

MARCH -2023 – ANSWER KEY**XI STANDARD – ECONOMICS – ENGLISH MEDIUM**

Time Allowed : 3 Hours

Maximum Marks : 90

I. Choose the most suitable from the given four alternatives and write the option code and the corresponding answer

20 x 1 = 20

A			B		
1	C	A single point tax with no cascading effects	1	A	Piece Wages
2	D	Straight line	2	C	2015
3	D	Monopoly	3	B	NITI Aayog
4	D	1,200	4	A	Alfred Marshall
5	A	AR	5	D	Production Function
6	D	Production Function	6	C	A single point tax with no cascading effects
7	C	Marshall	7	D	1,200
8	B	NITI Aayog	8	C	Marshall
9	D	Planning	9	D	2002 - 2007
10	D	Maximum	10	B	Third
11	C	2015	11	D	Planning
12	D	2002 - 2007	12	D	Straight line
13	A	Piece Wages	13	A	(1)-(iii) (2)-(i) (3)-(iv) (4)-(ii)
14	B	Third	14	A	Robbins
15	A	Robbins	15	D	Monopoly
16	A	(1)-(iii) (2)-(i) (3)-(iv) (4)-(ii)	16	D	Seventh
17	B	1998	17	A	AR
18	D	Seventh	18	C	TP/N
19	C	TP/N	19	B	1998
20	A	Alfred Marshall	20	D	Maximum

II. Answer any seven questions. Question No.30 is compulsory.**7 x 2 = 14****21. Classification of factors of production.**

1. Land,
2. Labour,
3. Capital and
4. Organisation

22. Distribution - Meaning:

- ▲ Distribution means division of income among the four factors of production.
- ▲ Distribution is given in terms of rent to landlords, wage to labour, interest to capital and profit to entrepreneurs.

23. Gross State Domestic Product (GSDP) - Meaning:

- The Gross State Domestic Product refers to the total money value of all the goods and services produced annually in the State.
- Tamil Nadu is the second largest economy (GSDP) in India

24. Features of a Indian Economy:**1. India has a mixed economy**

- ★ Indian economy is a typical example of mixed economy.
- ★ This means both private and public sectors co-exist and function smoothly.

25. The reasons for implementing LPG:

- Rise in Fiscal Deficit
- Increase in Adverse Balance of Payments:
- Fall in Foreign Exchange Reserves

26. Explicit Cost - Meaning:

- ★ Payment made to others for the purchase of factors of production is known as Explicit Costs.

27. Difference between HDI and PQLI:

- ♣ **Human Development Index:** It is a composite statistic of life expectancy, education and per capita income indicators.
- ♣ **Physical Quality of Life Index:** It is a measure to calculate the quality of life (well being of a country).

28. Classifications of wants:

- 1.Necessaries 2.Comforts 3.Luxuries

29. Microeconomics – Definition:

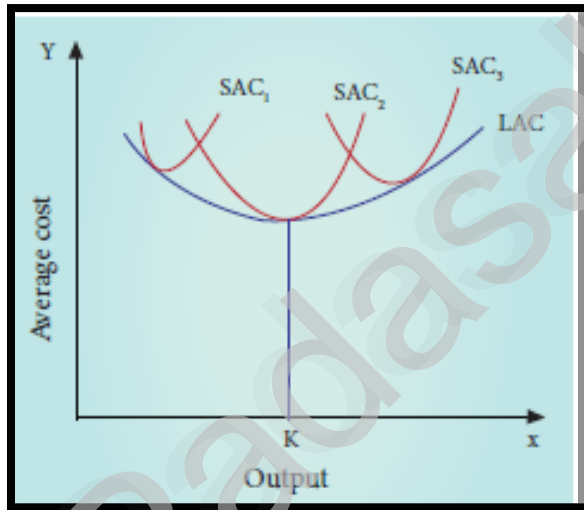
- ♣ Micro Economics is the study of the economic actions of individual units say households, firms or industries.

30. Classification of the market on the basis of Competition:

- i. Perfect competition market
- ii. Imperfect competition market

PART - III**III. Answer any seven questions. Question No.40 is compulsory.****7 x 3 = 21****31. Long run cost curves with suitable diagram.**

- ♣ In the long run all factors of production become variable.
- ♣ The existing size of the firm can be increased in the case of long run.
- ♣ There are neither fixed inputs nor fixed costs in the long run.



