit cost** : Implicit cost is the estimated cost of self owned resources of the production used in production process, by the producer or estimated value of inputs supplied by owner itself.



- ❑ **Total Cost (TC)** : Total cost refers to total expenditure incurred by a firm on production of a given quantity of output.
- ❑ Total cost is the sum of total fixed cost and total variable cost
 $TC = TFC + TVC$ or $TC = AC \times Q$
- ❑ **TFC** : Total fixed costs is the cost which remains constant at all levels of output. It is not zero even at zero output level. Therefore, TFC curve is parallel to OX-axis.
 $TFC = TC - TVC$ or $TFC = AFC \times Q$
- ❑ **TVC** : Total variable cost is the cost which vary with the quantity of output produced. It is zero at zero level of output. TVC curve is parallel to TC curve but it start from origin or zero point.
 $TVC = TC - TFC$ or $TVC = AVC \times Q$.
- ❑ **AC** : Average cost is per unit cost of production of a commodity.

It is the sum of average fixed cost and average variable cost.

$$AC = \frac{TC}{Q} \text{ or } AC = AFC + AVC$$

- ❑ **AFC** : Average fixed cost is per unit fixed cost of production of a commodity.

$$AFC = \frac{TFC}{Q} \text{ or } AFC = AC - AVC$$

AFC goes on decreasing as the level of output increase.

- ❑ **AVC** : Average variable cost is per unit variable cost of production of a commodity.

$$AVC = \frac{TVC}{Q} \text{ or } AVC = AC - AFC$$

- ❑ **Marginal Cost** : It refers to change in TC, due to additional unit of a commodity is produced. $MC = \Delta TC / \Delta Q$ or $MC_n = TC_n - TC_{n-1}$
But under short run, it is calculated from TVC.

$$MC_n = TVC_n - TVC_{n-1} \text{ or } MC = \frac{\Delta TVC}{\Delta Q}$$

Relation Between Short-Term Costs

- ❑ Total cost curve and total variable cost curve remains parallel to each other. The vertical distance between these two curves is equal to total fixed cost.
- ❑ TFC curve remains parallel to X-axis and TVC curve remains parallel to TC curve from origin.
- ❑ With increase in level of output, the vertical distance between AFC curve and AC curve goes on increasing. On contrary the vertical distance between AC curve and AVC curve goes on decreasing because their difference is AFC which keep decreasing with increase in output but these two curves never intersect because average fixed cost is never zero.
- ❑ **Relation between MC and AVC.**
 - (i) When $MC < AVC$, AVC falls.
 - (ii) When $MC = AVC$, AVC is minimum and constant
 - (iii) When $MC > AVC$, AVC rises.

❑ **Relation between MC and ATC (AC)**

- (i) When $MC < ATC$, ATC falls.
- (ii) When $MC = ATC$, ATC is minimum and Constant
- (iii) When $MC > ATC$, ATC rises.

❖ **Revenue**

- ❑ Money received from the sale of product is called revenue.
- ❑ Total revenue is the total amount of money received by a firm from the sale of given units of a commodity at a market price.

$$TR = AR \times Q \quad \text{or} \quad TR = \sum MR$$

$$TR = \text{Price} \times \text{Quantity Sold} = P \times Q$$

$$\text{Price} = AR \text{ i.e. } P = AR$$

- ❑ **AR** : Per unit revenue received from the sale of given units of a commodity is called average revenue. Average revenue is equal to price. Per unit price of a commodity is also called AR.

$$AR = \frac{TR}{Q} \quad \text{or} \quad \frac{P \times Q}{Q} = P = \text{Price}$$

- ❑ **MR** : Marginal revenue is net addition to total revenue when one additional unit of output is sold.

$$MR = \frac{\Delta TR}{\Delta Q} \quad \text{or} \quad MR_n = TR_n - TR_{n-1}$$

- ❑ **Relation between TR, AR and MR when more quantity sold at the same price : under perfect competition.**

- (a) Average revenue and marginal revenue remains constant at each levels of output and AR and MR curves are parallel to X-axis. $AR = MR$.
- (b) Total revenue increases at constant rate MR is constant and TR curve is positively sloped straight line passing through the origin.

