

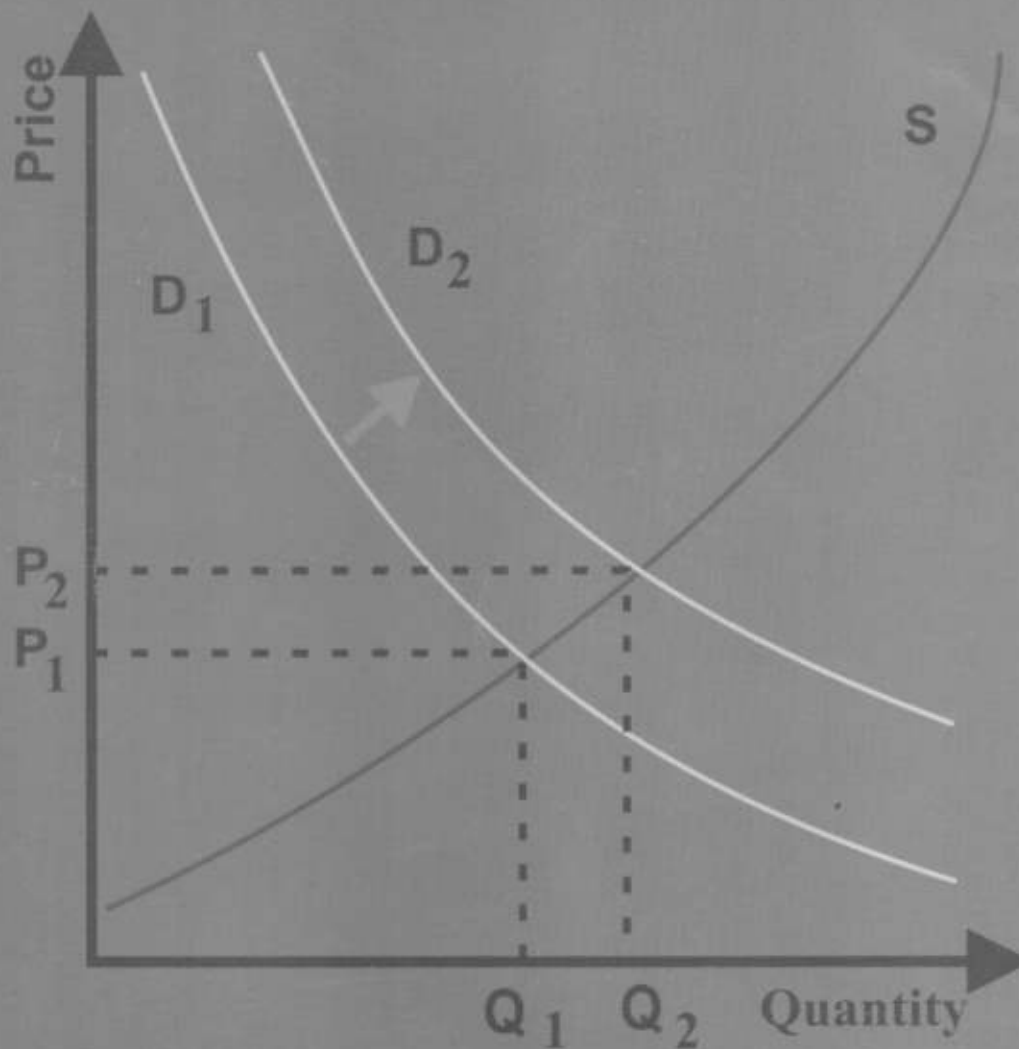


# GAUHATI UNIVERSITY

Institute of Distance and Open Learning

ECO-03-01

## MICROECONOMICS THEORY



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**Gauhati University**  
**Institute of Distance and Open Learning**

**M.A./M.Sc. Syllabus in Economics**



**Issued by**  
**Gauhati University**  
**Institute of Distance and Open Learning**  
**Gopinath Bordoloi Nagar**  
**Guwahati -781014**  
**Assam : India**

## COURSE STRUCTURE

A student shall do a total number of sixteen papers in the four Semesters. Each paper will carry 100 marks - 20 marks for internal evaluation during the semester and 80 marks for external evaluation through end semester examination. All the papers in the First, Second and Third Semesters will be compulsory. The paper XIII and XIV of the Fourth Semester will also be compulsory. The remaining two papers for the Fourth Semesters will be chosen by a student from the optional papers. The names and numbers assigned to the papers are as follows.

### First Semester

- |  |  |
|--|--|
| I Microeconomics Theory                          | II Macroeconomics Theory - I                 |
| III Mathematical Methods for Economic Analysis-I | IV Statistical Methods for Economic Analysis |

### Second Semester

- |   |                              |
|---|------------------------------|
| V Advanced Microeconomics                         | VI Macroeconomic Theory -II  |
| VII Mathematical Methods for Economic Analysis-II | VIII Elementary Econometrics |

### Third Semester

- |                             |                           |
|-----------------------------|---------------------------|
| IX Development Economics-I  | X International Economics |
| XI Issues in Indian Economy | XII Public Finance-I      |

### Fourth Semester

- |                               |                       |
|-------------------------------|-----------------------|
| XIII Development Economics-II | XIV Public Finance-II |
|-------------------------------|-----------------------|

**Papers XV and XVI are optional.**

A student has to choose any two of the following courses.

- |   |                         |
|---|-------------------------|
| (a) Population and Human Resource Development | (b) Econometric Methods |
| (c) Environmental Economics                   | (d) Financial System    |

## Semester I,

### Paper-I: MICROECONOMICS THEORY

#### Unit -1: Theory of production and Cost

Production function and related concepts - Isoquants and Substitution between Factors - Elasticity of Substitution - Returns to Scale and Returns to a Factor - Technical Progress and Production Function - Forms of Production Function; Cobb-Douglas, CES and Fixed coefficient Type - Single Decision of a Firm; Choice of Optimal Factor Combination - Expansion Path - Derivation of Cost Function from Production Function - Multi-product Firm: production Efficiency Locus, Production Possibility Frontier and Choice of Optimal Combination of Output of Products.

### **Unit - 2: Market Structure and Pricing of Products**

A Review of Perfect Competition Equilibrium - Monopoly and its Regulation - Monopolistic Competition: Price-Output Equilibrium - Duopoly Models of Cournot, Bertrand and Stackelberg - Kinked Demand Curve Model of Oligopoly - Collusive Oligopoly: Price Leadership Models.

### **Unit - 3: Theory of Distribution and Pricing of Factors**

Pricing of Factors under Perfect Competition - Factor Share and Technical Progress - Backward Bending Supply Curve of Labour - Monopsony

### **Unit - 4: Basic Financial Accounting**

Various terms used in Accounting - Account, Assets, Liabilities, Capital / Equity, Profit, Loss, Revenue income, Capital income, Revenue expenditure, Capital expenditure - Profit and Loss Account - Balance Sheet - Cash Flow Statement

#### **Recommended Readings:**

1. Koutsoyianis, A., "Modern Microeconomics", Macmillan.
2. Baumol, W.J., "Economic Theory and Operations Research", Prentice Hall of India.
3. Madalla and Miller, "Microeconomics", McGraw Hill.
4. Pindyck, R. & Rubinfeld, D.L., "Microeconomics", Prentice Hall of India.
5. Mukherjee, S., "Business and Managerial Economics", New Central Book Agency.
6. Salvatore, D., "Micro Economics", Schaums Series.
7. Juneja and Chawla, "Book Keeping and Accountancy."
8. B. B. Dam and H.C. Gautam, "Financial Accounting"

## **Paper - II: MACROECONOMIC THEORY - I**

### **Unit - 1: National Income Accounting**

Different forms of National Income Accounting; Social Accounting, Input-Output Accounting, Flow of Fund Accounting and Balance of Payment Accounting

### **Unit - 2: Theories of Income and Employment Determination**

A Review of the Classical and Keynes's Models - Income Determination Model including Money and Interest; IS-LM Analysis- Real Balance Effect and Patinkin's Full Employment Equilibrium; Patinkin's Concept of Underemployment Disequilibrium

### **Unit 3: Consumption Function**

The Consumption Function Puzzle - The Relative Income Hypothesis - The Permanent Income Hypothesis -The Life Cycle Hypothesis

### **Unit 4: Investment Function**

Marginal efficiency of Investment and level of Investment - The Accelerator and Investment behavior - Impact of inflation - Influence of policy measures on Investment.



### **Recommended Readings:**

1. Jha, R., "Macroeconomics: Theory and Policy"
2. Branson, W.H., "Macroeconomics: Theory and Policy"
3. Agarwala, S.K., "National Income Accounting"
4. Schultz, W., "National Income Analysis"
5. Brooman, F. S., "Macroeconomics".
6. Michl, "Macro Economic Theory -A Short Course", Prentice Hall of India
7. Harris, I., "Monetary Theory"
8. Gupta, S. B., "Monetary Economics"
9. Paul & Taylor, "Macro Economics".

### **Paper - III: MATHEMATICAL METHODS FOR ECONOMIC ANALYSIS-I**

#### **Unit -1: Matrix Algebra and its Application**

Matrix Algebra-type of matrices-matrix operations-matrix inversion and solution of simultaneous equations-Cramer's rule -Rank of a matrix-trace of a matrix-application to partial equilibrium market model, national income model, external sector model-static and dynamic open input-output models.

#### **Unit-2: Differentiation**

Basic rules of differentiation-rules of differentiations involving more than one functions of the same variable-Rules of differentiation involving functions of different variables-higher order derivatives-applications relating to derivation of elasticity, revenue function, cost function, tax yield in competitive market, tax yield and income multiplier, derivations of other marginal functions.

#### **Unit-3: Partial and total differentiation**

Rules of partial and total differentiations-derivative of implicit function-application to comparative static analysis of market model, national income model and input-output model-determination of partial elastic ties of demand-problems relating to indifference curve, isoquant, production function and Euler's theorem.

#### **Unit-4:Unconstrained Optimization**

Unconstrained maxima and minima with a single explanatory variable - applications to cost minimization, revenue maximization, tax revenue maximization, profit maximization and equilibrium of firm, Unconstrained maxima and minima with more than one explanatory variables - applications to discriminatory monopoly, Multiproduct equilibrium, Multiplan equilibrium, equilibrium of firm with advertisement cost and subsidy.

#### **Unit - 5: Integration**

Applications relating to derivation of total functions from marginal functions, estimation of consumer's surplus, producer's surplus,

### **Recommended Readings:**

- 1.A.C. Chiang, "Fundamental Methods of Mathematical Economics", McGraw Hill.

2. S. Baruah, "Basic Mathematics and its Economics Applications", MacMillan.
3. J.M.Henderson and R.E.Quandt, "Micro-economic Theory - A Mathematical Treatment."
- 4.R.G.D. Allen, "Mathematical Analysis for Economists."
5. Mouhammed, "Introduction into Mathematical Economics", Prentice Hall of India.
6. M. Metwally, "Mathematical Treatment of Micro-Economics."

#### **Paper - IV: STATISTICAL METHODS FOR ECONOMIC ANALYSIS**

##### **Unit - 1: Probability Theory**

Axiomatic Definition and derivation of Basic Probability Rules - Conditional Probability, Baye's Theorem (Concept only) - Random variable - Mathematical Expectation and Moments relating to both Discrete and Continuous random variables,

##### **Unit2: Standard Probability Distribution**

Binomial, Poisson and Normal - Moment Generating Function (Definition only) - The Central Limit Theory (without Proof).

##### **Unit - 3: Income Distribution**

Pareto's Law of Income Distribution - Log-normal Distribution - Lorenz Curve and Ginni Coefficient

##### **Unit - 4: Index Number**

Relation Between Laspayre's and Paasche's Index Numbers - Time Reversal, Factor Reversal, Circular test of Index Number - Fisher's Index Number - Chain Base Index Number - Base Shifting, Splicing and Deflating - Indices of Industrial Production.

##### **Recommended Readings:**

1. Yamane, Taro, "Statistics - An Introductory Analysis".
- 2.Hooda, P.R., "Statistics for Business and Economics", Macmillan.
3. Gupta, S.C. and Kapoor, U.K., "Fundamentals of Mathematical Statistics"
4. Nagar, A.L. and Das, R.K., "Basic Statistics", Oxford.
5. Agarwala, B.L., "Basic Statistics", New Age International.
6. Salvatore, Dominick and Reagle, Darrick, "Statistics and Econometrics", TMH
7. Klein, L.R., "An Introduction to Econometrics"
8. Goon Gupta, Das Gupta, "Fundamental of Statistics, Vol. II"

## Semester 2

### Paper - V: ADVANCED MICROECONOMICS

#### Unit - 1: Analysis of Consumer's Choice

A Review of Indifference Curve and Revealed Preference Approach - Violation of the Premises of Indifference curve Approach: Satiation and Lexicographical Ordering.

#### Unit - 2: Inter-temporal Choice & Choice under Uncertainty

Discounting and Present Value - Inter-temporal Consumption Decision - Inter-temporal Production Decision - Evaluation of Investment Projects - Determination of the Rate of Interest;

Attitude Towards Risk - Expected Utility - Measures of Risk Aversion - Certainty Equivalence and the Cost of Risk - Economics of Insurance. - Asymmetric Information and Adverse Selection - Moral Hazard

#### Unit -3: General Equilibrium

Partial Versus General Equilibrium Approaches - Meaning of General Equilibrium - Walrasian General Equilibrium System: Tatonnement; Existence, Stability and Uniqueness of the Equilibrium - Introductions to the Contributions of Arrow and Debreu - Critique of General Equilibrium Theory - Non-tatonnement Process.

#### Unit - 4: Welfare Economics

Pareto Optimality - The Fundamental Theorems of Welfare Economics - Market Failure: Externality and Public Good - Welfare Effects of Non-price Allocations and Price Control - Problem of Welfare Maximization: Compensation Principle, Social Welfare Function - Social Choice: Contributions of Arrow and Sen.

#### Recommended Readings:

1. Layard and Walters, "Microeconomic Theory",
2. Gravelle and Rees, "Microeconomics", Longman.
3. Baumol, W.J., "Economic Theory and Operations Research", Prentice Hall.
4. Ryan and Pearce, "Price Theory," Macmillan.
5. Madalla and Miller, "Microeconomics," Tata McGraw Hill.
6. Varian, Hall, "Intermediate Microeconomics."
7. Henderson and Quandt, "Microeconomic Theory"
8. Sen, A., "On Economic Inequality"
9. Hands, D.W., "Introductory Mathematical Economics", Oxford.

### Paper - VI: MACROECONOMIC THEORY - II

#### Unit - 1: Demand for Money & Supply of Money

The Demand Money - The Classical Approach - The Keynesian Approach - Friedman's Contribution - The Approaches of Baumol and Tobin: Inventory Theoretic Approach - The Portfolio Balance Approach.

## **Unit 2: Theory of Inflation and Economic Stabilization**

Classical, Keynesian and Monetarist approaches to inflation; Philips Curve Analysis - Short run and Long run Philips curve- the natural rate of unemployment hypothesis; Adaptive Expectations - Rational Expectations - The New Classical Approach and its Policy Implications - Empirical Evidence.

## **Unit -3: International Payments**

Exchange Rate-Balance of Payments-relationship between the current account and the capital and financial account- Disequilibrium in International Payment, Adjustment Mechanisms under various Exchange Rate Regimes, Devaluation and Exchange Control - The Monetarist Approach to the Balance of Payments.

## **Unit - 4: Business Cycles**

Theories of Kaldor, Samuelson and Hicks - Control of Business Cycles - Relative efficacy of Monetary and Fiscal policies

### **Recommended Readings:**

1. Brooman, F. S., "Macroeconomics"
2. Branson, W.H., "Macroeconomics: Theory and Policy"
3. Harris, I., "Monetary Theory"
4. Gupta, S. B., "Monetary Economics"
5. Patinkin, D., "Money, Interest and Prices"
6. Jha, R., "Macroeconomics: Theory and Policy"
7. Dornbursch, R. and Fisher, S., "Macroeconomics"
8. Soderstein, B., "International Economics", Tata McGraw Hill.
9. Paul and Taylor, "Macro Economics"

## **Paper - VII: MATHEMATICAL METHODS FOR ECONOMIC ANALYSIS-II**

### **Unit - 1: Optimization with Equality Constraint**

Optimization with equality constraints, Lagrange's multiplier method - application to consumer's equilibrium and producer's equilibrium in factor market

### **Unit - 2: Calculus for Dynamic Analysis**

First order differential equation and its solutions - application to dynamic stability of market and simple growth process (Harrod-Domar), First order difference equation and its solution- application of difference equation - lagged market model (Cobweb) and Harrod's model of growth.

### **Unit - 3: Optimization with inequality constraint**

Liner programming, General formulation Transportation problem, diet problem and production problem - Simplex method of solution (two variables, two constraints only) - Concept of duality

#### **Unit - 4: Game Theory**

Two-person Zero sum game - pure strategies with saddle point, games without saddle point - the rules of dominance - solution of games without saddle point - mixed strategies, Basic ideas and examples of non zero sum games - Nash equilibrium, Prisoner's dilemma and Repeated games.

#### **Recommended Readings:**

1. A.C. Chiang, "Fundamental Methods of Mathematical Economics", McGraw Hill.
2. S. Baruah, "Basic Mathematics and its Economics Applications", MacMillan.
3. J.M. Henderson and R.E. Quandt, "Micro-economic Theory - A Mathematical Treatment."
4. R.G.D. Allen, "Mathematical Analysis for Economists."
5. Taro Yamane, "Mathematics for Economists."
6. E.T. Dowling, "Theory and Problems of Mathematical Methods for Business and Economics", McGraw Hill.
7. Mouhammed, "Introduction into Mathematical Economics", Prentice Hall of India
8. R. Hadley, "Linear Algebra."
9. M. Metwally, "Mathematical Treatment of Micro-Economics."

#### **Paper -VIII: ELEMENTS OF ECONOMETRICS**

##### **Unit - 1: Sampling and Estimation**

Concept of Sampling Distribution and Standard Error of a Statistic - Methods of Estimation - Principles of Moments, Least Square and Maximum Likelihood (Concept only) - Characteristics of a Good Estimator

##### **Unit -2: Statistical Inference**

Testing of Hypothesis: Type I and Type II Errors, One-tailed and Two-tailed Tests - Test based on Standard Normal, t and Chi-Square Distributions.