- ♣ $LAC = LTC/Q$ where, LAC denotes Long-Run Average Cost, LTC denotes Long-run Total Cost and Q denotes the quantity of output.
- ♣ The LAC curve is derived from short- run average cost curves.
- ♣ It is the locus of points denoting the least cost curve of producing the corresponding output.
- ♣ The LAC curve is called as ‘Plant Curve’ or ‘Boat shape Curve’ or ‘Planning Curve’ or ‘Envelop Curve’

32. Differences between Rent and Quasi-rent.

- ✓ Rent is a payment for natural gifts of nature like land.
- ✓ Quasi rent is a payment for man made appliances like machines.
- ✓ Rent is permanent in nature while quasi rent is a temporary phenomenon.

33. Short note on Village Sarvodaya:

- ♣ According to Gandhi, —Real India was to be found in villages and not in towns or cities.
- ♣ So, he suggested the development of self-sufficient, self-dependent villages.

34. Features of SHGs:

- ♣ Self Help Groups are informal voluntary association of poor people, from the similar socio-economic background, up to 20 women (average size is 14).
- ♣ They come together for the purpose of solving their common problems through self-help and mutual help.
- ♣ The SHG promotes small savings among its members.
- ♣ They save small amounts Rs.10 to Rs.50 a month.
- ♣ The savings are kept with a bank.

35. Important features of Utility:

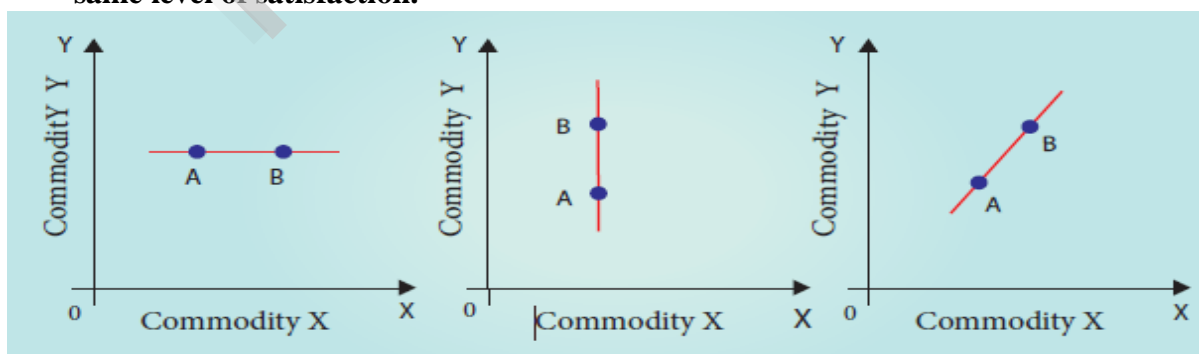
1. Utility is psychological.
2. Utility is not equivalent to usefulness.
3. Utility is not the same as pleasure.
4. Utility is personal and relative.
5. Utility is the function of the intensity of human want.
6. Utility has no ethical or moral significance.

36. Characteristics of land:

1. Land is a primary factor of production.
2. Land is a passive factor of production.
3. Land is the free gift of Nature.
4. Land has no cost of production.
5. Land is fixed in supply. It is inelastic in supply.
6. Land is permanent.

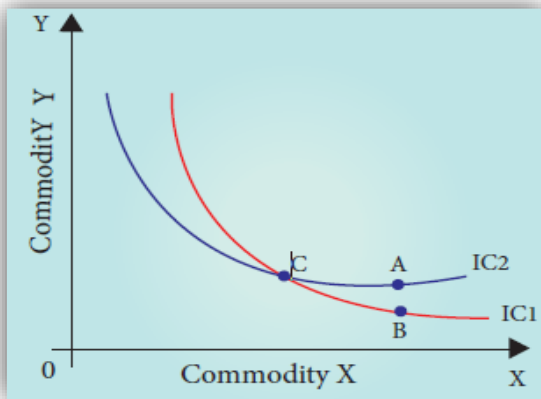
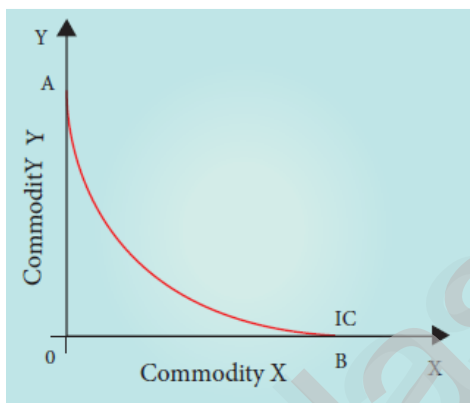
37. Properties of indifference curves:**1. Indifference curve must have negative slope:**

- ♣ An indifference curve has a negative slope, which denotes that if the quantity of commodity (y) decreases, the quantity of the other (x) must increase, if the consumer is to stay on the same level of satisfaction.



