

27/sep.

Transformation of inputs
into outputs.

Page No.



Ex-1001. ch - Production function.

Q1. What do you mean by production function?

Production function is a functional relation b/w production & factors of production i.e., land, labour, capital & entrepreneur.

Symbolically it can be written as $Q = f(L, La, K, e, \dots)$

Q = quantity of output

L = land

La = labour

K = capital

e = entrepreneur

Q2. What do you mean by short run & long run?

(variable only)

Short Run:-

It refers to time period in which output can be changed by changing only variable factors of production. In short run some factors are fixed like land, m/c, building etc. and some factors are variable like labour, raw material etc.

In short run we can change, these factors can be changed to change the production.

(all factors)

Long Run:-

It refers to that time period in which production can be changed by changing all factors of production because long run is long enough to change any factor of production.

Q3.

What do you mean by VF & FF?

Variable factors: Those ~~for~~ factors of production which can be changed in short run are known as VF like labour, raw material etc.

Fixed factors: Those factors of production which cannot be changed in short run.
Eg: land, building, m/c.

Q4.

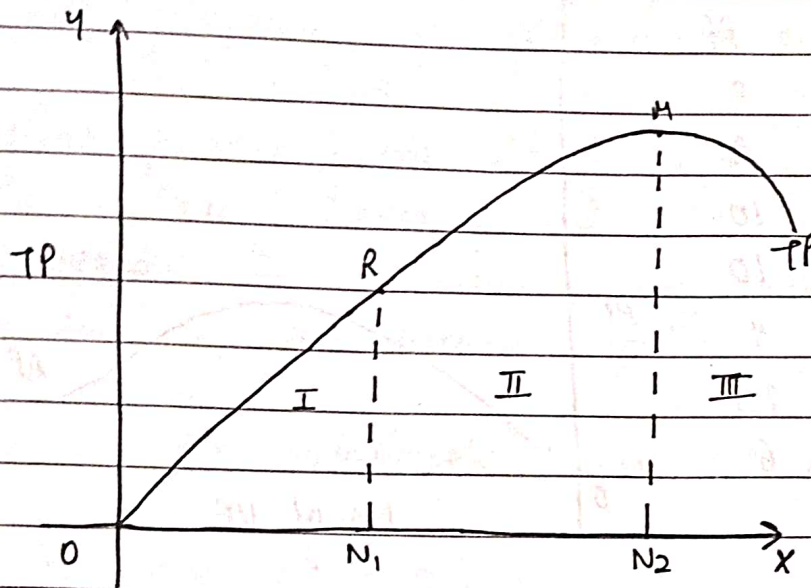
What do you mean by TP?

TP refers to total quantity of goods produced by a firm during a given period of time using certain factors of production.

The total product initially increases with the increase in quantity of factors and reaches its maximum & then it starts falling.

It can be understood by the following schedule & diagram.

Units of VF	TP	
1	8	] fast
2	18	
3	30	
4	40	] slow
5	45	
6	45	— stops
7	42	— negative (decreases)



~~No~~ No. of variable factors

In this diagram units on variable factors are shown on (x, 0) axis and units of TP are shown on (0, y) axis.

TP represents the total product curve that initially increases at a higher rate till point 'R'. Then it starts increasing at decreasing rate till point 'M' that is the max of TP. Then it starts falling.

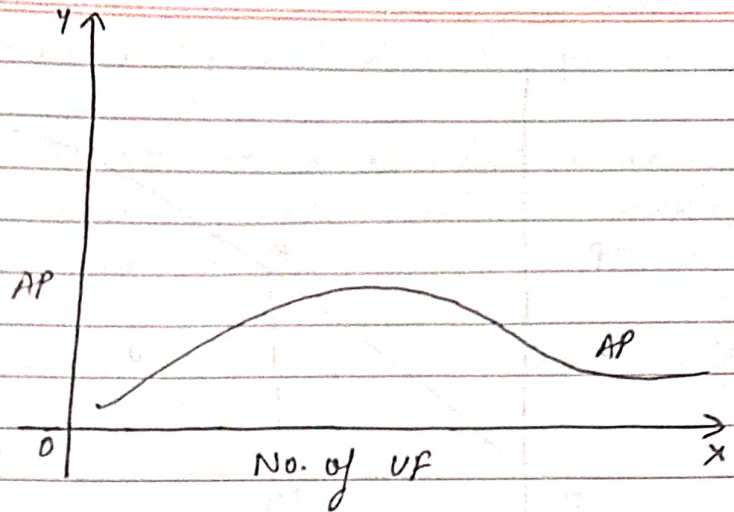
Q 3. What do you mean by Average product?

It refers to the output per unit of variable input. In other words output produced by one factor of production on an avg. It is calculated by dividing TP by VF.