##### **Unit 3: Linear Regression Model and Its Estimation**

The Two Variable Model and its OLS Estimation - The General Linear Regression Model - Standard Assumptions - OLS Estimators and their Properties - The Coefficient of Determination - Maximum Likelihood Methods, Estimation and Properties.

##### **Unit 4: Inference from Linear Regression Estimation**

Test of Hypothesis about Regression Coefficients and their Confidence Interval - Prediction with the Linear Regression Model

##### **Unit 5: Further Topics in Linear Regression Model**

Multicollinearity: Effects, Detection and Remedies - Specification Errors and their Consequences - Qualitative Factors and Dummy Variables - Introductions to Heteroscedasticity and Autocorrelation of Disturbances (Ideas only).



### Recommended Readings:

1. Johnston, J. "Econometric Methods", McGraw Hill.
2. Gujarathi, D., "Basic Econometrics", McGraw Hill.
3. Salvatore, Dominick and Reagle, Darrick, "Statistics and Econometrics", Tata Mc Graw Hill

## Semester 3

### Paper - IX: DEVELOPMENT ECONOMICS - I

#### Unit - 1: Development and Underdevelopment-An Overview

Problems in Defining Economic Development -- Per Capita Income as an Index of Development - Alternative Measures of Development Gap: HDI, GDI (including new concepts) and related indices. Poverty: Concepts and Measurement - Income Inequality and Growth - Redistribution with Growth

#### Unit-2: Theories of Economic Growth

Classical Approach-Adam Smith and Ricardo - The Theory of Marx.- Schumpeter's Analysis,

Harrod-Domor Model: Instability of Equilibrium - Solow's Neoclassical Model and Steady State Growth - Role of Technical Progress - Convergence - Role of Human Capital - Endogenous Growth - Alternative Growth Model: Joan Robinson and Kaldor

#### Unit - 3: Theories of Development

The Vicious Circle Theory -The Process of Cumulative Causation: Myrdal - Neo-Colonial Dependence Model. The Stages of Growth: Rostow - Big Push: Rosenstein - Rodan - Balanced Growth: Nurkse - Unbalanced Growth: Hirschman - Critical Minimum Efforts: Leibenstein.

#### Unit - 4: Development from Dual Economic Structure

Unlimited Supply of Labour and The Dual Economy Models of Lewis and Fei-Renis - The Harris-Todaro Model.

### Recommended Readings:

1. Meier, G.M., "Leading Issues in Economic Development", OUP.
2. Todaro, M.P., "Development Economics", Pearson.
3. Thirlwal, A. P. " Growth and Development" Palgrave
4. Roy, D., "Development Economics", OUP.
5. Basu, K., "Analytical Development Economics: A Critique of Contemporary Theory", OUP
6. Sen, A. (Ed.), "Growth Economics", Penguin.
7. UNDP, "Human Development Reports", OUP.
8. World Bank, "World Development Reports", OUP.
9. Barro & Sala-i-Martin, "Economic Growth", Prentice Hall of India.

## Paper - X: INTERNATIONAL ECONOMICS

### Unit 1: International Trade Theories

The main propositions of Heckscher-Ohlin Model - Rybczynski Theorem - Heckscher-Ohlin Theorem - Stolper-Samuelson Theorem - Factor Price Equalization Theorem

Alternative Trade Theories: Vent for Surplus - Availability - Increasing Returns to Scale - Monopolistic Competition and International Trade - Imitation Gap and Product Cycle Theories of Trade

### Unit 2: Economic Growth and International Trade

Effects of Growth on Trade - Growth, Trade and National Income - Trade and Technical Progress - Terms of Trade Effects - Prebisch-Singer Thesis

### Unit 3: Trade and Policy Prescriptions

Types of Tariff - Partial Equilibrium Analysis of Tariff - General Equilibrium Analysis (Small Country Case) - Tariff and World Welfare - Tariff and Income Distribution - Effective Protection - Economic and Non-economic Arguments for Protection

Instruments of Commercial Policy: Export Tax and Subsidy - Quantitative Restrictions - International Cartels - Dumping - Other Non Tariff Barriers

Preferential Trading Club - Free Trade Area - Customs Union - Common Market - Economic Union - Trade Creation and Diversion - Dynamic Effects of Customs

### Unit 4: International Monetary Order

Portfolio and Direct Investment - Theory of Direct Investment - Effects on Host and Investing Countries - Direct Investment and Exploitation, International Monetary System and Characteristics of a Good IMS - the Gold Standard - Inter-War Period - The Britton Woods System - Present System of Managed Flexibility Union - Optimum Currency Area - European Monetary System

### Recommended Readings:

1. Chacholiades, M., "International Trade: Theory and Policy", McGraw Hill.
2. Kindleberger, Ridge, "International Economics", Irwin.
3. Soderston, B., "International Economics", Tat McGraw Hill
4. Lipsey, R.G., "The Theory of Custom Union", Windfield.
5. Caves, R.F. and Jones, "World Trade and Payment", Little Brown Co.
6. Meade, J.F., "Theory of International Economic Policy", OUP.
7. Roy, P.N., "International Trade: Theory and Policy"
8. Jain, Peyrand and Yadav, "International Financial Management".
9. M.M. Conden, "Economics of Protection."

## Paper - XI: ISSUES IN INDIAN ECONOMY

### Unit - 1: National Income, Unemployment and Poverty

National Income: Trends in Growth and Structure - Unemployment: Recent Trends and Estimates, Employment



Policy under Different Plans, New Economic Policy and Employment Prospect - Poverty Analysis

### **Unit - 2: Industrial Policy and Controls**

The Industrial Environment at Independence - Industrial Policy of 1956 - Performance of Industrial Licensing System - Economic Reforms and New Industrial Policy Industry - Indian Industry in the Contemporary context.

### **Unit - 3: Indian Agriculture**

Agriculture Performance: Growth and Productivity - Agriculture Policy: Institutional Reforms, Credit Reforms, Agrarian Reforms - Agricultural Technology, Resources and Investment - Economic Reforms and their impact on Agriculture: Emerging Perspective.

### **Unit - 4: India's Economic Reforms**

Rationale for Economic Reforms - History of Economic Reforms - Current Phases of Reforms - Public Sector Enterprises - Privatisation and Competition - Financial Sector Reforms - Planning in the Context of Liberalisation - Economic Liberalisation and Regional Planning in India.

### **Unit - 5: India in the Context of Emerging Global Economy**

The Nature of Global Economy - Development in the World Economy - India's Economic Reforms in the Global Context - Foreign Trade Policy - Convertibility of Rupee - Impact of WTO on Indian Economy - Foreign Investment and Multinational Corporations.

### **Recommended Readings:**

1. Bardhan, P., "The Political Economy of Development of India", OUP.
2. Brahmananda, P.R. and Panchamukhi, V.R., "The Development Process of Indian Economy", Himalaya.
3. Jalan, Bimal (Ed), "The Indian Economy - Problems and Prospects", Viking.
4. Kapila, Uma (Ed), "India's Economic Reforms", Academic Foundation.
5. Hazari, R.K., "Industrial Planning and Licensing Policy", Final Report.
6. Sen, A. and Dreeze, J., "Economic Development and Social Opportunities", OUP.
7. Wadhwa, C. (Ed), "Some Problems of India's Economic Policy", Tata McGraw Hill.
8. Fouseca, A.J. (Ed), "Challenge of Poverty in India", Vikas.
9. Rao, V.K.R.V., "India's National Income, 1950-1980", Sage.
10. Byres, T.J. (Ed), "The State, Development Planning and Liberalisation in India".

## **PAPER-XII: PUBLIC FINANCE-I**

### **Unit-1 The State and its role in the Economy**

The role of the government in the economy -allocation, distribution, and stabilization functions. Criteria for policy evaluation - equity, economic efficiency, paternalism and individual freedom and their tradeoff.

### **Unit-2: The Provision of Public Goods**

The nature of Public goods, Public Goods and market failure, The efficient provision of public goods

Basic concepts- The Theory of Clubs, Tiebout Hypothesis, Voluntary Bargaining in Small Groups (Coase's analysis)  
Public goods - externalities, corrective policies, and viability of government intervention  
Public Choice: Majority Rule and the Median Voter, Logrolling,

### **Unit-3: Public Expenditure**

Theories of Public Expenditure- Lindahl's Model of Voluntary Exchange, Samuelson's Benefit Theory of Public Expenditure, Musgrave's Optimum Budget Theory

Public Expenditures on, non-marketed goods, fixed-quantity subsidy for marketed goods, and excise subsidy - their impact on allocation and distribution

Evaluation of public expenditure- cost-benefit analysis.

### **Unit-4: Public Revenue**

Concepts- Tax Ratio, Buoyancy, and Elasticity of taxation, Rate schedules of taxation, Tax Credit, Exemption and Deduction, Excess burden of tax, and Taxable Capacity.

Principles of Taxation: The Benefit Principle. The Ability to Pay Principle- Concepts of equal sacrifice, ability to pay and tax rate schedules, the Maximum- Welfare Principle of Budget Determination.

The Neo-classical Theory of Tax Incidence and Shifting, price-output effect of shifting under different cost conditions and market situations. Musgrave's Budget Incidence Theory. Capitalization of tax, Value Added Tax.

### **Recommended Readings:**

1. Cullis, John & Jones, Philip, "Public Finance and Public Choice", McGraw Hill.
2. Browning, E.K. & Browning, J.M., "Public Finance and the Price System", Pearson.
3. Musgrave & Musgrave., "Public Finance in Theory and Practice".
4. Current Report of the Finance Commission, India.
5. Buchanan, J.M., "The Public Finance", Richard D. Irwin.
6. Pigou, T.F. and L.G. Sgontz., "An Introduction to Public Finance", Houghton.

## **Semester 4**

### **Paper - XIII: DEVELOPMENT ECONOMICS-II**

#### **Unit -1: Components in the Development Process**

Agriculture's Contribution to Development - Agriculture-Industry Interactions - The Role of Land Reforms and Price Policy in Agricultural Transformation- Industrialization: Export Promotion versus Import Substitution Strategies - The Choice of Techniques.

#### **Unit - 2: Development Planning**

The Concept and Types of Planning - Rational for Planning in a Developing Economy - The Planning Process: Projection of Macro Variables, Input-Output Models and Sectoral Projections, Project Evaluation and Social Cost-Benefit Analysis - Plan Failures, Market Versus Planning - Planning in a Market Oriented Economy - Plan Models in India (The Models of 2nd Plan, 5th Plan and the ongoing Plan)

### Unit - 3: Financing of Development

Domestic Sources: Private Savings, Taxation - Financing by Money Creation and its Effects - The Dual Gap Analysis: Saving-Investment Gap and the Foreign Exchange Gap - Foreign Borrowing and the Debt Servicing Problem - Private Foreign Investment.

### Unit - 4: Environment and Development

Environment and Economy Interdependence - Poverty and Environmental Degradation - The Concept of Sustainable Development - Micro Planning for Environmental and Eco-Preservation - Watersheds and Joint Forest Management - Role of State in Environmental Preservation

#### Recommended Readings:

1. Meier, G.M., "Leading Issues in Economic Development", OUP.
2. Todaro, M.P., "Development Economics", Pearson.
3. Thirlwal, A. P. "Growth and Development" Palgrave
4. Roy, D., "Development Economics", OUP.
5. Basu, K., "The Less Developed Economy:", OUP.
6. World Bank, "World Development Reports", OUP.

## PAPER-XIV: PUBLIC FINANCE-II

### Unit-1: Public Debt

Public Debt - sources, burden and effects. Optimality in Public Debt Management

Pay-As-You-Use and Pay-As-You-Go Finance, Musgrave's Intergeneration Equity Theory

### Unit-2: Public Budget

The Modern Theory of Public Budgeting, Structure of a public budget, Incremental and Zero-base Budget, Outcome Budget

Concepts: Budget deficit, revenue deficit, fiscal deficit and primary deficit.

The current Union and the Assam state budget.

### Unit-3: Fiscal Policy

Fiscal Policy and its role in the economy, Compensatory Fiscal Policy, Functional Finance and Pump Priming

Fiscal Policy under conditions of inflation, and in the presence of unemployment

The Balanced Budget Multiplier, Built-in- Flexibility in the compensatory mechanism

Incidence of deficit financing: Impact of deficit finance on the capital market; The Crowding Out Effect. The welfare cost of deficit finance. Rationale and methods of reducing deficits

### Unit-4 Fiscal Federalism

Principles of division of financial resources, Instruments of inter-government resource transfer. Horizontal and Vertical fiscal balance, Problems of Centre-State Financial Relations in India

#### Recommended Readings:

1. Cullis, John & Jones, Philip, "Public Finance and Public Choice", McGraw Hill.
2. Browning, E.K. & Browning, J.M., "Public Finance and the Price System", Pearson.
3. Musgrave & Musgrave., "Public Finance in Theory and Practice".
4. Current Report of the Finance Commission, India.
5. Buchanan, J.M., "The Public Finance", Richard D. Irwin.
6. Pigou, T.F. and L.G. Sgontz., "An Introduction to Public Finance", Houghton.

## Optional Papers

### (a) POPULATION AND HUMAN RESOURCE DEVELOPMENT

#### Unit - 1: Basic Theories and Concepts

The Malthusian Theory of Population - Theory of Optimum Population - Theory of Demographic Transition - Population as Limits to Growth and as 'Ultimate Source' - Sources of Population Data - Population Pyramid - Population Change: Concepts and Measurement - Characteristics of Indian Population as Revealed by the Latest Census.

#### Unit - 2: Elements of Vital Statistics

Vital Rates: Measures of Fertility - Crude Birth Rate, General Fertility Rate, Age Specific Fertility Rates, Measures of Reproductivity - Total Fertility Rate, Gross Reproduction Rate, Net Reproduction Rate - Measures of Mortality - Crude Death Rates, Age Specific Death Rates, Concept of Infant Mortality Rate, Life Table - Concept, Type and Uses, The Different Columns of a Complete Life Table.

#### Unit - 3: Economics of Education

Education and Human Resource Development - Education and Economic Development - Cost - Benefit Analysis of Education - Measurement of Costs - Measurement of Benefits - The Rate of Return of Investment in Education - Social Rate of Return to Investment in Education - Public and Private - Financing of Education: Criteria for Adequacy of Education Finance, Traditional as well as Modern Concept of Adequacy - Financing of Education and Equity - Financing for Higher Education in India and its Problems.

#### Unit - 4: Manpower Planning

Significance and Problems, Measurement - Manpower Demand and Supply - Methodological Issues in Estimating Manpower Demand and Supply - Input-Output Method in Forecasting Manpower Requirement - Educational Planning and its Economic Aspects, Meaning and Concept of Brain Drain - Brain Drain and Under-developed Countries - Cost of Brain Drain.

#### Recommended Readings:

1. Bhende, A., and R. Kanitkar, "Principles of Population Studies".
2. Gupta and Kapoor, "Fundamentals of Applied Statistics."
3. Goon, Gupta, DasGupta, "Fundamentals of Statistics", Vol. II.
4. Ramkumar, R, "Technical Demography".
5. Nick hanley and Others, "Environmental Economics", MacMillan.
6. G. Psacharopolous (ed), "Economics of Education" Pergamon Press.
7. Ian Beardwell and Len Holden (ed), "Human Resource Management - Contemporary Perspectives" MacMillan.
8. M.P.Todaro, "Economic Development in the Third World", Oriented Longman.
9. NCAER, "India: Human Development Report".
10. UNDP Human Development Reports, Oxford University Press.

### (b) ECONOMETRIC METHODS

#### Unit - 1: Generalised Least Squares

Aitken's Theorem of GLS - Feasible GLS and its Properties - Heteroscedasticity: Test and Solutions - Autocorrelation: Test and Solutions.

## **Unit - 2: Non-Linear Estimation**

Non-Linear Least Squares and Iteration process - Models with Binary Dependents Variables - Logit and Probit Models

## **Unit - 3: Distributed Lag Models**

Concept - Koyck Model - Partial Adjustment and Adaptive Expectation Models - Estimation of Models with a Lagged Dependent Variable - Test of Autocorrelation in Auto-Regressive Models

## **Unit - 4: Analysis of Time Series**

Components of Time Series - Fitting of Trend - Variate Difference Method - The idea of a stochastic Time Series - Stationary and Non-stationary Time Series - Autocorrelation Function and Correlelogram - the Problem of Regression Analysis with Non-stationary Time Series.

## **Unit - 5: Introduction to Simultaneous Equation Model**

Structural and Reduced Forms - Simultaneity Bias - Informal Introduction to Identification Problem, Indirect Least Squares and Two Stage least Squares

### **Recommended Readings:**

1. Johnston, J., "Econometric Methods", McGraw Hill.
2. Gujarathi. D., "Basic Econometrics", McGraw Hill.
3. Pindyck and Rubinfeld, "Econometric Models and Econometric Forecasts", McGraw Hill.
4. Greene, William, "Econometric Analysis", Macmillan.
5. Johnston and Dinardo, "Econometric Methods", McGraw Hill.

## **(c) ENVIRONMENTAL ECONOMICS**

### **Unit -1: The Economy and the Environment**

Interlinkings between the Economy and the Environment - The First two laws of Thermodynamics - Environment Degradation as Market Failure- Externality, Pigouvian Tax, Property Rights and Transaction Costs - Environmental Public Goods

### **Unit - 2: Economics of Natural Resources**

Economic Issues relating to use of Non-renewable Resources, Optimal Depletion - Issues relating to Renewable resources, Sustainable exploitation - Common Property Resources - Open Access - The Tragedy of Commons

### **Unit -3: Valuation of Environmental Damages and Benefits**

Use and Nonuse Values - Valuation Methods - Stated Preference Methods: Contingent Valuation - Revealed Preference Methods: Hedonic Pricing and Travel Cost Method - Environmental Impact Assessment.