2. Indifference Curves are convex to the origin:

▲ Indifference curves are not only negatively sloped, but are also convex to the origin.

3. Indifference curve cannot intersect :**4. Indifference curves do not touch the horizontal or vertical axis:****38. Selling cost with an example:**

- The producer under monopolistic competition has to incur expenses to popularize his brand.
- This expenditure involved in selling the product is called selling cost.
- Most important form of selling cost is advertisement.
- Sales promotion by advertisement is called non-price competition.

39. Short note on mineral resources in Tamil Nadu:

1. Tamil Nadu has a few mining projects based on Titanium, Lignite, Magnesite, Graphite, Limestone, Granite and Bauxite.
2. The first one is the Neyveli Lignite Corporation that has led development of large industrial complex around Neyveli in Cuddalore with Thermal power plants, Fertilizer and Carbonisation plants.
3. Magnesite mining is at Salem from which mining of Bauxite ores are carried out at Yercaud and this region is also rich in Iron Ore at Kanjamalai.

40. Bilateral Monopoly:

- Bilateral monopoly refers to a market situation in which a single producer (monopolist) of a product faces a single buyer (monopsonist) of that product.

PART - IV**IV. Answer all the questions.****7 x 5 = 35****41.a. Features oligopoly:****1) Few large firms**

- Very few big firms own the major control of the whole market by producing major portion of the market demand.

2) Interdependence among firms

- The price and quality decisions of a particular firm are dependent on the price and quality decisions of the rival firms.

3) Group behaviour

- The firms under oligopoly realise the importance of mutual co-operation.

4) Advertisement cost

- The oligopolist could raise sales either by advertising or improving the quality of the product.

5) Nature of product

- Perfect oligopoly means homogeneous products and imperfect oligopoly deals with heterogeneous products.

[OR]**41.b) Short run cost curves with suitable diagram:****1. Total Fixed Cost (TFC)**

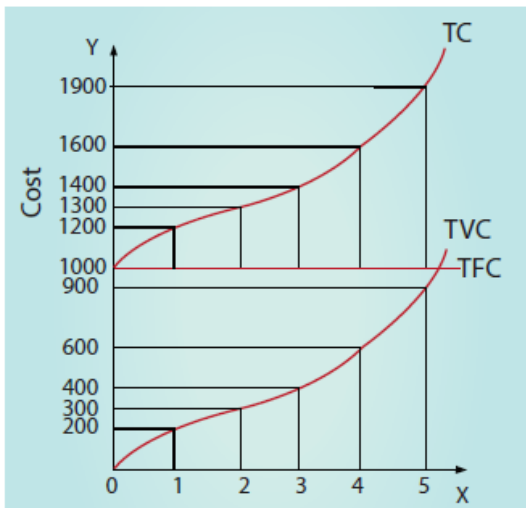
- All payments for the fixed factors of production are known as Total Fixed Cost.
- It could be observed that TFC does not change with output.

2. Total Variable Cost (TVC)

- All payments to the variable factors of production is called as Total Variable Cost.

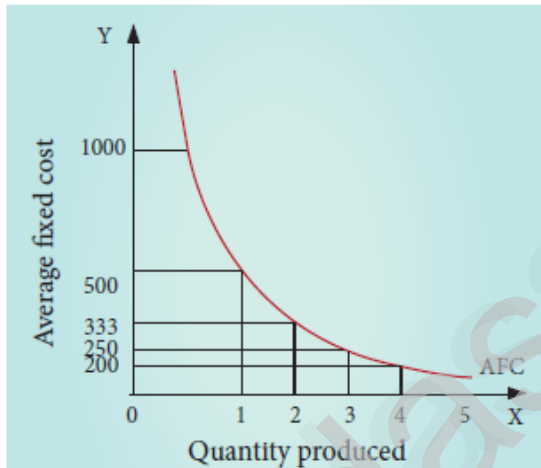
3. Total Cost (TC)

- Total Cost means the sum total of all payments made in the production.
- It is also called as Total Cost of Production.



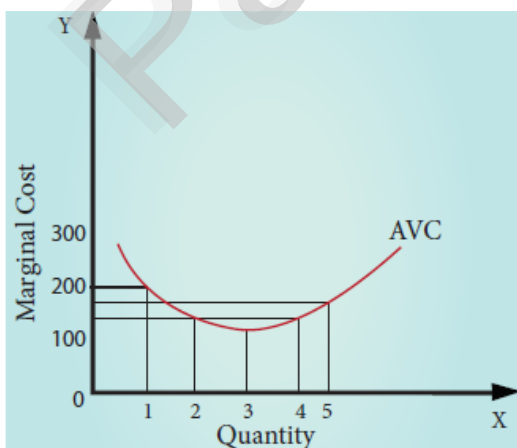
4. Average Fixed Cost (AFC)