- ❑ **Relation between TR, AR and MR when more quantity by sold at the lower price or there is monopoly or monopolistic competition in the market.**

- (a) Average revenue and marginal revenue curves have negative slope. MR curve lies below AR curve. $AR > MR$.
- (b) Marginal revenue falls, twice the rate of average revenue if AR & MR are linear.
- (c) So long as marginal revenue decreases and positive, total revenue increases at diminishing rate. When marginal revenue is zero, total revenue is maximum and when marginal revenue becomes negative, TR starts falling.

❑ **Relation between AR and MR (General)**

- (i) When $MR > AR$, AR rises.
- (ii) When $MR = AR$, AR is maximum and constant.
- (iii) When $MR < AR$, AR falls.

❖ **Producer's Equilibrium**

- ❑ **Concept of Producer's Equilibrium** : It refers the stage where producer is getting maximum profit with given cost and he has no incentive to increase or decrease the level of output.
- (A) **MR and MC Approach** : Conditions of producer equilibrium according to this approach are :
 - (a) $MC = MR$
 - (b) MC curve should cut the MR curve from below at the point of equilibrium.

Or

MC should be more than MR after the equilibrium point, with increase in output.

❖ **Supply**

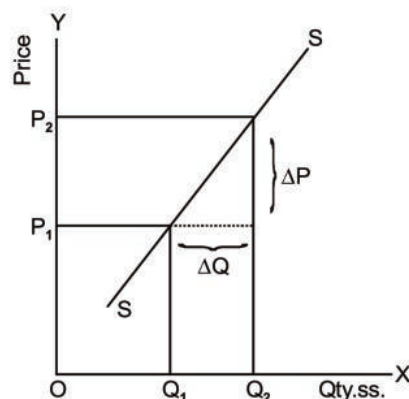
- ❑ **Supply** : Refers to the amount of the commodity that a firm or seller is willing to offer or ready to sell at a certain price and in a given period of time.
- ❑ **Factors affecting supply of a commodity** :
 1. Technological Progress
 2. Govt. Policy of Taxation & Subsidy

3. Prices of Inputs

4. Goal of the firm

- ❑ **Individual Supply** : Refers to quantity of a commodity that an individual firm is willing and able to offer for sale at a certain price during a given period of time.
- ❑ **Market supply** : It is the sum total of quantity supplied of a commodity by all sellers or all firms in the market at a certain price and in a given period of time.
- ❑ **Supply Schedule** : Refers to a tabular presentation which shows various quantities of a commodity that a producer is willing to supply at different prices, during a given period of time.
- ❑ **Supply curve** : Refers to the graphical representation of supply schedule which represents various quantities of a commodity that a producer is willing to supply at different prices during given period of time.

Slope of supply curve = $\Delta P / \Delta Q$



- ❑ **Law of Supply** : States the direct relationship between price and supply of a commodity, keeping other factors constant.

❖ Elasticity of Supply

- ❑ **Price Elasticity of Supply** : It refers to the degree of responsiveness of supply of a commodity with reference to a change in price of the commodity. It is always positive due to direct relationship between price and quantity supplied.

Price Elasticity of Supply (Es)

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

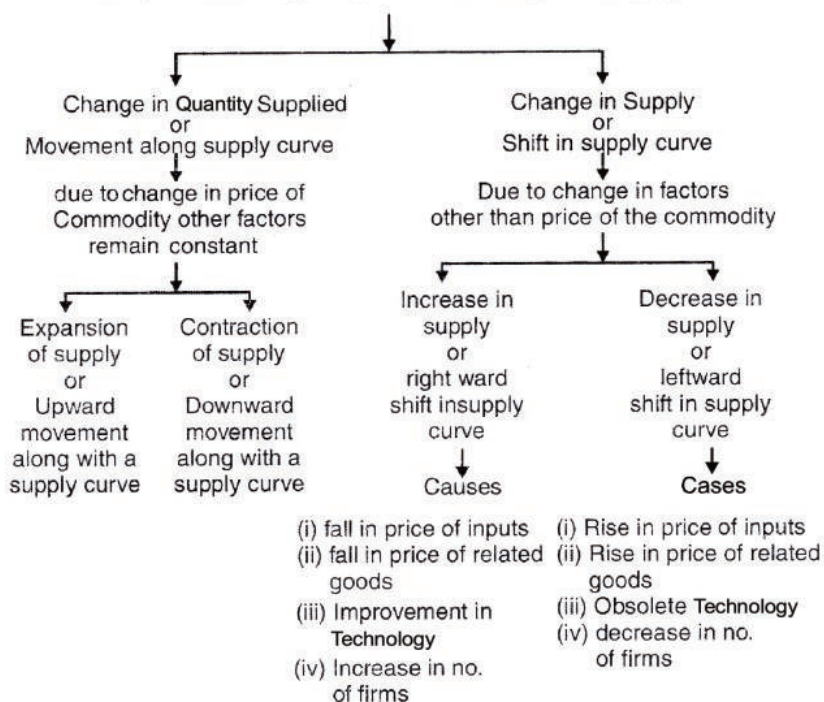
□ Methods for measuring price elasticity of supply :