### **Unit -4: Environment and Development**

Environment Development Trade off - Poverty and Environment - Concept and Indicators of Sustainable Development: Environmental Accounting - Policies for Sustainable Development.

### **Unit -5: Political Economy of Global Environmental Issues**

Climate Change, Loss of Biodiversity, Ozone Depletion, International Conventions and Protocols -Trade and Environment - Pollution Havens.

### **Recommended Readings:**

1. Kolstad, Charles D., "Environmental Economics", Oxford University Press.
2. Hanley, Shogren and White, "Environmental Economics", Macmillan.
3. Shanker, U, "Environmental Economics", Oxford University Press.



#### (d) FINANCIAL SYSTEM

##### Unit-1: The Financial System

Components of the financial system: Institutions, Markets, Instruments, and Services.-Functions of the Financial System. - Relationship between the Financial System and Economic Growth.

##### Unit-2: Financial Markets- Money Market

Structure and Functions. - Instruments in the money market -Treasury Bill, Call Money Market, Commercial Papers, Certificate of Deposits and Commercial Bills. Money Market Intermediaries: The Discount and Finance House of India and Money Market Mutual Funds.

Liquidity Management Instruments in the Money Market -.Money Market Derivatives.

##### Unit- 3: Financial Markets- Capital Market

Structure and functions of the capital market - Primary Equity Market: Instruments of resource mobilization Public Issues, Right Issues, and Private Placement. Resource mobilization from International Capital Market. Secondary Equity Market: Functions of the secondary market. The Stock market and its operation. Stock Market Index- The BSE Sensex and the NSE Nifty - Derivative Equity Market: Nature of Derivatives and their benefits Types of Financial Derivatives. - Debt Market: Participants in the Debt Market- The Private Corporate Debt Market, The PSU Bond Market and the Government Securities Market, MF Role and types of MF - Concepts of NPV.

##### Unit-4: Valuation of Financial Assets

The time value of money and asset pricing - The valuation of debt instruments - The equilibrium price and quantity of bonds: loanable fund approach, Demand and Supply approach. - Valuing stock and other assets- income stocks and growth stocks -Equilibrium price and value of stock transactions.

##### Unit-5: Financial Sector Reforms

Evolution of Banking System in India - Banking Sector Reforms - Reforms in the Capital Market.

##### Recommended Readings:

1. Baye, R. Michael & Jonson, W. Bennis, "Money, Banking and Financial Market-An Economic Approach" AITBS Publishers.
2. Pathak, Barati, B., "Indian Financial System", Pearson Publication.
3. Chandler, V.L., "The Economics of Money and Banking"
4. Saxena, R.M., "Development Banking in India"
5. Gupta, S. B., "Monetary Economics: Institutions, Theory and policy"
6. Avadnani, V.A., "Studies in Indian Financial System"
7. Sharma, S.K., "The Institutional Structure and Capital Market in India"
8. Dagli, V., "Financial Institutions in India"
9. Gupta, U.L., "Working of Stock Exchanges in India"
10. Raj, J., "Money Market, Mutual Funds: Scope and Implications"
11. RBI Reports, Tandon, Chakraborty, Dantwala Reports
12. Reserve Bank of India, "Functions and Working"



**Institute of Distance and Open Learning**  
**Gauhati University**

**M.A./M.Sc. in Economics**  
**Semester 1**

**Paper I**  
**Microeconomic Theory**



**Contents:**

- Unit 1 : Theory of Production and Cost**
- Unit 2 : Market Structure and Pricing of Products**
- Unit 3 : Theory of Distribution and Pricing of Factors**
- Unit 4 : Basic Financial Accounting**



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**MA/M.Sc. Economics**  
**Institute of Distance and Open Learning**  
**GAUHATI UNIVERSITY**

**COURSE STRUCTURE**

A student shall do a total number of sixteen papers in the four Semesters. Each paper will carry 100 marks - 20 marks for internal evaluation during the semester and 80 marks for external evaluation through end semester examination. All the papers in the First, Second and Third Semesters will be compulsory. The paper XIII and XIV of the Fourth Semester will also be compulsory. The remaining two papers for the Fourth Semesters will be chosen by a student from the optional papers. The names and numbers assigned to the papers are as follows.

**First Semester**

- I Microeconomics Theory
- II Macroeconomics Theory - I
- III Mathematical Methods for Economic Analysis-I
- IV Statistical Methods for Economic Analysis

**Second Semester**

- V Advanced Microeconomics
- VI Macroeconomic Theory -II
- VII Mathematical Methods for Economic Analysis-II
- VIII Elementary Econometrics

**Third Semester**

- IX Development Economics-I
- X International Economics
- XI Issues in Indian Economy
- XII Public Finance-I

**Fourth Semester**

- XIII Development Economics-II
- XIV Public Finance-II

**Papers XV and XVI are optional**

A student has to choose from the following courses.

- XV { (a) Population and Human Resource Development or  
(b) Econometric Methods
- XVI { (a) Environmental Economics or  
(b) Financial System

**Paper Introduction**  
**Paper - I**  
**MICROECONOMIC THEORY**

Microeconomics is one of the most relevant subjects that a student of economics can study. Without a good grasp of microeconomics there is no point of trying to master other aspects of economics such as international trade, public finance, macroeconomic policies etc. Microeconomics can help students understand what goes on in the world and how it can be used as a practical tool for decision making. In other words, microeconomics provides the basis for all other economic subjects or aspects for their clear and thorough understanding.

The paper here includes four units.

The first unit is about the theories of production and cost. It basically deals with the various concepts related to production function such as isoquants, substitution of factor of production, types of production function, choice of optimal factor combination of a firm etc. After reading the unit, the reader will get an over all idea about these concepts.

The second unit deals with market structure and pricing of products. This basically includes a review of perfect competition, monopoly, monopolistic and duopolistic markets along with some extended concept such as regulation of monopoly, collusive oligopoly models etc. The reader will get an overview about all these types of markets and how they functions.

The third unit discusses the theory of distribution and factor price determination. As the name suggests this units deals with how the prices of factors of production are determined under a perfectly competitive market. It also throws light on technical progress and its effect on factor shares. An extensive case includes the backward bending supply curve of labour. So the reader will definitely get an idea about factor pricing and all these related concepts.

The fourth and the last unit is a new addition and a bit different, but very relevant in the present economic world. This unit is on basic financial accounting and hence deals with various concepts used in accounting, such as account, assets, liabilities, capital, profit, loss, revenue income, capital income, revenue expenditure, capital expenditure, profit and loss account, balance sheet, cash flow statements etc. Along with providing their definitions and meanings, the unit also provides some practical problems allowing their application.



## UNIT - 01

### THEORY OF PRODUCTION AND COST

#### Structure :

- 1.0 Introduction
- 1.1 Objectives
- 1.2 Production function and related concepts
- 1.3 Isoquants and substitution between factors
- 1.4 Elasticity of substitution
- 1.5 Returns to a scale and returns to a factor
- 1.6 Technical progress and production function
- 1.7 Forms of production function
- 1.8 Single decision of a firm
- 1.9 Expansion path
- 1.10 Derivation of cost function from production function
- 1.11 Multiproduct firm
- 1.12 Summing Up
- 1.13 Glossary
- 1.14 References & Suggested readings.

#### 1.0. Introduction :

The unit starts with production function and various concepts related to the theory of production. The nature of production in the short run and long run and the role of technical progress in production are also discussed. In addition to this, the various forms of production function, equilibrium of a firm as well as of a multiproduct firm have also been analysed in the present unit.

#### 1.1. Objectives :

After going through this unit, you will be able to

- Understand some important concepts related to production economics
- Determine the measures of substitutability between factors
- Compare the production behaviour in the short run and long run
- Define the role of technical progress in production

- Learn the various forms of production function and their characteristics
- Understand about production decision or equilibrium of the firm

### 1.2. Production Function and Related Concepts :

A production function is a purely technical relation which links output to factor inputs. For a given state of technology it gives the maximum output that can be produced from any combination of factor inputs. In a single product and two factor case, the production function can be symbolically written as —

$$Q = F(L, K)$$

where L is the input of one of the factors (say labour),

K is the input of the other factor (say capital)

and Q is the output produced.

Three elementary concepts related to production function are average products, marginal products and elasticity of output with respect to factor inputs. The average product of a factor is the output per unit of the factor input.

$$\text{Thus, } AP_L = \frac{Q}{L} \text{ and } AP_K = \frac{Q}{K}$$

where  $AP_L$  and  $AP_K$  symbolise average products of the factors labour and capital respectively.

The concept of marginal product is defined in the context of a small change in the factor input keeping the use of the other factor(s) unchanged. The marginal product of a factor is the change in the output resulting from a small change in the factor input when the other factor(s) is (are) kept constant. Thus if  $\Delta L$  denotes a small change in labour input and  $\Delta Q$  the corresponding change in output while K is kept constant, the marginal product of labour is given by

$$MP_L = \frac{\Delta Q}{\Delta L}$$

Incidentally if  $\Delta L$  is kept very small, (mathematically if  $\Delta L \rightarrow 0$  i.e.  $\Delta L$  tends to zero), the above ratio becomes the partial derivative of the production function with respect to L. Thus, alternatively  $MP_L$  can also be written as

$$MP_L = \frac{\partial Q}{\partial L} \quad \text{or} \quad F_L(L, K)$$

where  $\frac{\partial Q}{\partial L}$  (or equivalently  $F_L(L, K)$ ) represents the first partial derivative of  $Q = F(L, K)$  with respect in L. Similarly when L is kept constant, marginal product of capital is given by

$$MP_K = \frac{\Delta Q}{\Delta K} \quad \text{or by}$$

$$MP_K = \frac{\partial Q}{\partial K} = F_K(L, K) \quad \text{as} \quad \Delta K \rightarrow 0$$

In contrast to marginal product, elasticity relates proportionate change in output to proportionate change in factor input. The elasticity of output (Q) with respect to labour input (L) is defined as the ratio of proportionate change in Q to proportionate change in L while the other inputs are kept constant. (Alternatively the elasticity may also be understood as percentage change in Q corresponding to one percent change in L with K remaining constant). Now as per symbols already introduced, the proportionate changes in L and Q can be written as  $\Delta L/L$  and  $\Delta Q/Q$  respectively. Thus elasticity of Q with respect to L can be written as

$$e_{QL} = \frac{\Delta Q}{Q} \div \frac{\Delta L}{L} = \frac{\Delta Q}{\Delta L} \div \frac{Q}{L} = \frac{MP_L}{AP_L}$$

Similarly,  $e_{QK} = \frac{MP_K}{AP_K}$

Being ratios of proportionate changes, elasticities are free of the units of measurement of output and factor inputs. In other words they are pure numbers, not affected by the units in which output and inputs are measured.

### STOP TO CONSIDER

#### Relationship between Efficiency and Production function :

Production function describes what is technically feasible when the firm operates effectively, i.e., when the firm uses each combination of inputs as effectively as possible. Efficiency here has a simple meaning. If it is possible to produce more output with the same amount of inputs, then the firm is operating inefficiently. If it is possible



to produce the same amount of output employing less of atleast one input, again, the firm must be operating inefficiently. When these situations are ruled out, we are left with only those techniques which are efficient. The production function consists of only those techniques that are efficient. But the firm has the option of using the inefficient techniques, i.e., these techniques are part of its production set.

### CHECK YOUR PROGRESS :

1. What do you mean by production function ?

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2. Distinguish between average and marginal product of a factor.

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3. Explain the relationship between average product, marginal product and elasticity of output.

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### 1.3. Isoquants and Substitution Between Factors :

An isoquant is a line formed by points representing such factor combinations that produce the same output level. To illustrate the concept



let us begin with the production function  $Q = F(L, K)$ . Now if  $Q$  is held constant at a particular level say  $Q_1$ ,  $Q_1 = F(L, K)$  involves only two variables, viz.  $L$  and  $K$ . Now if we plot  $Q_1 = F(L, K)$  in a two dimensional plane, we may get a line like  $A_1B_1$  in Fig 1.1.

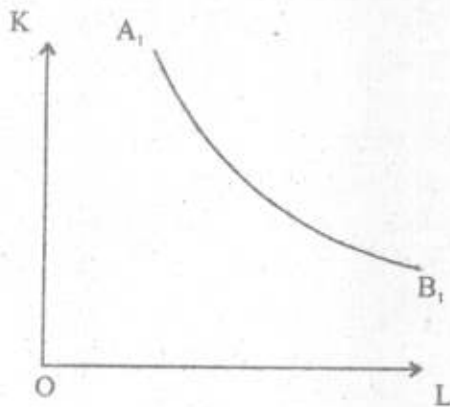


Fig. 1.1

The different points of the line  $A_1B_1$  represent different combinations of  $L$  and  $K$ . But all these combinations produce the same output level  $Q_1$ . Thus the line  $A_1B_1$  is the isoquant for output level  $Q_1$ .

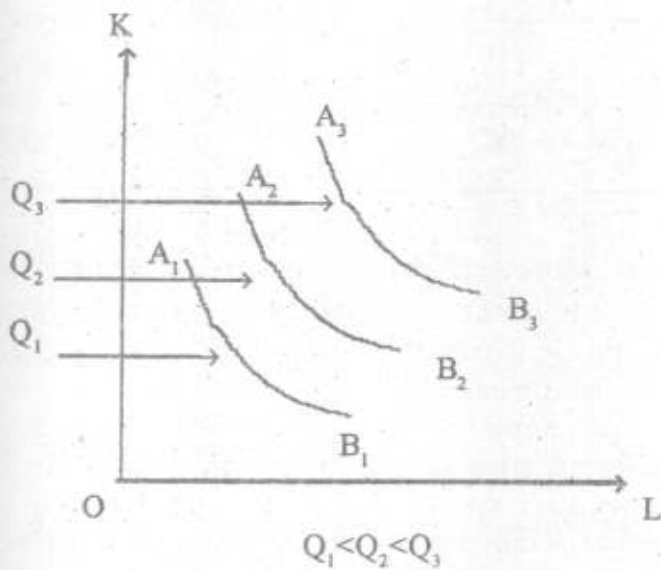


Fig. 1.2

For different output levels of course we get different isoquants. For output larger than  $Q_1$ , the isoquant will lie further off from the origin  $O$ . Similarly for a smaller output than  $Q_1$ , the isoquant will lie closer to the origin  $O$ . The entire production function therefore can be represented by

a family of isoquants in which inputs are shown directly but output levels are indicated indirectly by the distances of the isoquants from the origin (Refer Fig 1.2)

Text books usually assume isoquants to have shapes similar to those in fig 1.1 and 1.2. Thus conventionally an isoquant is assumed to be negatively sloped and convex to the origin. The negative slope implies that when one factor input is increased, less of the other factor is required to produce the same output. Convexity indicates the degree of substitutability among factors. Greater the substitutability less is the convexity. In the extreme case of perfect substitutability the isoquant is a straight line (Fig. 1.3.a). In the other extreme case of zero substitutability i.e. when factors are perfect complementaries and are to be used in fixed proportion, the isoquant will have a right angled shape (Fig 1.3.b)

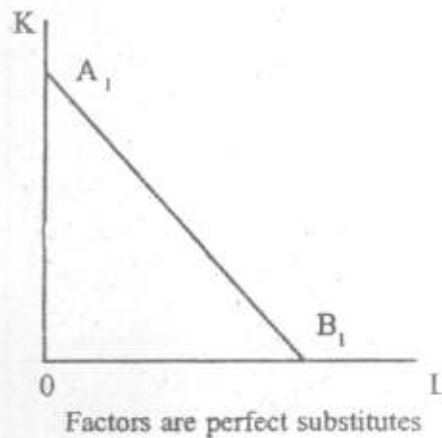


Fig. 1.3. (a)

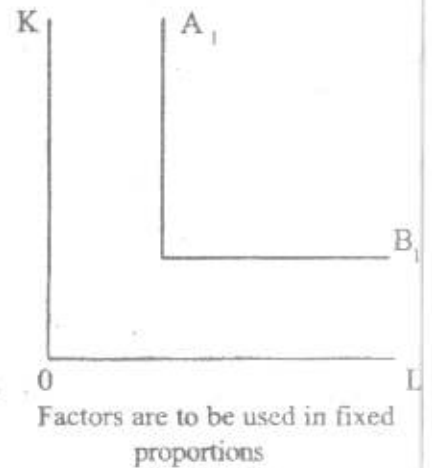
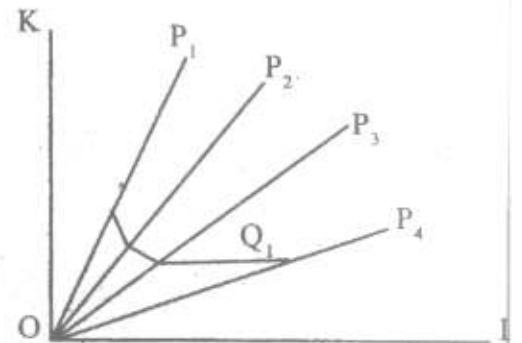


Fig. 1.3. (b)

### STOP TO CONSIDER

#### Kinked Isoquant

: Although traditional economic theory has mostly adopted continuous isoquants (the normal convex isoquants), in reality kinked isoquants are more practical. Engineers, managers and production executives consider the production processes in a discrete rather than in a continuous array. Kinked isoquant assumes limited substitutability of K and L. There are only



a few processes for producing any one commodity. Substitutability of the factors is possible only at the kinks. These isoquants are also called 'activity analysis isoquants' are 'linear programming isoquants.'