- It refers to the fixed cost per unit of output. It is obtained by dividing the total fixed cost by the quantity of output. $AFC = TFC / Q$ where, AFC denotes average fixed cost



5. Average Variable Cost (AVC)

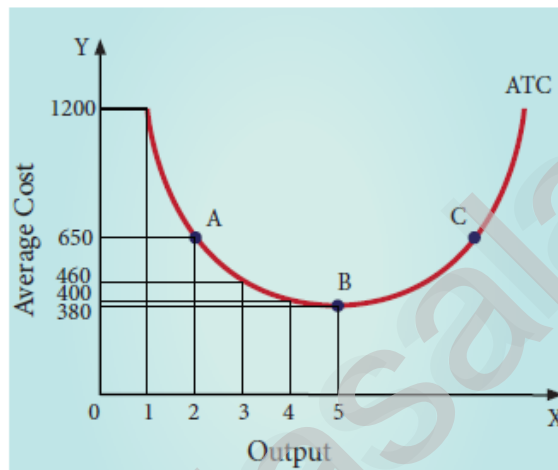
- It refers to the total variable cost per unit of output.
- It is obtained by dividing total variable cost (TVC) by the quantity of output.



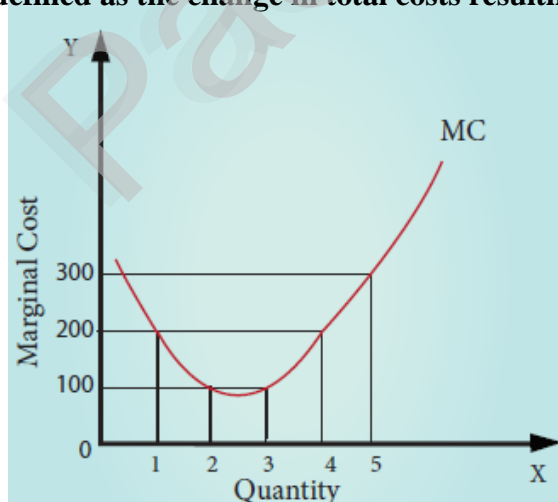
6. Average Cost (AC)

➤ It refers to the total cost per unit of output.

Q (in unit)	TFC (in ₹)	TVC (in ₹)	TC (in ₹) TFC +TVC	ATC (TC/Q) (in ₹)	AFC (in ₹)	AVC (in ₹)	ATC (AFC +AVC) (in ₹)
0	1000	0	1000	$1000 / 0 = \infty$	0	0	$0 + 0 = 0$
1	1000	200	1200	$1200 / 1 = 1200$	1000	200	$1000 + 200 = 1200$
2	1000	300	1300	$1300 / 2 = 650$	500	150	$500 + 150 = 650$
3	1000	400	1400	$1400 / 3 = 466$	333	133	$333 + 133 = 466$
4	1000	600	1600	$1600 / 4 = 400$	250	150	$250 + 150 = 400$
5	1000	900	1900	$1900 / 5 = 380$	200	180	$200 + 180 = 380$



- Marginal cost is the cost of the last single unit produced.
- It is defined as the change in total costs resulting from producing one extra unit of output.



42.a) Reasons for nationalization of commercial banks:

- 1) After Independence, the Government of India adopted planned economic development.
- 2) For this purpose, Five Year Plans came into existence since 1951.
- 3) The main objective of the economic planning aimed at social welfare.
- 4) Before Independence commercial banks were in the private sector.
- 5) These commercial banks failed in helping the Government to achieve social objectives of planning.
- 6) Therefore, the government decided to nationalize 14 major commercial banks on 19 July 1969. In 1980, again the government took over another 6 commercial banks.

[OR]**42.b) Salient features of EXIM policy (2015 – 2020):**

- 1) Reduce export obligations by 25% and give boost to domestic manufacturing supporting the —Make in India concept.
- 2) As a step to Digital India concept, online procedure to upload digitally signed document by CA/CS/Cost Accountant are developed and further mobile app for filing tax, stamp duty has been developed.
- 3) Repeated submission of physical copies of documents available on Exporter Importer Profile is not required.
- 4) Export obligation period for export items related to defence, military store, aerospace and nuclear energy to be 24 months.
- 5) EXIM Policy 2015-2020 is expected to double the share of India in World Trade from present level of 3% by the year 2020. This appears to be too ambitious.

43.a) A. Steps of Deductive Method :

Step 1: The analyst must have a clear and precise idea of the problem to be inquired into.

Step 2: The analyst clearly defines the technical terms used in the analysis. Further, assumptions of the theory are to be precise.