It is further explained using following schedule & diagram.

Increases & decreases at slower rate.

VF	TP	AP
1	8	8
2	18	9
3	30	10
4	40	10
5	45	9
6	45	7.5
7	42	6



Q6. Increases & decreases at faster rate.

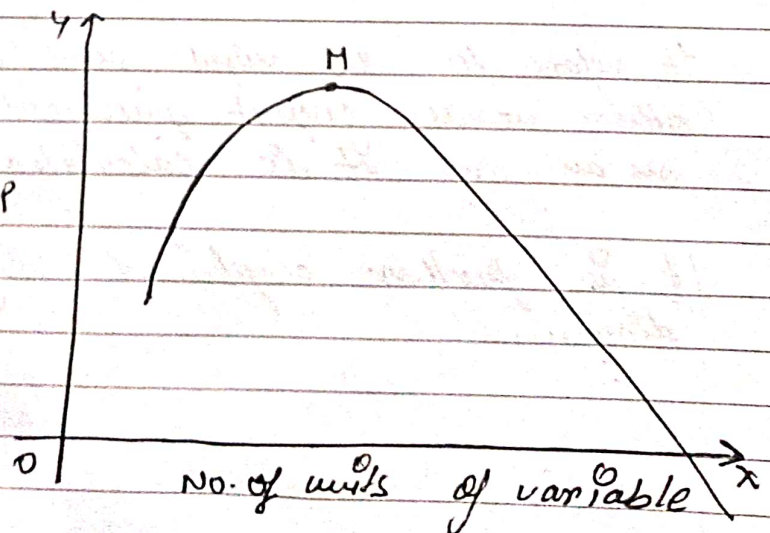
What is marginal product?

It refers to addition in total product due to increase in variable factor by 1 unit. It can be calculated by dividing change in total product by change in units of VF so.

$$MP = \frac{\Delta TP}{\Delta N}$$

It can further be explained by following schedule & diagram.

N	TP	MP
1	8	8
2	18	10
3	36	12
4	40	10
5	45	5
6	45	0
7	42	-3



In this diagram no. of units of VF are shown on (O,x) axis and MP on (O,y) axis. MP represents the marginal product curve. It is an inverse U shaped curve which first increases with the increase in units of VF, reaches its maximum as shown by point M and then falls. It even becomes negative.

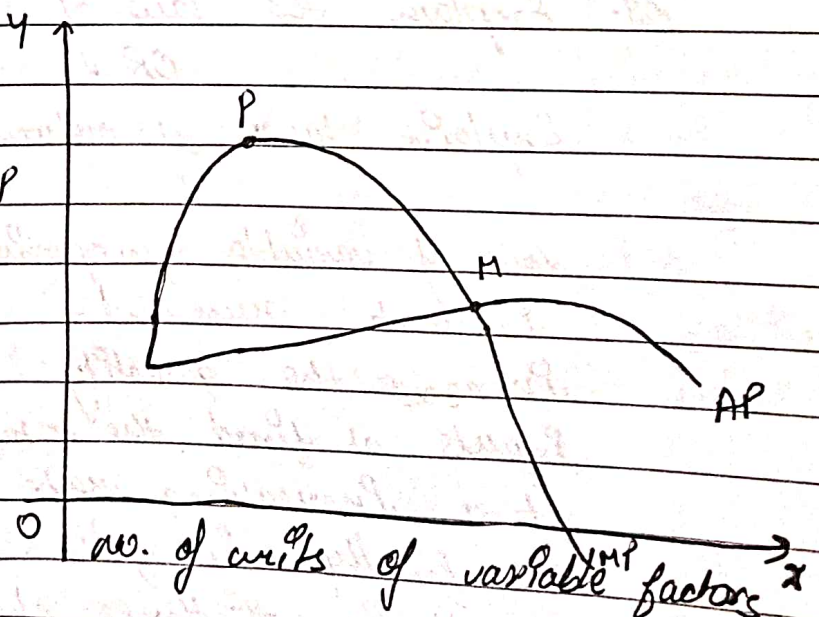
Q7. Explain the relationship b/w MP and AP.

AP: It refers to the output per unit of variable input.

MP: It refers to addition in TP due to increase in variable factor by one unit.

This relationship can be understood through following schedule & diagram.

N	TP	MP	AP
1	8	8	8
2	18	10	9
3	30	12	10
4	40	10	10
5	45	5	9
6	45	0	7.5
7	42	-3	6



In this diagram, units of VF are shown on (x, 0) axis and production on (0, y) axis. AP & MP represents average and marginal product curve respectively. Their relationship can be explained through following points:

→ Both AP & MP are derived from TP as

$$AP = \frac{TP}{N} \quad \& \quad MP = \frac{\Delta TP}{\Delta N}$$

→ When AP rises, MP also rises but at a faster rate and remains above AP.