One important concept related to isoquant is marginal rate of technical substitution or MRTS in short. Marginal rate of technical substitution of labour for capital ( $MRTS_{LK}$ ) is defined as the amount of capital that can be withdrawn by using an additional unit of labour in the production process while keeping the output level unchanged. So long as factors of production are substitutable, to produce a given output level if the firm decides to use a little more of a factor, it would be able to save some amount of the other factor(s). Let  $\Delta K$  be the amount of capital saved resulting from a small increase in the use of labour by  $\Delta L$ . Now by definition

$$MRTS_{LK} = \frac{\Delta K}{\Delta L}$$

Geometrically the  $MRTS_{LK}$  is represented by the slope of the isoquant (with the negative sign ignored). Mathematically, total differential of the production function

$$Q = F(L, K) \text{ is}$$

$$dQ = \frac{\partial Q}{\partial L} dL + \frac{\partial Q}{\partial K} dK \quad (1)$$

where  $dQ$ ,  $dL$  and  $dK$  represent small changes in  $Q$ ,  $L$  and  $K$  respectively. Note that

$$\frac{\partial Q}{\partial L} = MP_L, \quad \frac{\partial Q}{\partial K} = MP_K$$

and that  $dQ = 0$  along an isoquant. Thus when output is kept constant, the above equation becomes :

$$\text{From (1) } MP_L dL + MP_K dK = 0 \quad (\text{since } dQ = 0)$$

$$\text{or } -\frac{dK}{dL} = \frac{MP_L}{MP_K}$$

This result gives another expression for  $MRTS_{LK}$ . Thus  $MRTS_{LK}$  can also be expressed as the ratio of marginal product of labour to that of capital.

As a measure of substitutability among factors, MRTS suffers from a serious drawback. It is affected by the unit in which the factors are measured. The indicator of substitutability which is free from this drawback is the elasticity of substitution.

**CHECK YOUR PROGRESS :**

1. What is an isoquant ?

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2. What are the slopes of an isoquant in case of two goods which are perfect substitutes and complementaries ?

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3. What do you mean by marginal rate of technical substitution between two factors ?

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4. Explain the relation between shape of an isoquant and substitution between factors.

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**1.4 Elasticity of Substitution :**

This is the elasticity of factor ratio with respect to MRTS and

usually denoted by  $\sigma$ . For the production function  $Q = F(L, K)$ , the elasticity of substitution can be defined as

$$\sigma = \frac{\text{Proportionate change in } (K/L)}{\text{Proportionate change in } MRTS_{LK}}$$

with  $Q$  remaining constant.  $\sigma$  takes the value zero when factors are to be used in fixed proportions and no substitution is possible between them. It increases from zero with the increase in the substitutability among factors, reaching the value  $\infty$  for perfect substitutability.

To illustrate the concept of elasticity of substitution, let us take help of the fig-1.4. At the point  $P_1$  of the isoquant  $Q_1$ ,  $MRTS_{LK}$  is given by slope of the tangent  $T_1 t_1$  and capital labour ratio by slope of the line  $OP_1$ . Now if we move over to  $P_2$  we have a lower  $MRTS_{LK}$  (= slope of  $T_2 t_2$ ) and also a lower capital labour ratio (= Slope of  $OP_2$ ). Now the question is what is the comparative rate of change in the two? If the capital labour ratio changes at the same proportionate rate as the  $MRTS_{LK}$ ,  $\sigma$  will take the value unity. If the capital labour ratio changes at a higher proportionate rate than  $MRTS_{LK}$ ,  $\sigma$  will be greater than unity. In the remaining case of capital labour ratio changing at a lower rate than  $MRTS_{LK}$ ,  $\sigma$  will be a pure fraction.

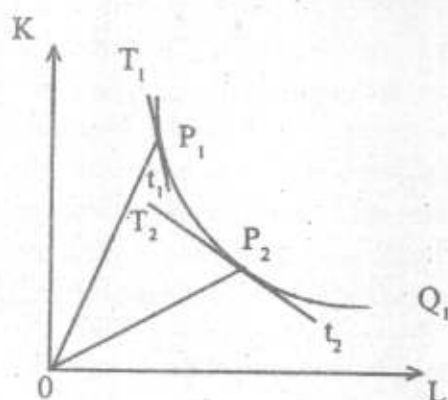


Fig. 1.4

We shall soon see that in equilibrium, firms under perfect competition equate  $MRTS$  to factor price ratio. In that context, the elasticity of substitution between factors can be interpreted as elasticity of factor ratio with respect to factor price ratio. This interpretation of the elasticity of substitution has implications for determination and changes in the relative factor share. (For details consult theory of distribution)

### SELF-ASKING QUESTION :

MRTS gives a measure of substitutability between factors. Then why elasticity of substitution is required as a separate measure of substitutability between factors ?

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### 1.5 Returns to Scale and Returns to a Factor.

Returns to scale refers to the response of production when all factors are changed in an equal proportionate rate. If output changes in response at the same rate, the returns to scale are said to be constant. Returns to scale are said to be increasing or decreasing depending on whether output responds by changing at a higher or lower rate corresponding to the rate of change in the factors.

An useful concept in this context is that of a homogeneous production function. The production function  $Q = F(L, K)$  is said to be homogeneous of degree  $n$  if the following result holds.

$$F(\lambda L, \lambda K) = \lambda^n F(L, K).$$

Where  $\lambda$  is a positive constant. Thus in case the production function is homogeneous, when each of the inputs is multiplied by a positive constant  $\lambda$ , output is changed by the factor  $\lambda^n$ . The power  $n$  of  $\lambda$  is called the degree of homogeneity of the function and is a measure of returns to scale.

If  $n < 1$ , we have decreasing returns to scale.

If  $n > 1$ , we have increasing returns to scale.

If  $n = 1$ , we have constant returns to scale.

This production function is called linear homogeneous production function when  $n = 1$ . It possesses a number of properties found to be useful for economic analysis.

For a non homogeneous production function,  $\lambda$  cannot be factored out of the production function.

Definition of returns to scale involves changes in the inputs of all factors. Since all factors can be varied only in the long run, the returns

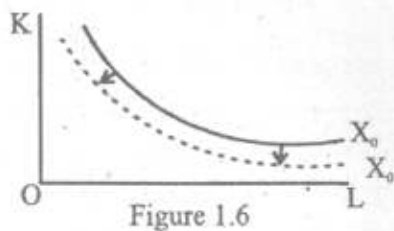
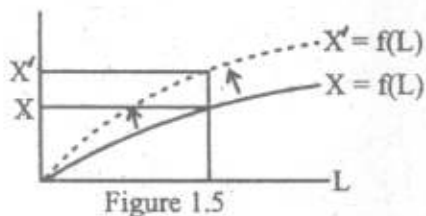
to scale are not relevant with short run analysis. In the short run it is not possible for a firm to change some of the factors such as its capital goods. Changes in the output level therefore has to be effected by varying the use of variable factors like labour and raw materials. The response of output to change in a factor's input as the other factors are kept unchanged is referred to as the returns to a factor. The nature of returns to a factor is described by the law of diminishing returns or the more general law of variable proportion.

### STOP TO CONSIDER :

**The Short Run Vs. Long Run :** The short run refers to a period of time in which the quantities of one or more factors of production can not be changed. In other words, in the short run, there is at least one factor that can not be changed; such a factor is called a fixed input. On the other hand, the long run is the amount of time needed to make all inputs variable. There is no specific time period, such as one year, that separates the short run from the long run. Rather one must distinguish them on a case by case basis.

### 1.6. Technical Progress and Production Function :

With the advancement of technology the production processes become more efficient. Thus, with technical progress it becomes possible to turn out a large volume of output from a given amount of resources. Mathematically this will mean an upward shift of the production function. Alternatively technical progress reduces the resource requirement for producing a given output. Viewed thus, technical progress will cause a downward shift of the isoquants. This is shown in figure 1.5 and 1.6.





Technical progress may be neutral or non-neutral. Technical progress is said to be neutral (strictly speaking Hicks neutral) if for a given factor ratio it raises the marginal productivity of all factors in the same proportion. Since all factors gain productivity at the same rate, this type of technical progress does not cause any change in the ratio in which factors are employed.

In contrast if the productivity of different factors are increased in unequal rates, technical progress induces relatively greater use of the factor whose productivity goes up at a higher rate than those of the other factors. Hence such technical progress is non-neutral.

Hicks distinguished three types of technical progress, depending on its effect on the rate of substitution of the factors of production.

#### **Capital deepening or labour saving technical progress :**

Technical progress is capital deepening (or capital using and labour saving) if, along a line on which the  $K/L$  ratio is constant, the  $MRS_{L,K}$  decreases. This implies that technical progress increases the marginal product of capital more than the marginal product of labour.

#### **Labour deepening or capital saving technical progress**

Technical progress is labour deepening (labour using and capital saving) if along a radius through the origin (with constant  $K/L$  ratio), the  $MRS_{L,K}$  increases. This implies that the technical progress increases the marginal product of labour faster than the marginal product of capital.

#### **Neutral technical progress**

Technical progress is neutral if it increases the marginal product of both factors by the same percentage, so that the  $MRS_{L,K}$  (along any radius) remains constant.

### **STOP TO CONSIDER**

#### **Harrod's Technical progress :**

Harrod's classification of technical progress employs the concept of the capital output ratio. Given the rate of profit, technical change is said to be capital-saving if it lowers the capital output ratio, labour-saving if it raises the capital output ratio and neutral if it leaves the capital-output ratio unchanged.

**CHECK YOUR PROGRESS :**

1. Distinguish between returns to a scale and returns to a factor.

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2. What do you mean by homogeneous production function ?

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3. Distinguish between neutral and non-neutral technical progress.

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**1.7. Forms of Production Functions :**

So far we have not specified any form of the production function. To deal with practical problems or for applied research, the production function has to be given a specific form. A popular form of the production function is that of Cobb-Douglas.

The Cobb-Douglas production function can be written as —

$$Q = AL^\alpha K^\beta, \quad A, \alpha, \beta > 0$$

while Q, L and K have the same meaning as in the earlier sections,

A,  $\alpha$  and  $\beta$  are parameters of the function. i.e. A,  $\alpha$  and  $\beta$  are constants for a particular structure but may vary from one structure to another (say from one line of production to another)

Readers may verify that for the above production function

$$MP_L = \frac{\partial Q}{\partial L} = \alpha \left( \frac{Q}{L} \right) = \alpha AP_L$$

Thus, 
$$\alpha = \frac{MP_L}{AP_L}$$

is the elasticity of Q (output) with respect to L. Similarly  $\beta$  is the elasticity of Q with respect to K. The other parameter A is called the efficiency parameter. It may be noted that higher the value of A, higher will be the level of output Q from any given combination of the factors L and K.

It can be easily verified that this production function is homogeneous of degree  $(\alpha + \beta)$ . Accordingly the production function represents increasing, constant or decreasing returns to scale depending on whether  $(\alpha + \beta)$  is greater than, equal to or less than unity. Of particular interest is the case when  $(\alpha + \beta) = 1$ . The production function now shows constant returns to scale and has the following forms

$$Q = AL^\alpha K^{1-\alpha} \quad \text{or} \quad Q = AL^{1-\beta} K^\beta$$

Another result associated with Cobb-Douglas production function is that the elasticity of substitution is unity irrespective of the values of the parameters. This is rather a limitation of the function, since the elasticity  $\sigma$  is always constrained to 1. In practice the elasticity of substitution between factors in all lines of production need not be equal to one. The constant elasticity of substitution or CES production function is free from this limitation of the Cobb-Douglas production function.

The CES production function can be written as

$$Q = A \left\{ \delta L^{-\rho} + (1 - \delta) K^{-\rho} \right\}^{-\frac{1}{\rho}}$$

where  $A > 0$ ,  $0 < \delta < 1$  and  $\rho > -1$  but  $\rho \neq 0$

As in case of the Cobb-Douglas production function, A is the efficiency parameter.  $\delta$  is called the distribution parameter as it has to do with the relative factor shares in the product.  $\rho$  is called the substitution parameter as it specifies the elasticity of substitution between factors. In fact the elasticity of substitution varies inversely with the value of  $\rho$ , this expression for the elasticity being

$$\sigma = \frac{1}{1+\rho}$$

Thus,  $\sigma > 1$  for  $-1 < \rho < 0$  and  $\sigma < 1$  for  $\rho > 0$

As indicated above the function is not defined for  $\rho=0$ . But as  $\rho$  approaches the value 0, the CES production function tends to be Cobb-Douglas production function (with constant returns to scale). Thus as a limiting case, as  $\rho$  tends to zero,  $\sigma$  tends to unity.

In the above form, the CES production function is linear homogeneous generating only constant returns to scale. To accommodate other types of returns to scale the CES production function can be generalized as

$$Q = A \left\{ \delta L^{-\nu} + (1 - \delta) K^{-\nu} \right\}^{-\frac{1}{\nu}}$$

where the new parameter  $\nu$  takes only positive values. The production function will now generate increasing, constant or decreasing returns to scale depending on whether  $\nu$  is greater than, equal to or less than one.

Both Cobb-Douglas and CES production function generate smooth downward sloping convex isoquants indicating smooth and continuous substitutability between factors. Such isoquants may be helpful for theoretical analysis. But in real life smooth and continuous substitution between factors may not be possible. Indeed it is possible to think of the extreme case where no substitution is at all possible between factors. In such a case output is to be produced by using the factors in a fixed proportion. Production activity is then completely specified by parameters called input co-efficients. The input co-efficients are quantities of the inputs required to produce one unit of output. In the context of the function  $Q = F(L, K)$ , let  $a$  and  $b$  be the input co-efficients for the factors labour and capital respectively. Since by definition 'a' amount of labour is required to produce one unit of output, total input  $L$  of labour is enough to produce  $L/a$  units of output. By the same logic, capital input of  $K$  is adequate for production of  $K/b$  units of output. Since factor substitution is not possible the output that a given combination of  $L$  and  $K$  can produce is the minimum of  $L/a$  and  $K/b$ . In other word, the production function can be written as

$$Q = \text{Min} \left( \frac{L}{a}, \frac{K}{b} \right)$$

This is a production function of fixed co-efficient types. Factors of production here are perfect complementaries to each other. The isoquant has a right angled shape as shown in figure 1.3.b. But so long as neither of the factors is a free good, firms will operate only at the corner points

of such isoquants. The production function implicitly assumes constant returns to scale. In input output analysis production functions are assumed to be of fixed co-efficient type.

**SELF-ASKING QUESTION :**

Given the Cobb-Douglas production function of the form

$$Q = AL^{\alpha}K^{\beta},$$

derive elasticity of output with respect to labour and capital.

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**CHECK YOUR PROGRESS :**

1. In case of Cobb-Douglas production function elasticity of substitution is always equal to \_\_\_\_\_ (fill in the blank)
2. Is CES production function an improvement over Cobb-Douglas production function ? Justify your answer.

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3. Distinguish between different types of production function.

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### 1.8. Single Decision of a Firm ; the Choice of Optimal Factor Combination : Minimisation of cost subject to output constraint

Having discussed the basic concepts related to production function, we are now in a position to apply the concepts in the analysis of various economic problems faced by a firm. First let us take the case of a firm which is to produce a particular quantity of output under given prices of factor inputs and output. We assume that the firm is a profit maximiser.

Since both output level and output price are already given, the revenue side is already pre-determined. Hence the goal of profit maximisation reduces to minimisation of cost. The specified output can be produced with the alternative factor combinations shown by the different points of the relevant isoquant. To minimise cost, and hence to maximise profit, the firm will choose that factor combination from all the alternatives available which costs the least under the given factor prices.

The conditions for equilibrium of the firm are—

- (a) Slope of isoquant = slope of isocost
- (b) The isoquant must be convex to the origin.

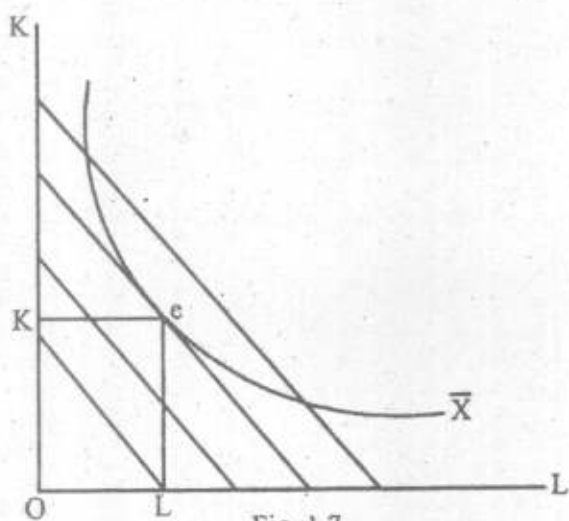


Fig. 1.7

In the figure 1.7, we have a single isoquant which denotes the desired level of output, but a set of isocost curves. The firm minimises its costs by employing the combination of K (capital) and L (labour) determined by the point of tangency of the  $\bar{X}$  isoquant with the lowest isocost line. Points below e are desirable because they show lower cost but are not attainable for output  $\bar{X}$ . Points above e show higher costs. Hence point e is the least cost point denoting the least cost combination of the factors K and L for producing  $\bar{X}$ . Thus at the least cost factor combination the slope of isocost are equal and the marginal rate of technical substitution between factors is equal to the factor price ratio.



### SELF-ASKING QUESTION :

Try yourself to explain diagrammatically the other case of choice of optimal factor combination viz. maximisation of output subject to a cost constraint.

**Hint :** Here it will be a map of isoquants and a single iso-cost line and the basic conditions of equilibrium will remain same

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### 1.9 Expansion path :

This is the path of optimal factor combination of a firm that will be traced as the firm expands its output. In the preceding section, the

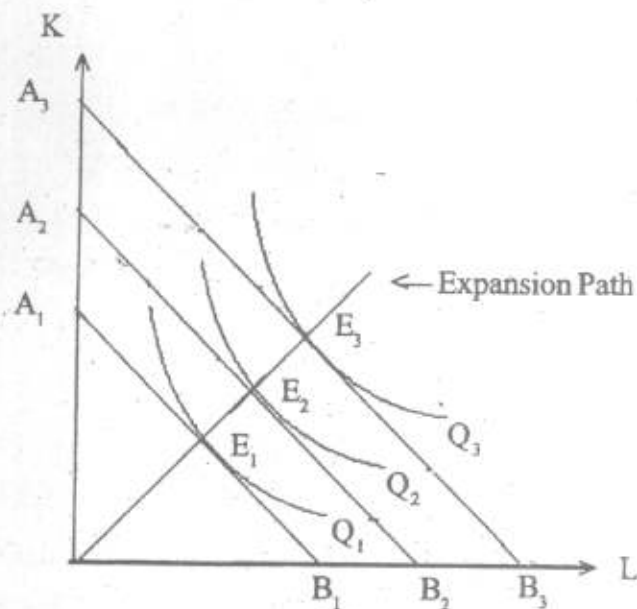


Fig. 1.8

choice of optimal factor combination (i.e. the least cost factor combination) for a particular output level has been discussed. For a different level of output, there will be a new equilibrium point indicating the optimal factor combination for the changed output level. Now if output level is continuously expanded, the successive equilibrium points will trace out a path. This is the expansion path.