Step 3: Deduce hypothesis from the assumptions taken.

Step 4: Hypotheses should be verified through direct observation of events in the real world and through statistical methods. (eg) There exists an inverse relationship between price and quantity demanded of a good.

b. Inductive Method of Economic Analysis

- *Inductive method*, also called *empirical method*, is adopted by the “Historical School of Economists”. It involves the process of reasoning from particular facts to general principle.
- Economic generalizations are derived in this method, on the basis of

(i) Experimentations;

(ii) Observations; and,

(iii) Statistical methods.

Step 1: Data are collected about a certain economic phenomenon. These are systematically arranged and the general conclusions are drawn from them.

Step 2: By observing the data, conclusions are easily drawn.

Step 3: Generalization of the data and then Hypothesis Formulation

Step 4: Verification of the hypothesis (eg. Engel's law)

[OR]

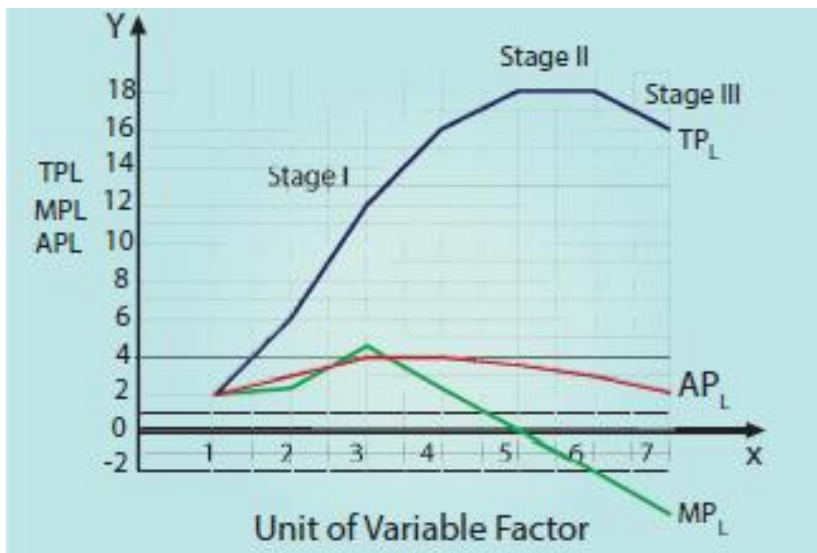
43.b) Law of Variable Proportions with the help of a diagram.

- The law states that if all other factors are fixed and one input is varied in the short run, the total output will increase at an increasing rate at first instance, be constant at a point and then eventually decrease.
- According to G. Stigler, —As equal increments of one input are added, the inputs of other productive services being held constant, beyond a certain point, the resulting increments of product will decrease, i.e., the marginal product will diminish.

Assumptions

- 1) Only one factor is variable while others are held constant.
- 2) All units of the variable factor are homogeneous.
- 3) The product is measured in physical units.
- 4) There is no change in the state of technology.
- 5) There is no change in the price of the product

Units of variable factor (L)	Total Product (TP _L)	Marginal Product (MP _L)	Average Product (AP _L)	Stages
1	2	2	2	I
2	6	4	3	
3	12	6	4	
4	16	4	4	II
5	18	2	3.6	
6	18	0	3	III
7	16	-2	2.28	



Stage I

- ♣ In the first stage MPL increases up to third labourer and it is higher than the average product, so that total product is increasing at an increasing rate.
- ♣ The tendency of total product to increase at an increasing rate stops at the point A and it begins to increase at a decreasing rate.
- ♣ This point is known as 'Point of Inflexion'.

Stage II

- ♣ In the second stage, MPL decreases up to sixth unit of labour where MPL curve intersects the X-axis. At fourth unit of labor MPL = APL. After this, MPL curve is lower than the APL.
- ♣ TPL increases at a decreasing rate.

Stage III

- ♣ Third stage of production shows that the sixth unit of labour is marked by negative MPL, the APL continues to fall but remains positive.
- ♣ After the sixth unit, TPL declines with the employment of more units of variable factor, labour.

44.a) Methods of measuring Elasticity of demand:

1. The Percentage Method

$$e_p = \frac{\Delta Q}{\Delta P} \cdot \frac{P}{Q}$$

- It is also known as ratio method, when we measure the ratio as:

$$e_p = \frac{\% \Delta Q}{\% \Delta P} \text{ where,}$$

- ✓ % ΔQ = percentage change in demand
- ✓ % ΔP = Percentage change in price

2. Total Outlay Method

- ✓ Marshall suggested that the simplest way to decide whether demand is elastic or inelastic is to examine the change in total outlay of the consumer or total revenue of the firm.