1. Percentage Method

$$Es = \frac{\% \text{ change in a quantity supplied}}{\% \text{ change in price}}$$

$$\text{Or } Es = \frac{\Delta Q}{\Delta P} \times \frac{P_0}{Q_0}$$

Change in Quantity Supplied Vs change in Supply



Exam. Oriented Questions with Answer

VERY SHORT ANSWER QUESTIONS (1 MARK)

- Q. 1.** Define production function.
Ans. The function showing technical relationship between inputs and output is called production function.
- Q. 2.** State the changes in marginal product when total product increases at decreasing rate.
Ans. When total product increases at diminishing rate, marginal product decreases but remains positive.
- Q. 3.** What is breakeven point?
Ans. The point where TR is equal to TC or $AR = AC$ is called breakeven point.
- Q. 4.** When with the change in price there will be no change in quantity of supply what will be the elasticity of supply.
Ans. Elasticity of supply will be equal to zero $\epsilon_s = 0$.
- Q. 5.** Define cost.
Ans. Cost refers to the sum of explicit cost, Implicit cost and Normal profit.
- Q. 6.** Define Marginal Cost.
Ans. Marginal cost refers to change in total cost due to additional unit of a commodity is produced.
- Q. 7.** Define Market Supply.
Ans. Market Supply refers to the sum total of quantity supplied of a commodity by all sellers or all firms in the market at a certain price and in a given period of time.

SHORT ANSWERS TYPE QUESTIONS (3-4 MARKS)

- Q. 1.** Explain the likely behaviour of total product under the phase of increasing return to a factor with the help of numerical example.

Ans. Increasing return to a factor is the first phase of the Law of return to a factor. When more and more units of a variable factor is combined with fixed factor up to a certain level total physical product increases with increasing rate.

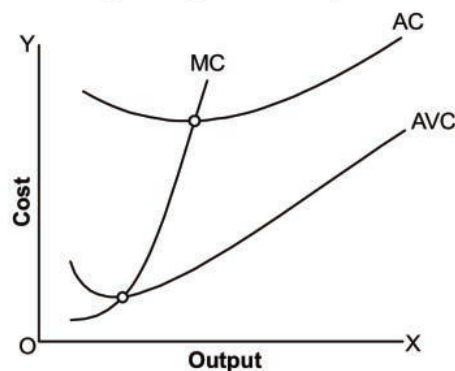
Machine	Unit of Labour	Total Physical Product
1	1	10
1	2	24
1	3	42

Q. 2. With the help of example distinguish between total fixed cost and total variable cost.

Ans.	Total fixed cost	Total Variable Cost
1.	Fixed cost remains constant at each level of output i.e., it do not change with change in in level of output.	1. Variable cost changes with the changes in level output, it increases or decrease as the output change.
2.	It can not be zero when output is zero.	2. It is zero when output is zero.
3.	Its curve is parallel to x-axis.	3. It curve is parallel to the curve of total cost.
4.	Example : Rent, wages of permanent staff.	4. Example : cost of raw material, wages of casual labourer.

Q. 3. Draw average cost, average variable cost and marginal cost curves on a single diagram and explain their relations.

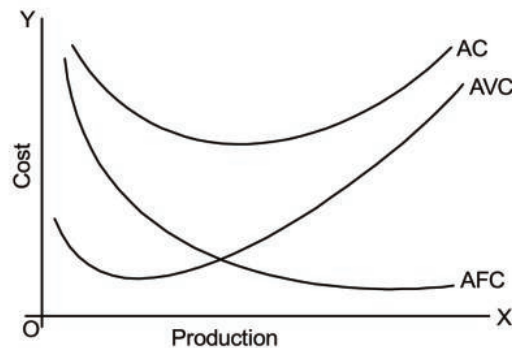
Ans.