In figure 1.8, lines  $A_1 B_1$ ,  $A_2 B_2$  and  $A_3 B_3$  represent the minimum cost of producing output level  $Q_1$ ,  $Q_2$  and  $Q_3$  respectively. The corresponding least cost factor combinations are represented by the points  $E_1$ ,  $E_2$  and  $E_3$ . These points along with similar points for other output levels form the expansion path.

As indicated above the choice of optimal factor combination for a given output level depends on the factor price ratio. Accordingly the expansion path is also specific to a particular factor price ratio. That is, for different factor price ratio, the optimum factor combination, and hence the expansion path, will be different.

### CHECK YOUR PROGRESS :

1. What do you mean by expansion path ? Show how an expansion path is derived with the help of a diagram

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2. Explain the process of obtaining the least cost combination of factors.

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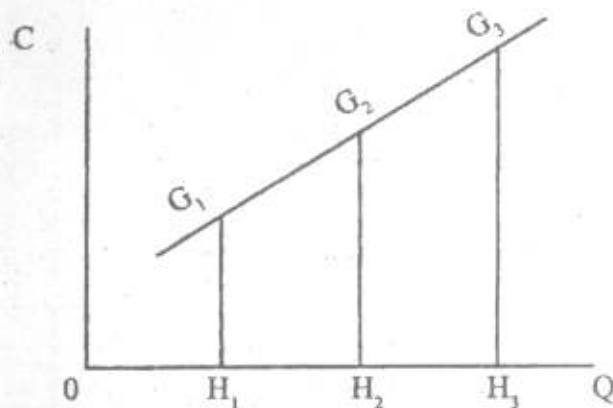
### 1.10. Derivation of Cost Function from Production Function:

Cost function relates the cost of production to the level of output. For a given state of technology and given set of factor prices, the cost function shows the minimum cost of producing any output. Symbolically it may be written as

$$C = f(Q)$$

where  $Q$  is the level of output and  $C$  is the minimum cost of producing it.

For any output level, say  $Q_1$ , the production function gives us an isoquant showing alternative factor combinations for producing  $Q_1$ . The least cost combination for producing  $Q_1$  then can be identified as the one at which iso-cost line is tangential to the isoquant. This tangent iso-cost line thus represents the minimum cost of producing  $Q_1$ . For other output levels the minimum cost of production can be similarly worked out. For instance, from Fig 1.8 we can see that the minimum costs of producing output levels  $Q_1$ ,  $Q_2$  and  $Q_3$  are represented by iso-cost lines  $A_1 B_1$ ,  $A_2 B_2$  and  $A_3 B_3$  respectively. Plotting the cost figures against corresponding output levels in a output cost plane, one can get the cost function. This is illustrated in Fig 1.9. Here  $OH_1$  represents output  $Q_1$  in Fig 1.8 and  $H_1 G_1$  shows the cost represented by the iso-cost line  $A_1 B_1$  in Fig 1.8. Points like  $G_1$ ,  $G_2$  and  $G_3$  form the cost function.



*Fig. 1.9*

Formally derivation of the cost function can be set up as a problem of minimisation of cost subject to the production function. With two factor inputs  $L$  and  $K$  with respective prices  $w$  and  $r$ , the cost equation becomes

$$C = wL + rK.$$

This is to be minimised subject to the production function

$$Q = F(L, K).$$

When the production function is given a specific form (say Cobb-Douglas or any other), the first order conditions for above optimisation

exercise give optimal L and K in terms of Q, w, r and the parameters of the production function. Substituting L and K by their optimal values in the cost equation, one can express C as a function of Q, w and r. By definition this indeed is the cost function.

**STOP TO CONSIDER :**

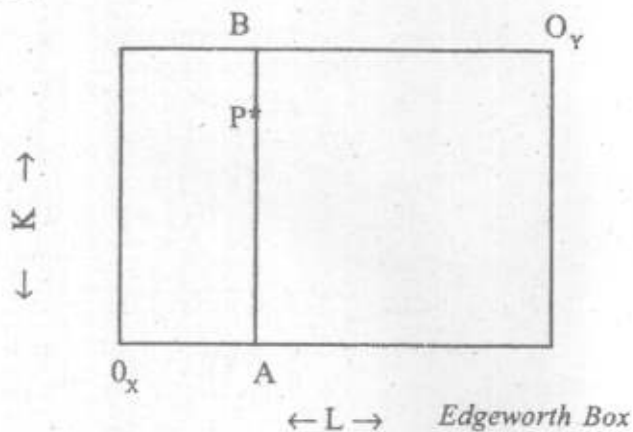
$C = f(Q)$  ceteris paribus i.e. cost is a function of output. 'ceteris paribus' implies that all other determinants of costs, i.e. production technology and the prices of factors, remain unchanged. If these factors change, the cost curve will shift upward or downward.

**1.11. Multi-Product Firm :**

When a firm produces more than one product, the products compete for the resources of the firm. A multi-product firm, therefore, has a problem of allocation of the resources at its disposal between the different lines of production. The allocation ultimately depends on the firm's decision regarding the combination in which the products are to be produced.

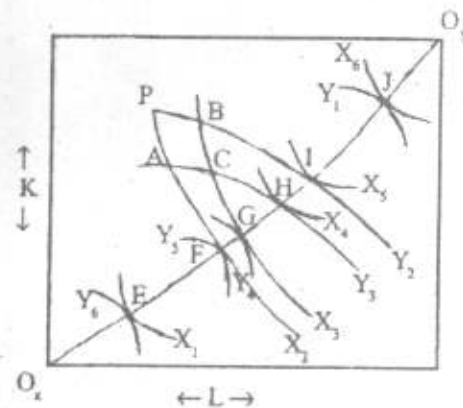
For the two products (X and Y) and two factors (L and K) case, the problem of allocation of resources of the firm can be geometrically presented with the help of the edgeworth box. The horizontal length of the box represents total availability of one factor (say L) and the height of the box shows the availability of the other factor (say K). The left hand lower corner serves as origin for one of the products (say X) and the right hand upper corner the origin for the other product (say Y).

Any point in the box now shows a particular allocation of the factors at the disposal of the firm between the production of the two products. For instance in Fig 1.10 the point P indicate the allocation of  $O_xA$  of L and AP of K to the production of X and  $O_yB$  of L and BP of K to the production of Y.



Edgeworth Box  
Fig. 1.10

Now as isoquants indicating different levels of production of X and Y are drawn in the edgeworth box, at some point the isoquants of X and Y will be tangents and at other points they will be intersecting. The points of tangency of isoquants of X and Y form what is known as the contract curve. Points on the contract curve represent efficient allocations in the sense that any reallocation cannot increase the production of one good without reducing the production of the other. Accordingly the contract curve is also called the production efficiency locus. In contrast, points not on the contract curve are inefficient allocations, as by altering such allocation it is possible to produce more of at least one of the goods without reducing the production of the other. For illustration let us take point P in Fig- 1.11 which is not on the contract curve and at which isoquants  $X_2$  and  $Y_2$  intersect. By changing the allocation P to A, B or C the firm can be on a higher isoquant of X or Y or both without having to be on a lower isoquant for either of the products. Thus, by reallocation from P it is possible to produce more of at least one of X or Y, without reducing the production of the other. No such gainful reallocation are possible from E, F, G, H, I and J which are on the contract curve. Hence all these points are efficient allocations.



*Fig : 1.11*

Corresponding to each efficient allocation, there is a combination of the products X and Y indicated by tangential isoquant at the allocation point. Representing these combinations in a X-Y plane we get what is called the production possibility frontier. The PPF shows the different combinations of X and Y that can be produced by efficiently utilising the resources of the firm. The frontier is negatively sloped indicating the obvious fact that with a given amount of resources more of one good can be produced only by reducing the production of the other. This is shown in fig. 1.12.

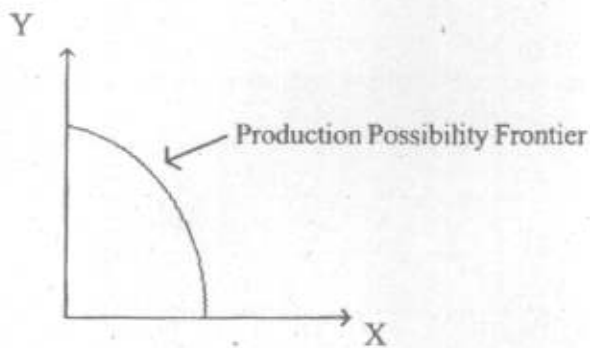


Fig : 1.12

The slope of the frontier represents the marginal rate of transformation i.e. the number of Y that has to be sacrificed to produce an additional unit of X. The concavity of the frontier to the origin indicates that the marginal rate of transformation increases as more and more X are produced.

From the alternative combinations of X and Y represented by the different points on the PPF, a profit maximising firm will choose to produce that combination which will yield maximum revenue. To identify this optimal combination, it is necessary to introduce the idea of iso-revenue line. An iso-revenue line is formed by all combinations of the products that yield the same amount of revenue under given prices of the products. Like the consumer's budget line or the firm's iso-cost line, the iso-revenue line is a downward sloping straight line with slope equal to the ratio of prices of the products. Moreover, a higher iso-revenue line represents a higher amount of revenue. The firm, therefore, will select that combination on the PPF which is on the highest iso-revenue line. This optimal combination happens to be the one at which the iso-revenue line is tangential to the PPF. (This is point E as shown in Fig. 1.13. All other points on the PPF are on lower iso-revenue lines indicating that they yield less revenue than the point E does.)

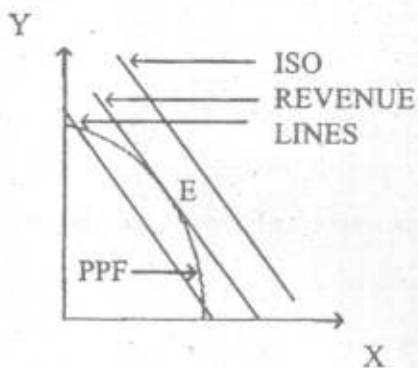


Fig : 1.13



At the optimal combination therefore, slope of the PPF is equal to that of the iso-revenue line. Hence the condition for choice of optimal product combination can be written as

$$MRT_{XY} = \frac{P_X}{P_Y}$$

where  $MRT_{XY}$  is the marginal rate of transformation of Y to X and  $P_X$  and  $P_Y$  are prices of X and Y respectively. Incidentally  $MRT_{XY}$  can also be expressed as the ratio of marginal costs of the two products. Hence alternatively the above condition can also be written as.

$$\frac{P_X}{P_Y} = \frac{MC_X}{MC_Y}$$

where  $MC_X$  and  $MC_Y$  are marginal cost of production of X and Y respectively.

### STOP TO CONSIDER

A multiproduct firm wants to maximize its profit given (i) the constraint set by the factors of productions, (ii) the transformation curve (or the PPF) and (iii) the prices of the commodities ( $P_X, P_Y$ ) and of the factors of production ( $w, r$ ).

Assuming the quantity of factors and their prices as given, maximization of  $\pi$  is achieved by maximizing the revenue, R.

Graphically the equilibrium of the firm is defined by the point of tangency of the given PPF and the highest isorevenue curve. At the point of tangency, the slopes of the isorevenue and the product-transformation curves are equal. Thus the condition for equilibrium is that these slopes be equal :

$$-\frac{dy}{dx} = \frac{MP_{LY}}{MP_{L,X}} = \frac{MP_{KY}}{MP_{K,X}} = \frac{P_X}{P_Y} \quad \left(-\frac{dy}{dx} = MRT_{XY}\right)$$

### CHECK YOUR PROGRESS :

1. Why is the production possibility frontier negatively sloped ?

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2. What does the slope of production possibility curve represent?

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3. What is an iso-revenue line ?

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4. What is a contract curve ?

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5. What is the equilibrium condition of a multiproduct firm ? Explain  
how a multi product firm attains equilibrium

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6. How will you derive cost function from a production function ?

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### 1.12 Summing Up :

A production function shows technical relationship between inputs and output. For a given state of technology it gives the maximum output that can be produced from any combination of inputs. The important concepts related to production function are average product, marginal product and elasticity of output. The average product of a factor represents the amount of output produced per unit of the factor concerned. The marginal product of a factor shows how output changes due to a small change in the factor concerned, keeping other factors constant. On the contrary, elasticity of output measures the extent to which output changes due to a change in factor used. In other words, it relates proportionate change in output to proportionate change in a factor.

An isoquant is the locus of combination of two factors which give the same level of output. The shape of the isoquant depends on the degree of substitutability between factors. Conventionally the isoquants are assumed to be negatively sloped and convex to the origin. However, in the extreme case of perfect substitutability between factors, the isoquant is a straight line. In the other case of zero substitutability i.e. complementaries between factors, the isoquant has a right angled shape. The slope of an isoquant is called the marginal rate of technical substitution (MRTS). As a measure of substitutability among factors, MRTS suffers from a serious drawback that it is affected by the units in which the factors are measured. Therefore, an alternative indicator of substitutability which is free from this drawback is given by elasticity of substitution.

In the short run, it is not possible to change all the factors of production. We can change only one or two factors. The returns to a factor shows how output changes when one factor is changed keeping all other factors constant. On the other hand, in the long run we have sufficient time to change all the factors of production. The returns to scale show how output changes when all the factors are changed in the same proportion.

Technical progress has an important role in production. This makes it possible to increase the volume of production with the same amount of resource or produce the same level of output with a less amount of resources. Depending on the nature of impact on the productivity of factors, technical progress is classified into neutral and non-neutral technical progress.

Cobb-Douglas production function is a popular form of production function. However, an important limitation of this production function is that the elasticity of substitution is always unity. The constant elasticity of substitution (CES) production function is free from this limitation. Both Cobb-Douglas and CES production function give downward sloping convex isoquants indicating smooth and continuous substitutability between factors. However, when factors of production are perfect complementaries to each other, we get a production function of fixed coefficient type. In such a case the isoquant has a right angled shape.

A firm attains best cost combination of inputs where an iso-revenue line is tangent to the isoquant which implies that the marginal rate of technical substitution between factors is equal to the factor price ratio. A multi-product firm produces more than one product. Therefore it has the problem of allocation of resources at its disposal between various lines of production. A multi-product firm attains equilibrium where the iso-revenue line is tangent to the production possibility frontier. It implies that the marginal rate of transformation between two products has to be equal to their price ratio.

### 1.13 Glossary:

**Production function:** A technical relationship between inputs and output.

**Average product :** Output per unit of a factor used. It is obtained by dividing output by the amount of input used.

**Marginal product :** The change in output produced resulting from a small change in a factor keeping the other factors constant.

**Elasticity of output :** The ratio of proportionate change in output to a proportionate change in a factor keeping the other factors constant.

**Isoquant :** A locus of various combinations of two inputs that yield the same level of output.

**Marginal Rate of Technical Substitution (MRTS) :** The rate at which one factor can be substituted for another while keeping the output level constant. In other words,  $MRTS_{LK}$  is defined as the amount of capital that has to be sacrificed to have an additional unit of labor in the production process to keep the output level constant.

**Elasticity of substitution :** It is a measure of responsiveness of factor ratio to change in marginal rate of technical substitution (MRTS) between factors (or their price ratios). It is defined as the ratio of proportionate change in factor ratio to a proportionate change in MRTS between the factors.

**Returns to scale :** It refers to the change in output when all factors are changed in the same proportion.

**Returns to factor :** It refers to the change in output when only one factor is changed keeping the other factors constant.

**Neutral technical progress :** Technical progress is said to be neutral when for a given factor ratio it raises the marginal productivity of all factors

in the same proportion. This is called Hicksian neutral technical progress.

**Non-neutral technical progress :** Technical progress is said to be non-neutral when for a given factor ratio it raises marginal productivity of factors in different proportions. Thus it induces relatively greater use of the factor whose productivity increases at a higher rate than those of the other factors.

**Homogeneous production function :** Production function is said to be homogeneous of degree  $\theta$  if when all the factors are increased by  $n$  times output increases by  $n^\theta$  times.

**Expansion path :** A line joining various points of least cost factor combination as a firm expands its output.

**Multi-product firm :** A firm which produces more than one output.

**Contract curve :** The locus of the points of tangency between the isoquants (or indifference curves) of two products (or consumers) corresponding to which marginal rate of technical substitution (or marginal rate of substitution) is equal.

**Production possibility frontier :** A curve which represents various production possibilities of two products that can be obtained by using a given amount of resource and technology.

**Marginal rate of transformation (MRT):** The rate at which one product can be transformed into another. In other words, MRT is defined as amount of one product that has to be surrendered to produce an additional unit of the other product.

#### 1.14 Reference & Suggested Readings :

1. Maddala, G.S. and Ellen Miller (2004), "Microeconomics- Theory and Applications," Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. Koutsoyiannis, A (1979), "Microeconomics," Macmillan Press London.
3. Henderson, J.M. and R.E. Quandt (1980), "Microeconomic Theory: A Mathematical Approach", McGraw Hill, New Delhi.
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5. Sen, Anindya (1999), "Microeconomics, Theory and Applications" Oxford University Press.



## UNIT-2

### MARKET STRUCTURE AND PRICING OF PRODUCTS

#### STRUCTURE :

- 2.0 Introduction
- 2.1 Objectives
- 2.2 Market-Meaning
- 2.3 Perfect Competition
- 2.4 Monopoly and its Regulation
- 2.5 Monopolistic Competition
- 2.6 Duopoly Model of Cournot
- 2.7 Duopoly Model of Bertrand
- 2.8 Duopoly Model of Stackelberg
- 2.9 Kinked Demand Curve Model of Oligopoly
- 2.10 Collusive Oligopoly
- 2.11 Price Leadership Models
- 2.12 Cartels
- 2.13 Summing Up
- 2.14 Glossary
- 2.15 References & Suggested readings.