Total Revenue = (Price x Quantity Sold)

TR = (P x Q)

Price	Quantity Demanded	Total Outlay	Elasticity
150	3	450	} e > 1
125	4	500	
100	5	500	} e = 1
75	6	450	

3. Point or Geometrical Elasticity

- ✓ When the demand curve is a straight line, it is said to be linear.
- ✓ Graphically, the point elasticity of a linear demand curve is shown by the ratio of the segments of the line to the right and to the left of the particular point.

[OR]

44.b) Loanable Funds Theory of Interest.

- ♣ The Loanable Funds Theory, also known as the —Neo—Classical Theory, was developed by Swedish economists like Wicksell, Bertil Ohlin, Viner, Gunnar Myrdal and others.
- ♣ According to this theory, interest is the price paid for the use of loanable funds.
- ♣ The rate of interest is determined by the equilibrium between demand for and supply of loanable funds in the credit market.

Demand for Loanable Funds**1. Demand for Investment (I)**

- The most important factor responsible for the loanable funds is the demand for investment.
- Bulk of the demand for loanable funds comes from business firms which borrow money for purchasing capital goods.

2. Demand for Consumption (C)

- The demand for loanable funds comes from individuals who borrow money for consumption purposes also.

3. Demand for Hoarding (H)

- The next demand for loanable funds comes from hoarders.
- Demand for hoarding money arises because of people's preference for liquidity, idle cash balances and so on.
- The demand for C, I and H varies inversely with interest rate.

Supply of Loanable Funds

1. Savings (S)

- ♣ Loanable funds come from savings.
- ♣ According to this theory, savings may be of two types, namely,
 - 1) Savings planned by individuals are called —ex-ante savings. E.g. LIC premium, EMI payment etc.
 - 2) The unplanned savings are called, —ex-post savings. Savings is left out after spending are ex post saving.

2. Bank Credit (BC)

- 1) The bank credit is another source of loanable funds.
- 2) Commercial banks create credit and supply loanable funds to the investors.

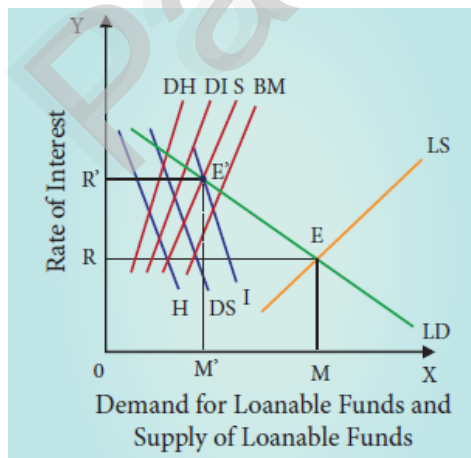
3. Dishoarding (DH)

- 1) Dishoarding means bringing out the hoarded money into use and thus it constitutes a source of supply of loanable funds.
- 2) In India, after 1991, Public sector undertakings are being sold to private people to mobilize more funds.
- 3) This is also called disinvestment.

4. Disinvestment (DI)

- 1) Disinvestment is the opposite of investment.
- 2) In other words disinvestment means not providing sufficient funds for depreciation of equipment.
- 3) It gives rise to the supply of loanable funds.
- 4) All the four sources of supply of loanable funds vary directly with the interest rate.

Equilibrium



- In the above Diagram X axis represents the demand for and supply of loanable funds and Y axis represents the rate of interest.
- The LS curve represents the total supply curve of loanable funds.
- This is obtained by the summation of the Saving Curve (S), Bank credit curve (BC), Dishoarding curve (DH) and Disinvestment curve (DI).
- The LD curve represents the total demand for loanable funds; this is obtained by the summation of the demand for investment curve I, demand curve for consumption demand or dissaving curve and curve for demand for hoarding curve H.
- The LD and LS curves, intersect each other at the point —E|| the equilibrium point.

Criticisms

- 1) Many factors have been included in this theory. Still they are many more factors.
- 2) Two such factors are
 - 1) Asymmetric Information
 - 2) Moral Hazard.
- 3) In practice larger firms, due to their political powers, are able to get huge bank credit at lower interest rates. But due to NPAs,
- 4) It is very difficult to combine real factors like savings and investment with monetary factors like bank credit and liquidity preference.

45.a) The main economic ideas of B.R.Ambedkar :

1. Financial Economics

- Much of the work done by Ambedkar during his stay abroad mostly during the period 1913-1923, was in the field of Finance Economics.
- Ambedkar divided the evolution of provisional finance into three stages:
 - (i). Budget by Assignment (1871-72 to 1876-77);
 - (ii) Budget by Assigned Revenue (1877-78 to 1881-82); and
 - (iii) Budget by Shared Revenues (1882-83 to 1920-1921).