Relation of AC, AVC and MC

1. MC intersects AC and AVC at their minimum level.
2. AC and AVC decreases before the intersection by MC, but remain greater than MC.
3. AC and AVC starts to increase after the intersection by MC, and becomes less than MC.
4. As output increases, AC and AVC tends to be closer but the difference between AC and AVC can never be zero.

Q. 4. Draw average cost, average variable cost and average fixed cost curves on a single diagram and explain their relation.



1. AC is the vertical summation of AVC and AFC.
2. The difference between AC and AVC falls as output increases but the difference of AC and AFC increase.
3. As output increases AC and AVC tends to be closer but their curves do not intersect each other because AFC always remains more than zero.

Q. 5. Explain the relation between average revenue and marginal revenue when a firm can sell an additional unit of a good by lowering the price.

- Ans.**
1. AR and MR both decreases.
 2. MR decrease at the rate of twice than AR.
 3. MR become zero and negative but AR can never be zero.

Q. 6. Distinguish between 'change in quantity supplied' and 'change in supply'.

Ans.	<i>Change in Quantity Supplied</i>	<i>Change in Supply</i>
1.	It refers to the change in supply due to change in price of the good	1. It refers to the change in supply due to the change in the price determinants of supply other than price.
2.	Determinants of supply other than price remains unchanged.	2. Price of the good remains unchanged.
3.	Law of supply apply.	3. Law of supply does not apply.
4.	There is upward and downward movement along with curve in this situation.	4. Supply curve shifted to leftward or rightward under this supply condition.

Q. 7. Explain how does change in price of input affect the supply of a good.

Ans. **Increase in price of Input :** Increase in price of input is cause of a decrease in the supply of a good because the production cost of a good will increases due to increase in price of input. It will reduce the profit. So producer will decrease the supply of the good.

Decrease in the good : Decrease in price of input is cause of increase in supply because when the price of input decrease the production cost of a good also decreases. Decreases in cost increases the profit margin. It motivate to producer to increase the supply of the good.

Q. 8. Explain how changes in prices of other products influence the supply of a given product.

Ans. The supply of a good is inversely influenced with the change in price of other product which can explain as follows :

A. Rise in Price of Other product : When there is rise in the price of other product the production of these product become more profitable due to unchanged cost in comparison of the production of given product. As a result the producer will produce more quantity of other product so the supply of given good will decrease.

B. Fall in the price of Other Product : When there is fall in the price of other product the production of these product become less profitable due to unchanged cost in comparison of the production of given product. As a result producer will produce less quantity of other product so the factors of production shifted for the production of given good. It cause an increase in supply of given good.

Q. 9. Explain how technology advancement bring a positive impact in the supply of a given product.

Ans. Technology advancement reduces per unit cost and increase the productivity of given factors of production. Due to these reasons production of given production becomes more profitable.

Q. 10. What is the behaviour of average fixed cost as output is increased? Why is it so?

Ans. AFC falls continuously as output is increased. It is because, even when output is increased TFC remains unchanged.

Q. 11. An individual is both the owner and the manager of a shop taken on rent. Identify implicit cost and explicit cost from this information. Explain.

Ans. Implicit cost : Estimated salary of the owner. Because the owner would have earned this salary if he had worked with a firm not owned by him.

Explicit cost : Rent paid. Because it is actual money expenditure on input.

Q. 12. What is a supply schedule? What is the effect on the supply of a good when Government gives a subsidy on the production of that good? Explain.

Ans. A supply schedule is a schedule that shows the quantity supplied of a commodity at different prices during a period of time.

Due to Subsidy, Cost remaining unchanged, profit rise.

As a result supply increases.

LONG ANSWER TYPE QUESTIONS (6 MARKS)

- Q. 1.** Explain the law of variable proportion with the help of diagram/schedule.

OR

What is the likely behaviour of total product/marginal product when only one input is increased for increasing production? Used diagram/Schedule.

- Ans.** Law of variable proportion state the impact of change in unit of a variable factor on the physical output. When more and more unit of a variable factor combined with fixed factor then total product increases at increasing rate in the beginning, Then increases at decreasing rate and finally it starts falling.