#### 2.0. INTRODUCTION :

Market is the system through which buyers and sellers come to a negotiation and set a definite price for a product or service and then it is exchanged between them at the agreed price. The concept of market is so important in Economics that it finds place in all the Microeconomics syllabus. In this unit, concept of different market forms and determination of equilibrium price-output combination in some important markets have been discussed.



## 2.1 OBJECTIVES :

In this unit, attempt has been made to—

- give you an idea of different market structures,
- analyse price output determination in perfect competition, monopoly and monopolistic competition,
- discuss duopoly models of Cournot, Bertrand and Stackelberg,
- provide the concepts of collusive and non-collusive oligopoly.

## 2.2 MARKET— MEANING :

In Economics, market has a specific connotation. It refers to the system through which buyers and sellers come to a contract and buy and sell a commodity at an agreed price. Market, thus, does not require a particular place or locality where purchase and sale of a commodity can take place. What is needed for the market to exist is a close communication between the buyers and sellers through personal contact, telephone, telegram or other electronic devices so that they can come to a contract to buy and sell a product at an agreed price.

On the basis of the characteristics present in different markets, they can be classified into different categories. Generally, markets are classified into two main forms— (i) perfect competition and (ii) imperfect competition.

In perfectly competitive markets, there is large number of firms or producers producing a homogeneous product. An individual producer can produce a very negligible part of the total industry output and therefore, cannot influence upon the prevailing price for the homogeneous product.

On the other hand, in imperfectly competitive markets, producers have significant control over the price of their products depending upon the degree of imperfection. Firms under these types of markets exercise control over the price due to either fewness of firms or differentiated products. Imperfectly competitive markets can take different forms such as monopoly, monopolistic competition, oligopoly, duopoly, monopsony, etc. In monopoly, only one firm controls the entire supply of a product or service in the market, while in case of duopoly, there are two firms in the market supplying a product. In monopolistic competition, number of firms is large but they produce differentiated

products. Existence of a few firms is the basic characteristic of oligopoly while the main feature of monopsony is the existence of only one buyer. In the following, price and output determination in perfect competition and some forms of imperfectly competitive markets have been discussed.

### 2.3 PERFECT COMPETITION :

Perfect competition refers to a market form where there are many buyers and sellers of a homogeneous product, each too insignificant to affect the price. An individual producer produces a very negligible portion of the total industry output. The main characteristics of perfectly competitive markets are—

- (1) Large number of buyers and sellers or firms.
- (2) Each firm produces a homogeneous product.
- (3) Factors of production are perfectly mobile (they can move at zero cost) among various industries and locations within the market.
- (4) Buyers and sellers have complete and perfect knowledge of market conditions.
- (5) Firms are free to enter into or exit from the industry.

#### *Short-run Equilibrium of Firm and Industry :*

Short run is a period when firms can adjust supply to changed market demand only by changing the amount of the variable factors like raw materials, daily labourers, etc. Again, in such a period, entry of new firms or exit of existing firms from the industry is not possible.

We know that under perfect competition, individual firm cannot impact upon the price and therefore, the existing price is accepted by each firm as given at which they can produce and sell any quantity. As a result, the demand curve or the average revenue curve faced by the firms is a horizontal straight line (i.e., perfectly elastic) at the existing price as shown in the diagram below. Since the firms have to sell every additional unit of the product at the same price, the marginal revenue curve (MR) coincides with the average revenue curve as shown in the diagram 2.1. Generally, marginal cost and average cost curves are U-shaped.

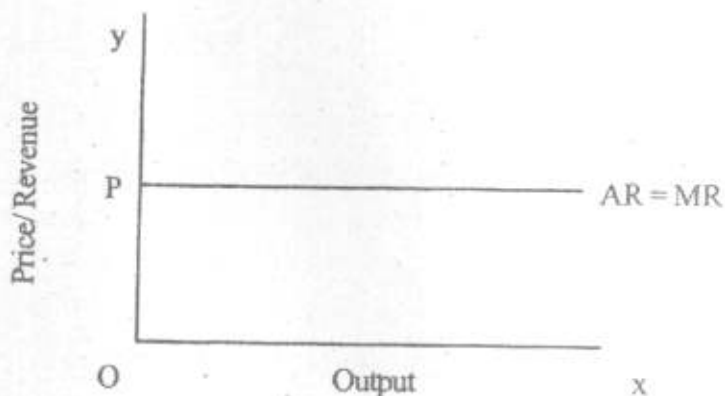


Fig. 2.1

In the figures 2.2 (a) and 2.2 (b), equilibrium price determination of short-run firm and industry is explained—

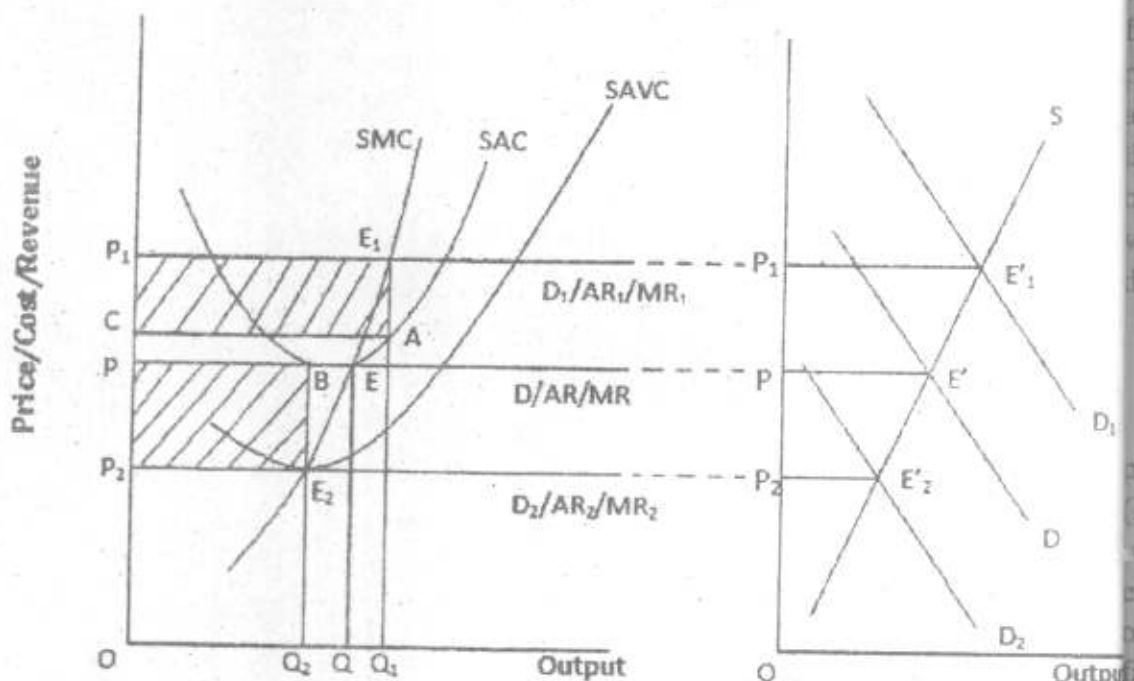


Fig. 2.2 (a)

Fig. 2.2 (b)

In figure 2.2 (a), short-run equilibrium of an individual firm and in figure 2.2 (b), that of an industry are shown. The industry demand curves are derived by summing up horizontally all the demand curves of individual consumers of a product. Similarly, supply curve of the industry (S) is obtained by horizontal summation of short-run supply curves of all individual firms in the industry. The short-run supply curve of the firm is the rising portion of its marginal cost curve above the average variable cost. At price OP, short-run demand and supply curves intersect at point E' which is the point of industry equilibrium. The individual firm will take the price OP as given and attain equilibrium

at E where its marginal cost equals marginal revenue in figure 2.2(a) ( $SMC=AR=MR$ ). The firm earns only normal profit at E since price equals short-run average cost at that point ( $OP=SAC$ ).

If demand increases in the market, industry demand curve shifts to  $D_1$ . This new demand curve intersects industry supply curve at  $E_1'$  which will be the new equilibrium point of the industry. Price will rise to  $OP_1$ . In such a situation, the firm will attain equilibrium at  $E_1$  where  $SMC$  is equal to  $MR_1$ . Since price  $OP_1$  is greater than the firm's average cost, it will earn super-normal profit upto the extent of  $E_1A$  per unit of output and the total amount of supernormal profit will be equal to the shaded area  $P_1E_1AC$ .

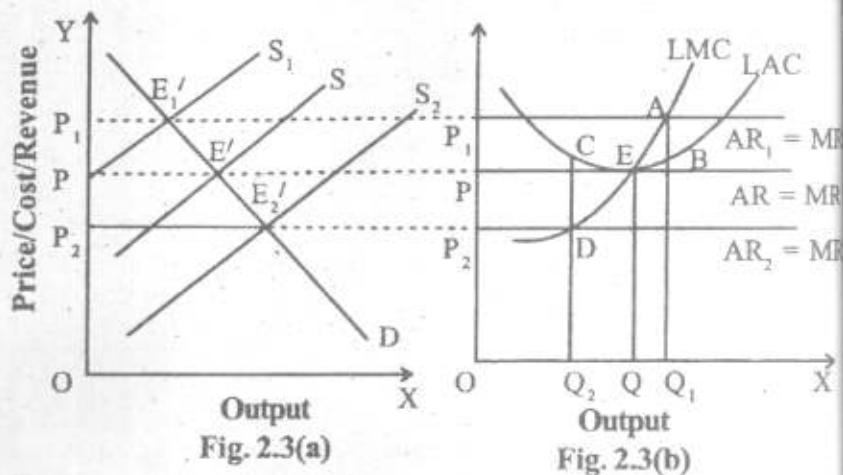
Similarly, if industry demand decreases to  $D_2$ , the industry will be in equilibrium at  $E_2'$  where equilibrium price is determined at  $OP_2$ . In figure 2.2(a), the individual firm will be in equilibrium at  $E_2$  at the same price. Since price  $OP_2$  is lower than average cost  $SAC$ , the firm faces a loss of  $BE_2$  per unit of output. However, the price  $OP_2$  is equal to the firm's average variable cost ( $OP_2=SAVC$ ). Therefore, the firm will continue its production with losses. But if price falls below average variable cost, it will close down its business.  $OP_2$  is, thus, the shut-down price.

#### *Long-run Equilibrium of Firm and Industry :*

In the long-run, firms can adjust their plant capacity so as to produce at the minimum point of their long-run average cost curve ( $LAC$ ). The firms earn only normal profit that is included in their long-run average cost of production. If, in the short-run, they are making excess profits, new firms will be attracted to the industry. With entry of new firms in the long-run, industry supply will increase leading to fall in price. This wipes out super-normal profits enjoyed by the firms in the short-run. Again, if firms face losses, those who are unable to bear such losses will leave the industry in the long-run. Industry output will decrease and price will increase eliminating short-run losses of the remaining firms. Thus, in the long-run, all firms earn normal profits at the long-run equilibrium price which is popularly known as the normal price. At such an equilibrium position, firm's marginal cost, marginal revenue, price and average cost are all equal, i.e.,  $LMC=MR=LAC=P$ . The long-run equilibrium of firm and industry under perfect competition can be explained with the help of the following figures—

In figure 2.3(a), industry equilibrium and in figure 2.3(b), firm equilibrium are shown. The industry is in long-run equilibrium when a price is reached at which all firms are in equilibrium. There should not

be any further entry or exit of firms in the industry. Such a point industry equilibrium is  $E'$  in figure 2.3(a) where industry demand curve ( $D$ ) intersects industry supply curve ( $S$ ) and  $OP$  equilibrium price determined. The firm is in equilibrium at point  $E$  in figure 2.3(b) at the same price  $OP$ . It is evident from figure 2.3(b) that  $E$  is the minimum point of the long-run average cost curve. Thus, long-run equilibrium of the firm is achieved at the minimum point of  $LAC$  where the firm earns only normal profit (because  $OP=LAC$ ). If short-run price is  $OP_1$ , the firm is making  $AB$  supernormal profits per unit of output. Attracted by this profit, new firms would enter into the industry. Industry supply curve will shift from  $S_1$  to  $S$  and price will be reduced to  $OP$  for  $OQ$  quantity.



On the other hand, if short-run price is  $OP_2$ , firm will incur  $CD$  loss per unit. Some firms being unable to bear this loss will leave the industry leading to a shift in the industry supply curve from  $S_2$  to  $S$ . As a result, price will rise from  $OP_2$  to  $OP$  and equilibrium is re-established at point  $E$ .

Thus, long-run equilibrium is achieved at the minimum point of the  $LAC$  when  $LMC=MR=LAC=AR=P$ . At this point, charging the normal price  $OP$ , all firms earn normal profit.

### STOP TO CONSIDER

**The Long run Industry supply curve under Perfect Competition in different cost conditions :**

**Constant cost Industry :** Cost of production is mainly affected by changes in factor price. When the changes in demand for factors of productions from the producers are too insignificant to affect the factor prices, then we call it a constant cost industry. The cost curves of the individual firms will not shift with an attempt to increase output. And hence the long run supply curve for the industry is horizontal.



**Increasing cost industry :** In increasing cost industry the attempt to increase industry output leads to an increase in factory prices and this shifts up the cost curves of the firms. The firms are said to suffer from 'pecuniary diseconomies' and the long run industry supply curve is upward sloping, in contrast to constant cost industries.

**Decreasing cost industries :** There are certain cases when the prices of inputs fall with an increase in industry output. This might happen when the inputs are manufactured using technologies enjoying substantial economies of scale. The firms enjoy the benefits of 'pecuniary economies' and the long run industry supply curve is a downward sloping curve.

**SELF-ASKING QUESTION :**

Analyse the dynamic changes that may affect the equilibrium of a perfectly competitive industry.

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**2.4 MONOPOLY AND ITS REGULATION :**

**Monopoly :**

Monopoly is said to prevail when only one seller or producer sells or produces a product having no close substitute. The single seller or producer controls the entire supply of the product in the market. He faces no competition in the market since his product has no close substitute. There are strong barriers to the entry of other firms into the monopoly market of one producer.

In monopoly, there is only one producer constituting the whole industry. The producer faces the entire demand for its product. The demand curve of the monopolist is a downward sloping curve. If he wants to increase his sales, he must lower the price of his product. The demand curve of the monopolist is also his average revenue curve. Thus, the average revenue curve slopes downward and the marginal revenue curve lies below the average revenue curve as shown in figure 2.4 below. This is because the monopolist has to reduce price to sell additional units of his product. Marginal revenue will, thus, be less than the price. A monopolist is a price-maker who can set the price for his product to his maximum advantage. But the monopolist sets neither a very high price nor a very low price. He sets the price so as to earn maximum profit.



### Price-output Equilibrium :

The monopolist always tries to maximize his profits. He goes producing additional units of his product until his marginal cost production becomes equal to marginal revenue. His profit will maximum at the point where marginal cost equals marginal revenue and that will thus be the point of equilibrium. Figure 2.5 illustrates the determination of price-output equilibrium under monopoly—

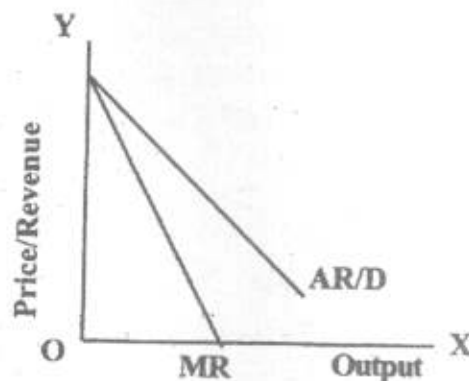


Fig.2.4

In figure 2.5, marginal revenue and marginal cost of the monopolist become equal at point E. Thus, E is the point of equilibrium where the monopolist produces and sells OQ amount of output at OQ price. Any output less than OQ adds more to revenue than to cost. So, the monopolist produces additional units. But production beyond OQ adds more to cost than to revenue. The monopolist, therefore, will not produce more than OQ. At OQ output, MC is equal to MR and profit earned by the monopolist is the maximum at this output level. Since, equilibrium price OP is higher than average cost of production, he earns MN supernormal profit per unit of output and the total amount of supernormal profit is represented by the area PMNS.

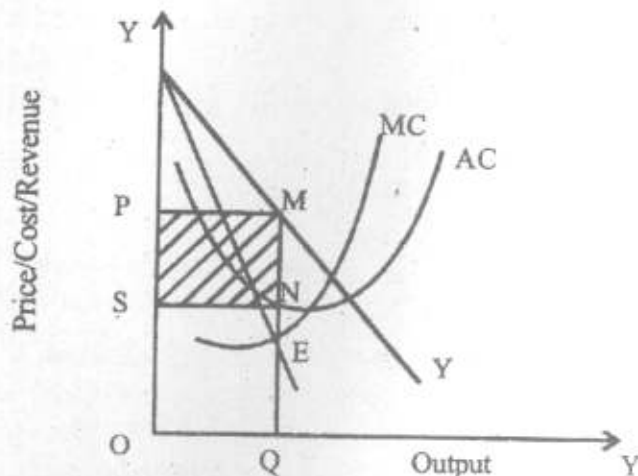


Fig. 2.5

## STOP TO CONSIDER

**The shutdown condition :** A monopolist will shut down production if the demand curve everywhere lies below the short run average cost curve. The price will be always below average cost and the monopolist will sustain losses on account of variable cost in addition to the fixed cost if he continues to produce. So he will stop producing.

### *Price Discriminating Monopoly :*

Price discrimination is said to exist when the same product is sold at different prices to different buyers or in different markets. Monopolists discriminate prices to raise total revenue and profits. The necessary conditions for successful implementation of price discrimination are—

i) The entire market of the monopolist should be divided into sub-markets with different price elasticities.

ii) The total market should be so divided that nobody can buy the product at a low-price market and resell it at a high-price market.

The degree of price discrimination may vary according to the pricing behaviour of the monopolist. Prof. Pigou discussed various degrees of price discrimination depending on the limit to which a monopolist can charge different prices for his product.