2. Agricultural Economics

- In 1918, Ambedkar published a paper “Small Holding in India and their Remedies”.
- Citing Adam Smith’s ‘Wealth of Nations’, he made a fine distinction between “Consolidation of Holdings” and “Enlargement of Holdings”.

3. Economics of Caste

- Ambedkar believed that caste was an obstacle to social mobility.
- It resulted in social stratification.
- He was of the firm view that individuals must be free to change their occupations.
- Moreover, the caste system caused social tensions.
- The caste system has resulted in the absence of social democracy in India as distinct from political democracy.

4. Economics of Socialism

- Ambedkar was a socialist.
- He was a champion of state socialism.
- He advocated the nationalization of all key industries and suggested state ownership of land and collective farming.
- He was for state monopoly of insurance business.
- Not only that, he advocated compulsory insurance for every citizen.

[OR]

45.b) Ricardian Theory of Rent:

- The Classical Theory of Rent is called “Ricardian Theory of Rent”.
- “Rent is that portion of the produce of the earth which is paid to the landlord for the use of the original and indestructible powers of the soil”.

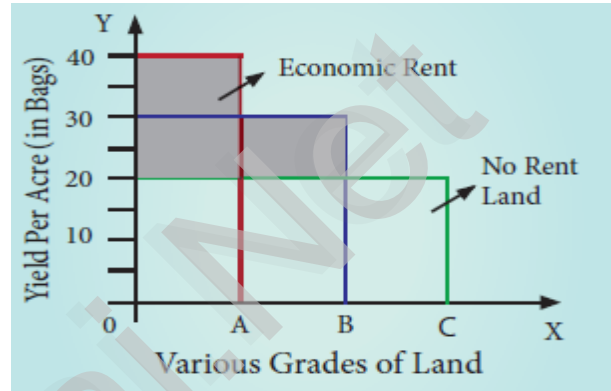
1. Land differs in fertility.
2. The law of diminishing returns operates in agriculture.
3. Rent depends upon fertility and location of land.
4. Theory assumes perfect competition.
5. It is based on the assumption of long period.
6. There is existence of marginal land or no-rent land.
7. Land has certain —original and indestructible powers.
8. Land is used for cultivation only.
9. Most fertile lands are cultivated first.

Statement of the Theory with Illustration

- ♣ Assume that some people go to a newly discovered island and settle down there.
- ♣ There are three grades of land, namely A, B and C in that island.
- ♣ A' being most fertile, B' less fertile and C' the least fertile.
- ♣ They will first cultivate all the most fertile land (A grade) available.
- ♣ Since the land is abundant and idle, there is no need to pay rent as long as such best lands are freely available.
- ♣ Given a certain amount of labour and capital, the yield per acre on A' grade land is 40 bags of paddy.
- ♣ Suppose another group of people goes and settles down in the same island after some time.
- ♣ Hence the demand for agricultural produce will increase.
- ♣ The most fertile lands [A grade] alone cannot produce all the food grains that are needed on account of the operation of the law of diminishing returns.
- ♣ So the less fertile lands [B grade] will have to be brought under cultivation.
- ♣ Suppose yet another group of people goes and settles down in the same island.
- ♣ So the least fertile land (C grade) will have to be brought under cultivation.
- ♣ For the same amount of labour and capital, the yield per acre on C' grade land is 20 bags of paddy.

- ♣ This surplus of A' grade land is now raised to 20 bags [40-20], and it is the —Economic Rent of A' grade land.
- ♣ The surplus of B' grade land is 10 bags [30-20].
- ♣ This is the economic rent of B' grade land.
- ♣ In the above illustration in C' grade land, cost of production is just equal to the price of its produce and therefore does not yield any rent (20 - 20).
- ♣ Hence, C' grade land is called —no-rent land or marginal land.
- ♣ Therefore, No-Rent Land or Marginal Land is the land in which cost of production is just equal to the price of its produce.
- ♣ The land which yields rent is called —intra –marginal land.

Grades of Lands	Production (in bags)	Surplus (i.e., Rent in bags)
A	40	40-20=20
B	30	30-20= 10
C	20	20-20= 0



- ♣ In the above diagram X axis represents various grades of land and Y axis represents yield per acre (in bags). OA, AB and BC are the A' grade, B' grade and C' grade lands respectively.
- ♣ The application of equal amount of labour and capital on each of them gives a yield represented by the rectangles standing just above the respective bases.
- ♣ The C' grade land is the —no-rent land. A' and B' grade lands are —intra –marginal lands.