→ When AP is at its maximum as shown by point MP = AP

→ When AP falls MP also falls but at a greater rate and remains below AP.

Q8: Explain the law of variable proportions.
OR

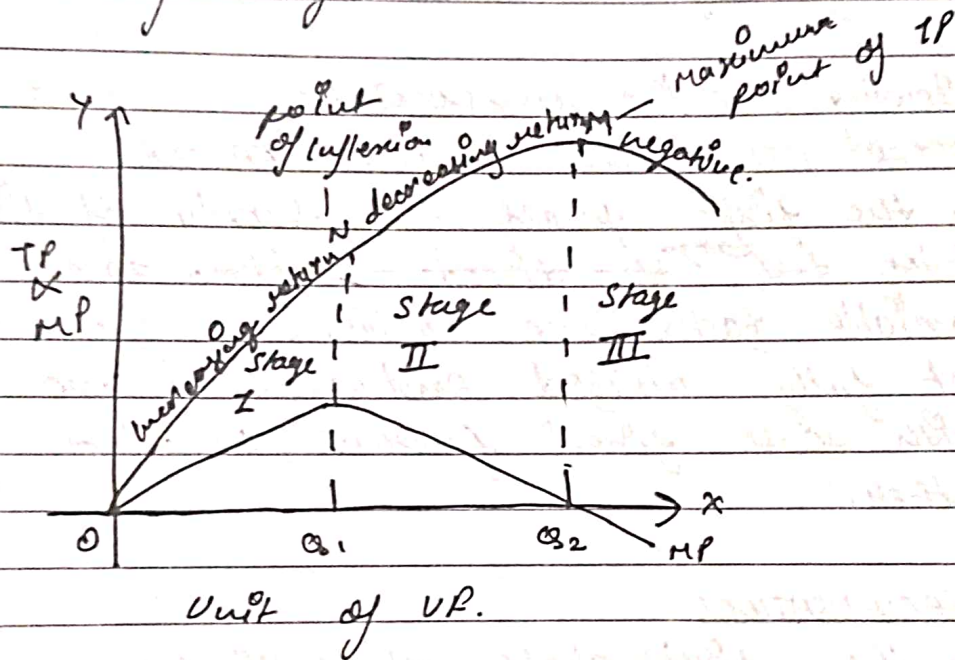
Explain law of returns to a factor.

Law of variable proportions is a law of applicable in short run and it states that when we increase the quantity of one input, keeping other inputs as fixed, the total product initially increases at a increasing rate then at decreasing rate, then finally it falls. This law can be explained in following three phases:-

PHASE 1 Law of increasing returns.

This is the first phase in which every additional variable factor results in higher rate of increase in output.

Eg: The variable input increases by 10% and output increases by 15%. In this phase, TP increases at increasing rate and MP increases as shown in stage I of diagram.



PHASE 2 Law of diminishing returns
It is the second phase where additional units of VP increase the total output but at a lesser rate.
Eg: The variable input increases by 10% and output increases by 8%. In this phase, the TP starts increasing at a decreasing rate and MP starts falling as shown by stage II in the diagram after point of inflexion.

PHASE 3 Law of negative returns.
In this phase any increase in variable factors leads to decrease in total product.
Eg: The variable input increases by 5%. In this phase,

TP starts decreasing and H.P becomes -ve as shown under stage III of the diagram where T.P starts has started falling and MP starts become -ve.

Q9. What are the reasons behind increasing return to a factor?

Following are the reasons:-

1. BETTER UTILISATION OF FIXED FACTOR

In the first phase the supply of fixed factors is too ~~less~~ ^{large}, so, fixed factors are large whereas variable factors are too less, so, fixed factors are not fully utilized and when VF are increased with these fixed factors, the return of output is better.

2. SPECIALISATION

In the first phase where VF are available in plenty, they can be utilised with higher degree of specialisation. They are used for similar work repeatedly and become specialists. Therefore, any increase in variable input results in higher rate of increase in output.

3. Indivisibility of fixed factors.

Generally, the fixed factors are indivisible and they are not available in parts. Once an investment is made in fixed factors, any addition in VF improves the utilisation of fixed factors & the increasing return apply as long as the optimum level of combination of fixed & VF is achieved.

Q10. What are the reasons behind decreasing or -ve returns to a factor?

Following are the reasons:-

1. OPTIMUM COMBINATION OF FACTOR

Among different combinations of variable & fixed factor, there is one optimum combination at which the total product reaches at its maximum. After reaching this combination when more of variable factor are introduced the output starts falling.