Phase I : TP increase at an increasing rate

Phase II : TP increases at diminishing rate

Phase III : TP falls

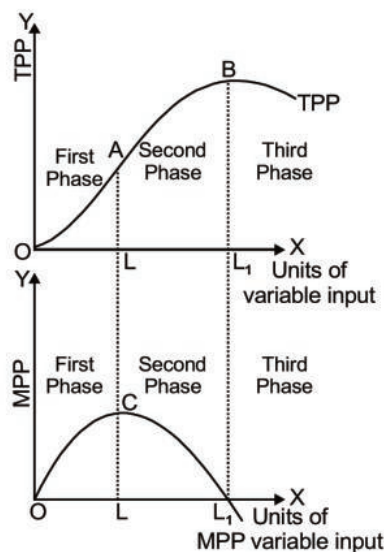
Behaviour of MP

Phase I MP increases and becomes maximum.

Phase II MP decreases and becomes zero.

Phase III MP becomes negative

<i>Machine</i>	<i>Unit of Labour</i>	<i>TPP (Unit)</i>	<i>MPP (Unit)</i>
1	1	3	3
1	2	7	4
1	3	12	5
1	4	16	4
1	5	19	3
1	6	21	2
1	7	22	1
1	8	22	0
1	9	21	-1



First Phase : TPP increases with increasing rate upto A point. MPP also increase and becomes maximum at point C.

Second Phase : TPP increases with diminishing rate and it is maximum at point B. MPP start to decline and becomes zero at D point.

Third Phase : TPP starts to decline and MPP becomes negative.

- ☐ Important instruction for giving the answer of above question.
- ☐ Do not use diagram for the explanation of this question if it is instructed to use schedule and do not use schedule if the explanation of this question asked with the help of diagram.
- ☐ Do not explain the behaviour of marginal product with the help of schedule and diagram. If there is instruction to explain only the behaviour of total product.
- ☐ Do not explain the behaviour of total product with help of schedule and diagram if there is instruction to explain only the behaviour of marginal product.

Q. 2. What is producer's equilibrium? Explain the conditions of producer's equilibrium through the 'marginal cost and marginal revenue' approach. Use diagram/schedule.

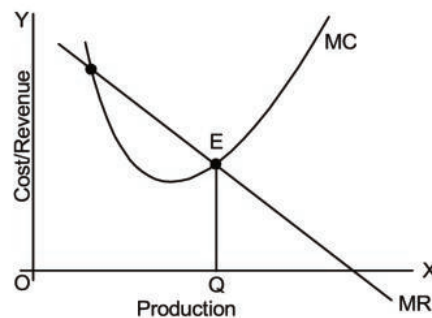
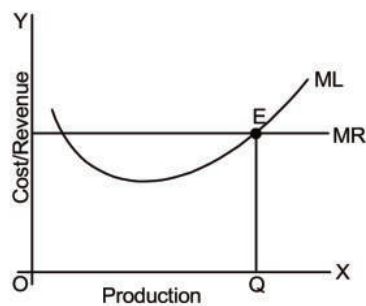
Ans. Producer's equilibrium refers to the stage under which with the help of given factors of production, the producer attains the level of production at which he is getting maximum profit. The conditions of producer's equilibrium through the marginal cost and marginal revenue approach are as follows.

1. Marginal cost should be equal to marginal revenue.
2. With the increase in output after equilibrium, marginal cost should be greater than marginal revenue.

Output (units)	MR (Rs.)	MC (Rs.)
1	4	5
2	4	4
3	4	3
4	4	4
5	4	5

OR

Output (Units)	MR (Rs.)	MC (Rs.)
1	10	5
2	8	4
3	6	3
4	4	4
5	2	5



Explanation of Conditions

- (i) So long as MC is less than MR, it is profitable for the producer to go on producing more because it adds to its profits. He stops producing more when MC becomes equal to MR.
- (ii) When MC is greater than MR after equilibrium it means the profit will decline if producer will produce more units of the good.

Important instruction for giving the answer of the above question :

- ☐ Use only one schedule/diagram given as above for the explanations.
- ☐ Do not use diagram for the explanation of this question if it is instructed to use schedule and do not use schedule if the explanation of this questions is asked with the help of diagram.