### *First Degree Price Discrimination :*

In the first degree price discrimination, the monopolist sells each unit of his product at the highest price each consumer is willing to pay (the reservation price) and extracts the entire consumers' surplus. The monopolist is assumed to know the maximum amount of money each consumer is willing to pay for a definite quantity. He then sets his price upto the extent what the consumers are willing to pay and thus extracts the whole consumers surplus from each consumer. Thus the MR curve for the monopolist becomes the demand curve. In this case, the equilibrium level of output, which is given by the intersection of demand curve and MC curve, is the same as the output under perfect competition.

### *Second Degree Price Discrimination :*

In this price discrimination, the monopolist sets different prices for different ranges or groups of output to different consumers but is unable to extract the entire consumer's surplus. In second degree price

discrimination, he extracts only a portion of the entire consumer's surplus. There are many examples of second-degree price discrimination. In the pricing of electricity, natural gas, or telephone calls, a 'declining block price' is used. For instance, the first 200 kwh of electricity or 1,000 ft of natural gas or 3 minutes of a long distance call might cost a certain amount, but for subsequent units price is lower. Magazine subscriptions also frequently cost a certain amount for a one year subscription but a lower average for a two-year subscription and a still lower average for a three year subscription.

### *Third Degree Price Discrimination :*

Third degree price discrimination occurs when the monopolist partitions market demand into two or more groups of customers and then charges different prices to the different groups (the price is uniform for members within a group). Basically the monopolist tries to exploit the different price elasticities of demand for the different groups. Third-degree discrimination is profitable only if the customer groups that can be separated have different elasticities of demand. Example of third degree discrimination includes special prices offered to students or pensioners etc. Here, also the monopolist is able to extract only a part of consumer's surplus.

A monopolist applies price discrimination in order to earn the highest possible profit. He maximises profits by selling that quantity where his marginal cost equals marginal revenue. We can explain third degree price discrimination with the assumption that the monopolist divides his entire market into two sub-markets— market 1 and market 2 where he sells his product. It is also assumed that price elasticity of demand is higher in market 1 than in market 2. Therefore, average revenue curve of market 1 ( $AR_1$ ) is more price elastic than the average revenue curve of market 2 ( $AR_2$ ) as depicted in the figures.  $MR_1$  and  $MR_2$  are the corresponding marginal revenue curves in market 1 and 2 respectively.  $CMR$  is the aggregate marginal revenue curve which is the horizontal summation of the marginal revenue curves  $MR_1$  and  $MR_2$ .  $MC$  is the marginal cost curve of the monopolist.

Now, the monopolist has to determine his total output that should be divided in the two sub-markets. Again, he has to determine the prices at which the products are sold in the two sub-markets.

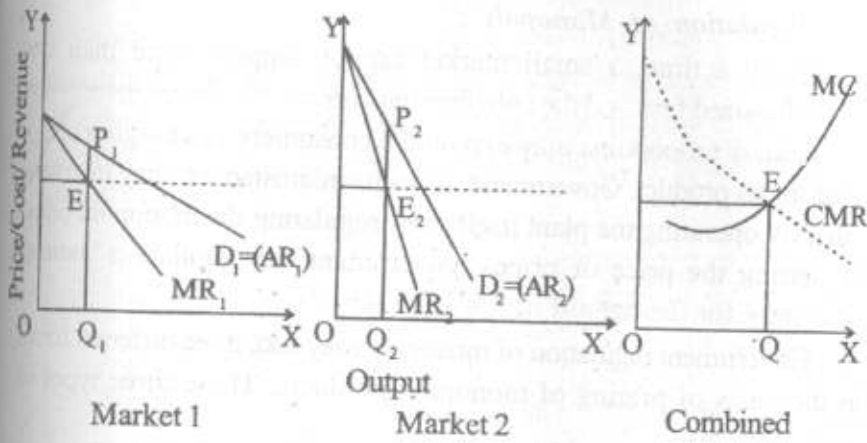


Fig. 2.6

The total quantity that the monopolist will produce is given at the intersection point of MC and the combined marginal revenue curve CMR. In the combined market diagram, these two curves intersect at point E where the monopolist produces OQ output. This is the profit maximising total output that has to be divided between the two sub-markets. Total profit is maximised when the monopolist equates the common MC to the individual revenues in the two markets, i.e.,  $MC=MR_1=MR_2$ . Therefore, he allocates OQ output in the sub-markets in such a way that the marginal revenues in both markets are equal to marginal cost EQ. He will sell  $OQ_1$  at market 1 and  $OQ_2$  at market 2 since at these output levels marginal revenues in the two markets are equal to the marginal cost ( $E_1Q_1=E_2Q_2=EQ$ ). Clearly,  $OQ=OQ_1+OQ_2$ . The monopolist charges  $P_1Q_1$  price for  $OQ_1$  output in market 1 and  $P_2Q_2$  price for  $OQ_2$  output in market 2. As seen in the figures,  $P_1Q_1 < P_2Q_2$  and  $OQ_1 > OQ_2$ . This indicates that the monopolist sells a larger quantity at lower price in the market where price elasticity of demand is more and a smaller quantity at higher price in the market where price elasticity of demand is less.

**SELF-ASKING QUESTION :**

Compare and contrast the situations of perfect competition and monopoly with appropriate figures and examples.

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### Regulation of Monopoly :

Many a time, a small market cannot support more than one optimally-sized firm and the only firm may become a 'natural' monopolist. But 'natural' monopolist may exploit the consumers by charging a high price for its product. Government, in such circumstances, may intervene either by operating the plant itself or by regulating the monopoly price. By setting the price or prices, government can regulate a 'natural' monopoly for the benefit of the consumers.

Government regulation of monopoly may take three different forms on the basis of pricing of monopoly products. These three types of regulation are—

- i) marginal cost pricing
- ii) average cost pricing
- iii) price discrimination.

In marginal cost pricing, the price will be set at the interaction point of marginal cost and average revenue curves. In the following figure, price may be set at point B where price equals MC. At B,  $OP_1$  price is set for  $OQ_1$  quantity.  $OP_1$  price is lower than monopoly price  $OP$  and  $OQ_1$  output is greater than monopoly output  $OQ$ .

In average cost pricing policy, government sets a price which is equal to the average cost of the monopolist. At point C in figure, price is equal to AC where  $OP_2$  price is set for a still higher output level  $OQ_2$ . The monopoly firm is allowed to attain a fair return on capital as normal profit in this pricing policy. But difficulties arise in determining the fair return on capital.

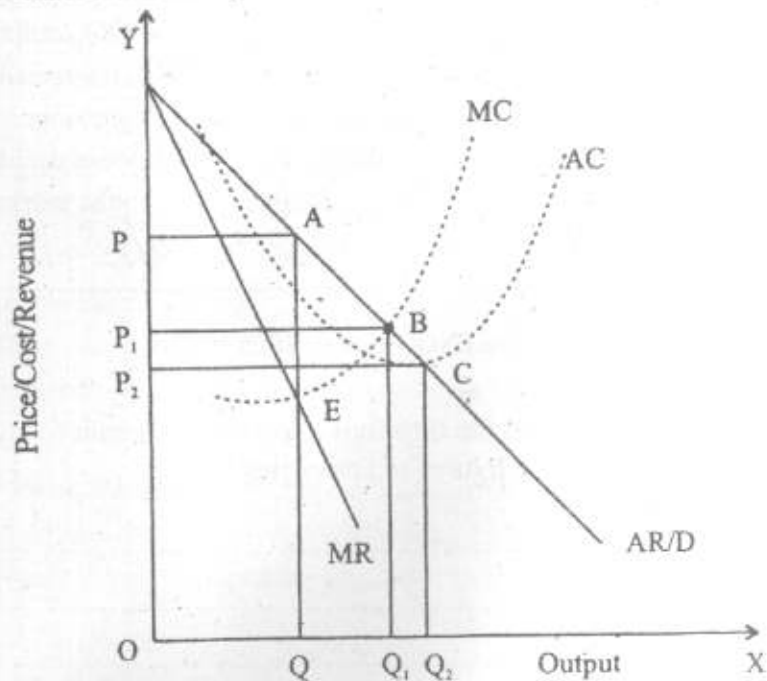


Fig. 2.7

The government may also apply a price discrimination policy. In this policy, the monopoly firm is allowed to discriminate prices among different markets. The output of the discriminating monopolist is generally larger than that of a non-discriminating monopolist. However, such price discrimination may create problems of inequity and mal-distribution of resources.

### STOP TO CONSIDER

#### Sources of Monopoly power :

We can identify five factors in general which enables a firms to become a monopoly.

**1. Control over critical inputs :** If in an industry, an input is critical in the production process, and one firm control the supply of the inputs, then that firm becomes a monopoly. Other firms can not enter the industry as they do not possess that particular input.

**2. Economies of scale and scope :** In the long run some firms may enjoy economics of scale as a result of which the LAC of that firm will be downward sloping, enabling the firm to produce each additional unit at lower cost. This makes it difficult for new entrants to complete with the existing low-cost producer. Similarly, existence of economies of scope (the benefits arising from productions of related goods or services) also enables a firm to produce more cost efficiently, making chances of competition from new entrants rare.

**3. Intellectual property right :** Intellectual property rights such as patents, copyrights etc. also creates monopolies. For instance, a developer of a new software can acquire monopoly rights over its use by getting it copyrighted.

**4. Regulation :** In industries where economics of scale and scopes are strong, a government may decide to allow only one or a few firms to be set up with the intention of achieving lower average cost in the industry. Thus, the firms which are allowed to continue production enjoy monopoly power resulted from government regulation.

**5. Entry Lags :** In industry like steel, there is a huge gestation lag between the time the work starts on plants and machinery and the time when production begins. These gestation lags prevent new firms from entering the industry.



**CHECK YOUR PROGRESS :**

1. Discuss the characteristics of perfect competition. How equilibrium price is determined under short run in perfect competition ?

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2. Define normal price. Explain why firms under perfect competition attain long run equilibrium when price equals average cost.

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3. Analyse the different types of regulation of monopoly.

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4. Explain how a monopolist divides his total output in different sub markets and discriminates prices.

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5. Discuss various degrees of monopoly price discrimination.

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## 2.5. MONOPOLISTIC COMPETITION :

The concept of monopolistic competition was developed simultaneously by Professor E.H. Chamberlin and Mrs. Joan Robinson in their books "The Theory of Monopolistic Competition" and "The Economics of Imperfect competition" respectively. Pure monopoly and pure competition are the two opposite extreme cases between which there may be a series of intermediate cases. These intermediate cases differ from one another in respect of the relative strengths of monopoly and competitive elements they possess. Monopolistic competition is one of such intermediate cases which is a mixture of pure competition and monopoly.

Monopolistic competition possesses the elements of both pure competition and monopoly because of the existence of differentiated products. The products of various firms in this type of market are not homogeneous but heterogeneous though they are close substitutes. These products are made slightly different so that they remain almost similar and serve as close substitutes of each other. Because of this differentiation among the products of various firms, each firm enjoys some degree of monopoly in its product market. Again large number of firms producing almost similar products face competition in the market since the products are close substitutes. Thus, monopolistic competition refers to a market with monopoly and competitive elements where there are a large number of producers of a differentiated product.

### SELF-ASKING QUESTION :

Describe how products can be differentiated in markets under monopolistic competition.

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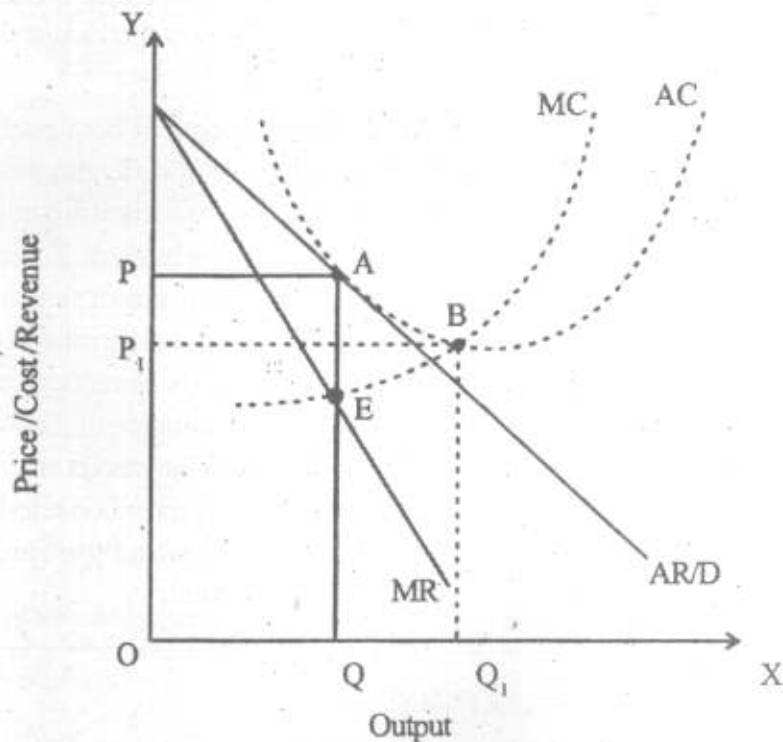
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**Price-output Equilibrium under Monopolistic Competition :**

We know that the products of monopolistic competitive markets are not homogeneous but heterogeneous. The firms producing such heterogeneous products cannot be brought under an industry like perfect competition. Therefore, Chamberlin used the term 'group' instead of 'industry'. Thus, a group refers to the collection of firms that produce close substitutes but not identical products. He analysed price-output equilibrium of such a group on the assumption that demand and cost conditions for all the products are uniform throughout the group. The following figure explains equilibrium of a group under monopolistic competition—



**Fig. 2.8**

In the figure, AR(=D) and MR are the average revenue and marginal revenue curves which are downward sloping. Each firm of the group tries to maximize profits by producing and selling the output at which

its marginal revenue becomes equal to marginal cost. MR is equal to MC at point E in the figure and thus E is the point of equilibrium. At E, equilibrium price OP is determined for OQ quantity. Since this price is equal to the average cost of production ( $OP=AC$ ), all firms are making only normal profits. However, individual firms may earn supernormal profits in the short run. This supernormal profit will attract new firms to the group. Market will be shared among more firms and demand or average revenue curve will shift downward until it becomes tangent to the average cost curve. Thus, supernormal profits will be wiped out in the long run. Similarly, if the firms suffer losses in the short run, some firms exit the group. Market will be shared among fewer firms as a result of which the average revenue curve shifts upward until it becomes tangent to the average cost curve. Thus in the long run, all firms within a group enjoy just normal profit like firms under perfect competition.

The important point to be noted here that the long run equilibrium price under monopolistic competition is higher and output is lower than those under perfect competition. This is because long run equilibrium of firms under perfect competition is attained at the minimum point of the average cost curve. On the other hand, Long run equilibrium of firms under monopolistic competition is attained at the falling portion of the average cost curve. In figure 2.8, firms under perfect competition would have produced  $OQ_1$  output charging  $OP_1$  price per unit at equilibrium.

#### STOP TO CONSIDER :

**Selling Cost :** An important concept of monopolistic competition is that of selling cost. Since the products under monopolistic competition are close substitutes to one another, it is essential for the monopolistic producer to present their own products as in distinguished form to attract the majority of the buyers in the market. For that, they incur some amount of selling cost in addition to the cost of production in the form of advertisement cost, cost of free delivery of products, cost of providing free goods along with the purchased products etc. For this, additional cost the average cost curve of the monopolistic firm shifts upward and incorporates both average production cost and average selling cost within it.

### SELF-ASKING QUESTION :

Make a comparison between equilibrium price-output combination under perfect competition and monopolistic competition.

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### 2.6 DUOPOLY MODEL OF COURNOT :

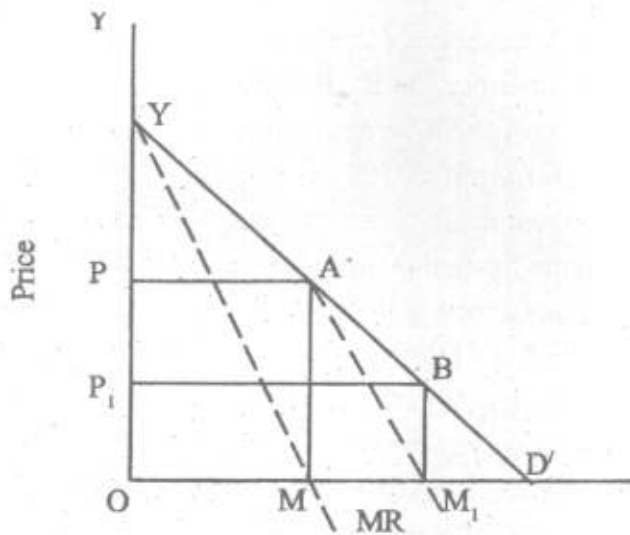
Duopoly is a limiting case of oligopoly where there are only two sellers of a product in the market. The main characteristic of this type of market is that each seller assumes certain reaction pattern of its rival competitor in each time and holds it continuously even if it is not adopted by the rival. Thus, firms behaviour is assumed to be at least naive.

Augustin Cournot, a French economist, developed the oldest model of duopoly in 1838. Cournot described his model by assuming two firms each owning a mineral well and the production cost of mineral water is zero. Each firm assumes that its rival firm will not change its output and decides own output from which it can earn maximum profit.

If firm A starts production, it will produce OM as shown in the figure below and sells at OP price since at this output level, its  $MC = MR = 0$  and thus earns maximum profit. Now, let firm B enter the market. It assumes that A will constantly produce OM output and thinks its own demand curve to be  $AD'$ . Therefore, firm B will produce half of  $MD'$ , i.e.,  $MM_1$  and sells at  $OP_1$  price. This is because at  $MM_1$  output level, firm B's  $MC=MR=0$  where it maximises profit. Thus, B produces half of the total market demand which is not supplied by firm A and therefore, its production is  $\frac{1}{4}=(\frac{1}{2} \cdot \frac{1}{2})$  of the total market.