2. IMPERFECT SUBSTITUTES

The fixed and variable factor are not perfect substitutes of each other. There is a limit to a extend of which one factor of production can be substituted in place of capital but upto a certain limit and beyond that output starts falling.

Q11.

Differentiate b/w short run & long run.

BasisShort runLong runMeaning

It refers to the TP in which production can change by changing VF only.

It refers to the TP in which production can be changed by changing all factors of production.

Classification

Factors are classified in VF & FF.

All factors are variable.

Price Determination

Demand plays an imp. role in fixation of price because supply can hardly change.

Demand and supply both play vital role in determination of price in long run.

Q12.

Differentiate b/w fixed factors & variable factors

BasisVariableFixedMeaning

Those factors which can be changed in short run.

Those factors which cannot be changed in short run.

Relation w/ output

They have direct relation with output.

They have no direct relation with output as they do not change with the change in output.

eg.

Raw material, casual labour, power etc.

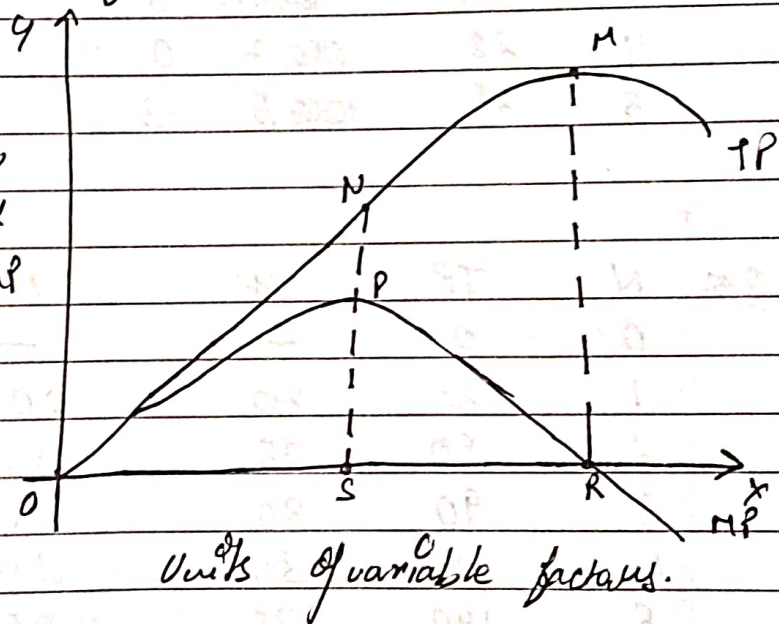
Land, building, machine, salary of permanent staff etc.

Q13 Explain the relationship b/w TP & MP.

TP: It refers to the total quantity of goods produced by a firm during a given period of time with given factors of production.

MP: It refers to addition in TP when 1 more unit of LP is employed. The relationship can be understood through following schedule & diagram.

N	TP	MP
1	8	8
2	18	10
3	30	12
4	40	10
5	45	5
6	45	0
7	42	-3



Relationships:

1. MP can be derived from TP as $MP = \frac{\Delta TP}{\Delta N}$
2. When TP increases at increasing rate MP increases as shown till point N and P in the diagram.
3. When TP starts to decrease at diminishing rate MP falls as shown b/w point M & N of TP in the diagram.

4. When TP reaches at its maximum as shown by point m. MP becomes '0' and it intersects x-axis.

5. When TP starts falling MP becomes -ve as shown beyond point 'M' in the diagram.

Q14-

N	TP	AP	MP
0	0	-	-
1	8	8	8
2	20	40	12
3	28	20 33	8
4	28	20 7	0
5	25	10 5	-3

Q15-

N	TP	AP	MP
0	0	-	-
1	20	20	20
2	50	25	30
3	90	30	40
4	120	30	30
5	140	28	20
6	150	25	10
7	150	21.4	0
8	140	17.5	-10
9	120	13.3	-20

Q16.

N	MP	TP	AP
1	24	24	24
2	20	44	22
3	16	60	20
4	12	72	18
5	8	80	16
6	0	80	13.3
7	-8	72	10.2

Q17.

N	AP	MP	TP
1	8	<u>8</u>	8
2	10	<u>12</u>	20
3	<u>10</u>	10	30
4	9	<u>6</u>	36
5	<u>8</u>	4	40
6	7	<u>2</u>	42

Q18.

N	TP	AP	MP
0	<u>0</u>	<u>-</u>	<u>-</u>
1	<u>5</u>	5	<u>5</u>
2	<u>19</u>	<u>8</u>	<u>28</u>
3	<u>17</u>	<u>56</u>	4
4	25	<u>6.25</u>	<u>8</u>
5	<u>30</u>	<u>6</u>	5
6	<u>30</u>	<u>5</u>	0
7	<u>26</u>	<u>3.7</u>	-4