Criticisms

1. The order of cultivation from most fertile to least fertile lands is historically wrong.
2. This theory assumes that, rent does not enter into price. But in reality, rent enters into price.

46.a) Causes for Rural Indebtedness:

1) Poverty of Farmers:

- 1) The vicious circle of poverty forces the farmers to borrow for consumption, cultivation and celebrations.
- 2) Thus, poverty, debt and high rates of interest hold the farmer in the grip of money lenders.

2) Failure of Monsoon:

- 1) Frequent failure of monsoon is a curse to the farmers and they have to suffer due to the failure of nature.
- 2) Therefore, farmers find it difficult to identify good years to repay their debts.

3) Litigation:

- 1) Due to land disputes litigation in the court compels them to borrow heavily.
- 2) Being uneducated and ignorant they are caught in the litigation process and dry away their savings and resources.

4) Money Lenders and High Rate of Interest:

- ★ The rate of interest charged by the local money lenders is very high and the compounding of interest leads to perpetuate indebtedness of the farmer.

[OR]

46.b) Various sources of energy in Tamil Nadu:**Nuclear Energy**

- ♣ The Kalpakkam Nuclear Power Plant and the Koodankulam Nuclear Power Plant are the major nuclear energy plants for the energy grid.

Thermal Power

- ♣ In Tamil Nadu the share of thermal power in total energy sources is very high and the thermal power plants are at Athippattu (North Chennai) Ennore, Mettur, Neyveli and Thoothukudi.

Hydel Energy

- ♣ There are about 20 hydro electric units in Tamil Nadu.
- ♣ The prominent units are Hundah, Mettur, Periyar, Maravakandy, Parson Valley.

Solar Energy

- ♣ Tamil Nadu tops in solar power generation in India.

Wind Energy

- ♣ Tamil Nadu has the highest installed wind energy capacity in India.
- ♣ The State has very high quality of off shore wind energy potential off the Tirunelveli coast and southern Thoothukudi and Rameswaram coast.

47.a) (a) Uses of Mathematical Methods of Economics:

- ♣ Mathematical Methods help to present the economic problems in a more precise form.
- ♣ Mathematical Methods help to explain economic concepts.
- ♣ Mathematical Methods help to use a large number of variables in economic analyses.
- ♣ Mathematical Methods help to quantify the impact or effect of any economic activity implemented by Government or anybody. There are of course many other uses.

(b) Causes for housing problems in rural areas:

- ♣ Rapid adoption of nuclear families.
- ♣ Lack of water supply, good sanitation, proper disposal of sewage.

[OR]

47.b)

Solution:

The matrix form of the given equation is written as

$$\begin{bmatrix} 7 & -1 & -1 \\ 10 & -2 & 1 \\ 6 & 3 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 0 \\ 8 \\ 7 \end{bmatrix}$$

$$\Delta = \begin{vmatrix} 7 & -1 & -1 \\ 10 & -2 & 1 \\ 6 & 3 & -2 \end{vmatrix}$$

$$\begin{aligned} &= 7(4-3) - (-1)(-20-6) + (-1)(30+12) \\ &= 7(1) + 1(-26) - 1(42) \\ &= 7 - 26 - 42 = -61 \end{aligned}$$

$$\Delta x_1 = \begin{vmatrix} 0 & -1 & -1 \\ 8 & -2 & 1 \\ 7 & 3 & -2 \end{vmatrix}$$

$$\begin{aligned} &= 0(4-3) - (-1)(-16-7) + (-1)(24+14) \\ &= 0 + 1(-23) - 1(38) \\ &= -23 - 38 = -61 \end{aligned}$$

$$\Delta x_2 = \begin{vmatrix} 7 & 0 & -1 \\ 10 & 8 & 1 \\ 6 & 7 & -2 \end{vmatrix}$$

$$\begin{aligned} &= 7(-16-7) - 0(-20-6) + (-1)(70-48) \\ &= 7(-23) + 0 - 1(22) \\ &= -161 - 22 = -183 \end{aligned}$$

$$\Delta x_3 = \begin{vmatrix} 7 & -1 & 0 \\ 10 & -2 & 8 \\ 6 & 3 & 7 \end{vmatrix}$$

$$\begin{aligned} &= 7(-14-24) - (-1)(70-48) + 0(30+12) \\ &= 7(-38) + 1(22) + 0 \\ &= -266 + 22 = -244 \end{aligned}$$

$$x_1 = \frac{\Delta x_1}{\Delta} = \frac{-61}{-61} = 1$$

$$x_2 = \frac{\Delta x_2}{\Delta} = \frac{-183}{-61} = 3$$

$$x_3 = \frac{\Delta x_3}{\Delta} = \frac{-244}{-61} = 4$$

***** All The Best *****