Now, firm A assumes that B will keep its output constant and reacts by producing one-half of the market not supplied by B. Since B is producing  $\frac{1}{4}$ th of the market, A will now produce  $\frac{1}{2}(1-\frac{1}{4}) = \frac{3}{8}$  th of the total market. In this situation, B will again react by producing one-half of the total market not supplied by A with the assumption that A

will keep output constant i.e.  $\frac{1}{2} \left( 1 - \frac{3}{8} \right) = \frac{5}{16}$



Output  
Fig. 2.9

This action-reaction process will continue since no firm learn from its past experience that its rival firm will not hold output constant. An equilibrium will be achieved when each firm will produce  $1/3$ rd of the total market and together they supply  $2/3$ rd of it. Though each firm maximises profit, industry profit is not maximised. If the firms recognise their interdependence, they can act as monopolists and each can supply  $1/2$  of the total market.

Cournot's model assumes production cost to be zero but it is quite unrealistic. This model can be explained without this assumption through the 'reaction curves' approach. In the following, the procedure of derivation of reaction curves is explained and then Cournot's duopoly model is analysed in terms of reaction-curves approach.

#### *Derivation of Reaction Curves :*

Reaction curve of a firm can be derived from its isoprofit curves. An iso-profit curve of a firm represents different levels of output of the firm and its rivals which give the same profit to the firm. In figure 2.10,, an iso-profit curve of firm A ( $\pi_{A1}$ ) is drawn. At all the points of the  $\pi_{A1}$  curve, A's profit is the same. If firm B decides to produce  $OB_1$  output, firm A will produce either  $OA_1$ , or  $OA_2$  at point S or T to retain his profit on the curve  $\pi_{A1}$ . Generally, firm A will choose to produce a higher quantity and therefore, will produce  $OA_2$ . If firm B increases output to  $OB_2$ , A will reduce its output to  $OA_3$  to keep his profit at the same level. Thus, upto point e, with every increase



in B's output, A reduces its output level to keep profit constant. If firm B increases output beyond  $B_e$ , firm A cannot retain its profit on the  $\pi_{A1}$  curve. Its profit will be represented by a higher iso-profit curve showing a lower profit to firm A. Because, an iso-profit curve lying further from the quantity axis represents a lower level of profit. It is evident from the figure that the highest point of the iso-profit curve of firm A, i.e., point e represents the profit-maximising output of A given the output of B. Such highest points of successive iso-profit curves of firm A lie to the left of each other. If we combine the highest points of the iso-profit curves, we obtain firm A's reaction curve. Firm A's reaction curve is the locus of points of highest profits that A can attain given the rival firm B's output. This curve shows how firm A reacts to B's decision to produce a definite level of output and hence it is called reaction curve. Similarly, firm B's reaction curve is the locus of points of highest profits that B can achieve given the output of its rival A. In fig. 2.11(a) reaction curve of firm A and in fig. 2.11(b), reaction curve of firm B is shown.

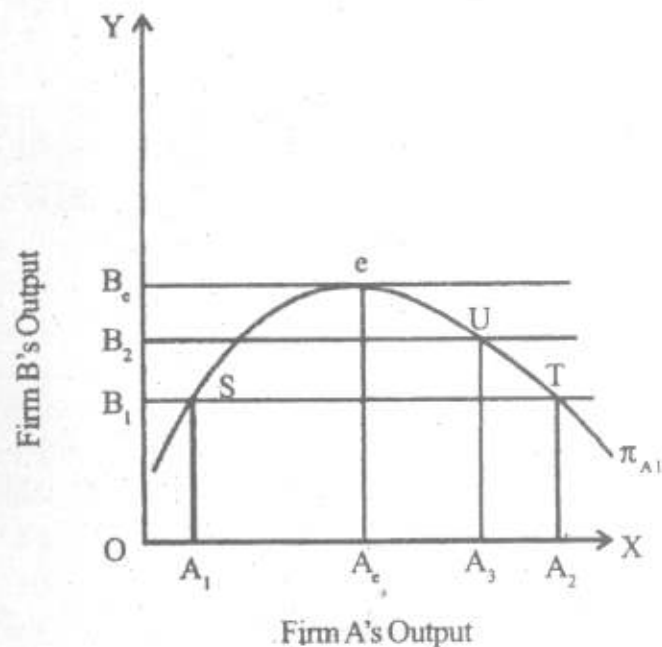


Fig. 2.10

B's iso-profit curves are concave to the OY axis. The highest points of B's iso-profit curves lie to the right of each other. Reaction curve of B can be obtained by joining such highest points of B's iso-profit curves.

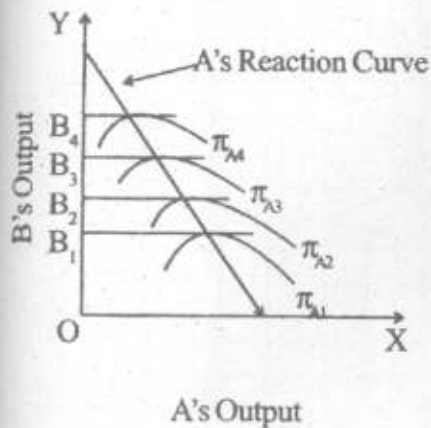


Fig. 2.11 (a)

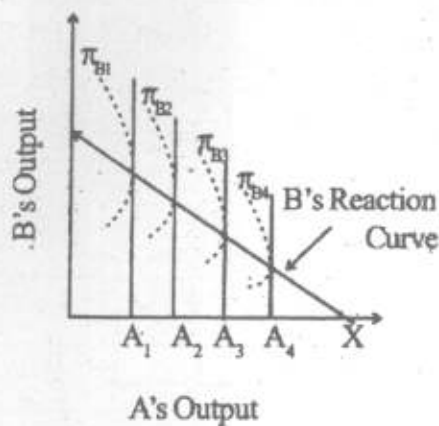


Fig. 2.11 (b)

**Cournot Model in Terms of Reaction Curves :**

Cournot's equilibrium is determined at the point where the reaction curves of firm A and B intersect. It is a stable equilibrium as shown in the following diagram—

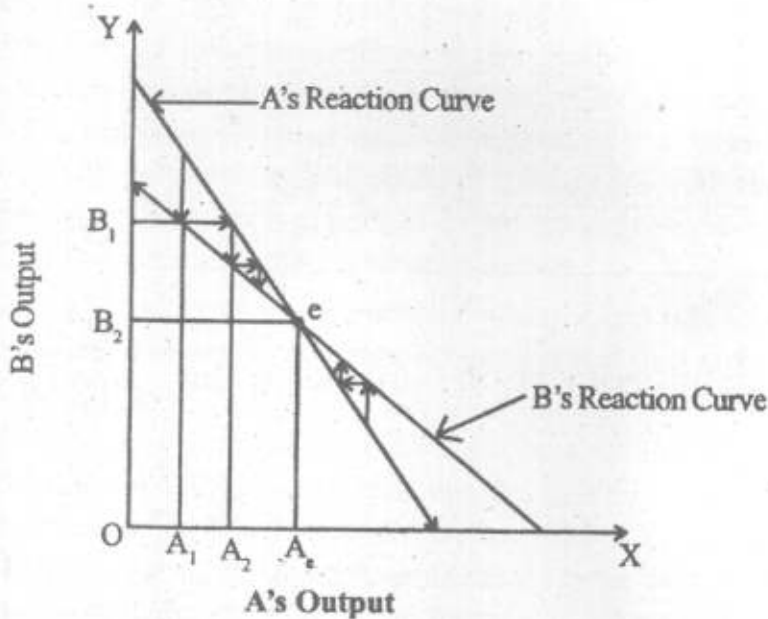


Fig. 2.12

If A produces a lower quantity  $OA_1$  than the equilibrium quantity  $OA_e$ , firm B reacts by producing  $OB_1$  with the assumption that A will not change its output. But A will react by producing a higher quantity  $OA_2$  on the assumption that B will retain output at  $OB_1$ . This action-reaction pattern will continue until point e is reached. If we start from the right of e, the same equilibrium is achieved at e. Therefore, e is a stable equilibrium point where each firm maximises profit but industry profit is not maximised.

### CHECK YOUR PROGRESS :

1. Explain the features which distinguish monopolistic competition from perfect competition and monopoly. Analyse the impact of these features on the price output equilibrium of a firm under monopolistic competition.

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2. Find out the situation where industry profit is maximised in Cournot's duopoly model.

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### 2.7 DUOPOLY MODEL OF BERTRAND :

Another duopoly model was developed by Bertrand in 1883. While Cournot's model assumes that each firm thinks rival's output to be constant, in Bertrand model, each firm believes that its rival firm will keep price constant. Each firm faces the same market demand and tries to maximise profit assuming competitors price to remain the same.

Bertrand's model can be explained with the help of reaction curves which are derived from convex iso-profit maps of the firm representing their profits at different price levels. Each iso-profit curve of firm A shows the same level of profit to the firm at different levels of prices charged by A and its rival B. The iso-profit curve of firm A is convex to its price axis as shown in the figure 2.13(a)—

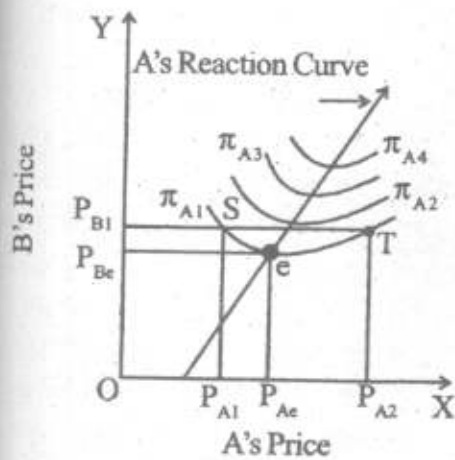


Fig. 2.13 (a)

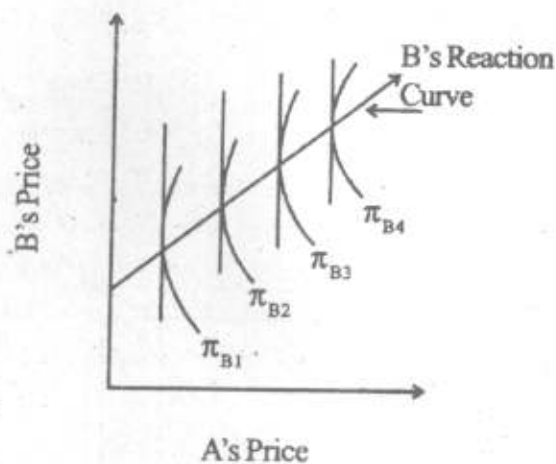


Fig. 2.13 (b)

In figure 2.13(a), if firm B charges  $OP_{B1}$  price, firm A will charge either  $OP_{A1}$  or  $OP_{A2}$  at points S or T. If firm B cuts price to  $OP_{Be}$ , firm A also reduces its price to  $OP_{Ac}$  to retain its profit on the same iso-profit curve  $\pi_{A1}$ . But if firm B cuts price below the point e, firm A will not be able to retain its profit on  $\pi_{A1}$  and will find itself on a lower iso-profit curve. A lower iso-profit curve represents a lower level of profit. Therefore, the profit maximising price of firm A lies at the minimum point of the highest attainable iso-profit curve given the price of its rival firm B. If we join such minimum points of different iso-profit curves representing different levels of profit at different prices charged by the two firms, we get the reaction function of firm A.

Similarly, we can obtain the reaction function of firm B by joining all the minimum points of successive iso-profit curves of B as shown in figure 2.13(b).

Bertrand showed that the duopolists will be in equilibrium at the intersection point of their reaction functions. In figure, equilibrium is achieved at e where firm A charges  $OP_{Ac}$  and firm B charges  $OP_{Be}$  price. Point e shows stable equilibrium because any deviation from it leads to re-establishment of the equilibrium at e. If, for example, firm A charges  $OP_{A1}$  price, firm B will charge  $OP_{B1}$  with the assumption that A will keep price constant. Firm A will react by charging a higher price  $OP_{A2}$  assuming B's price to remain at  $OP_{B1}$  level. Firm B will, again, react by increasing its price with the same assumption. Thus action-reaction process will continue until point e is reached.

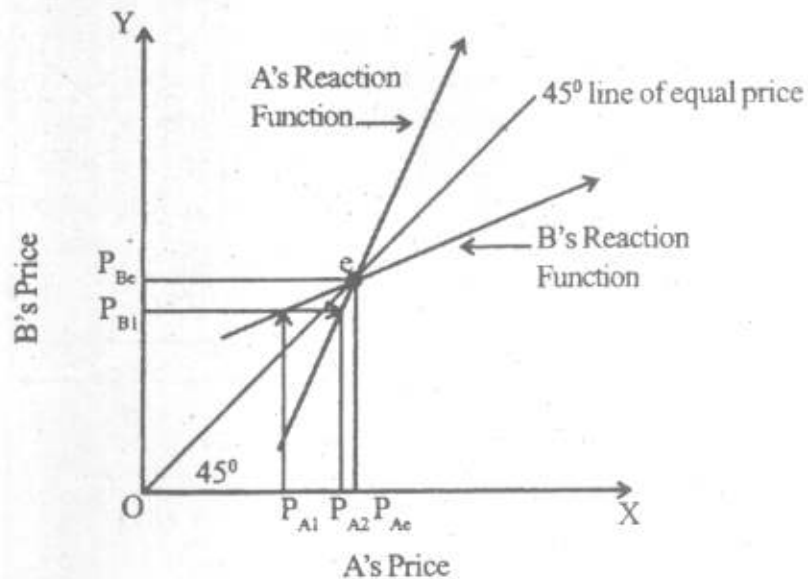


Fig. 2.14

Unlike Cournot's model, though individual firms attain highest profit, industry profit will not be the maximum in Bertrand model. This is because firms do not learn from past behaviour of their rival and continuously assume that the rival firm will keep price constant. Industry profit can be maximised if the firms recognise their interdependence and abandon action-reaction process as assumed in the model.

#### STOP TO CONSIDER :

The serious limitations of both the above models are of rivals, the failure to deal with entry; the failure to incorporate other variables in the model, such as advertising and other selling activities, location of the plant and changes in the product. Product differentiation and selling activities are the two main weapons on non price competition, which is a main form of competition in the real business world; both models do not define the length of the adjustment process. Although dealing in terms of 'time periods' their approach is basically static; both models assume that the market demand is known with accuracy; both are based on individual demand curves which are located by making the convenient assumption of constant reaction curves of the competing firms.

## 2.8 DUOPOLY MODEL OF STACKELBERG :

Another model of duopoly was propounded by Von Stackelberg. Stackelberg's model is an extension of Cournot's model. This model assumes one duopolist to be sophisticated who can recognise his rival's action based on Cournot's assumption that its rival firm will keep quantity constant. The sophisticated duopolist is assumed to be so efficient that he can correctly imagine his rival's reaction curve and determine his own profit function accordingly in order to maximise his profit like a monopolist.

In figure 2.15, iso-profit curves and reaction curves of two duopolists, firm A and firm B, are shown. Let A is the sophisticated firm who can accurately recognise firm B's reaction function. Firm A will fix that output level which maximises its own profit. In the figure, after recognising B's reaction function, firm A will choose to supply at point S that lies on the lowest possible iso-profit curve of A representing the maximum profit to A. At S, after incorporating B's reaction function, firm A supplies  $OM_A$  output and firm B reacts by supplying  $ON_B$  on its own reaction function assuming that A will keep output constant. Firm A gains more in this case since it acts like a monopolist and attains an iso-profit curve closer to his axis than the iso-profit curve it would have attained by acting on Cournot's assumption. Thus, sophistication is beneficial to firm A. However, firm B will be the loser as compared to Cournot's equilibrium because by supplying an output level as point S, it attains an iso-profit curve far away from its axis.

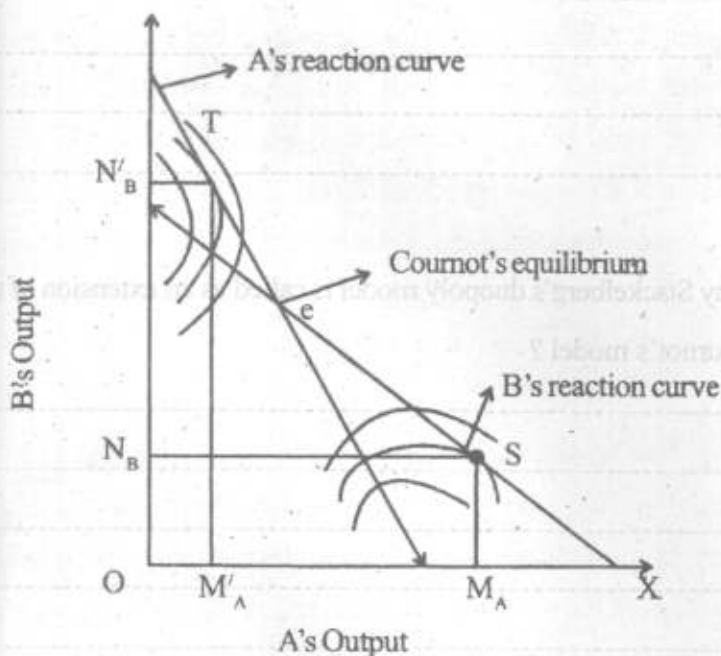


Fig. 2.15



Now, if we assume firm B to be the sophisticated leader, it will recognise firm A's reaction function and incorporate it into its own profit function. Then, it will choose to produce at point T on A's reaction function where it attains the lowest possible iso-profit curve and maximises profit by producing and supplying  $ON'_B$  output. Firm A, assuming B's supply to remain fixed, will supply  $OM'_A$  output. Thus, firm A becomes the naive follower. As compared to the Cournot equilibrium, B is the gainer while A is the loser.

It is evident that if one firm is sophisticated, it becomes the leader and the other firm emerges as the follower. In such a situation, a stable equilibrium is reached. But if both the firms are sophisticated, then both want to act as the leader. If this is the case, no stable equilibrium is reached. This situation is known as Stackelberg's disequilibrium which leads to either a price war between the duopolists or an agreement between them. If both the firms recognise their interdependence and come to an agreement abandoning their naive behaviour, both firms attain maximum profit.

#### CHECK YOUR PROGRESS :

1. Explain the process of attaining equilibrium under Stackelberg's

Duopoly model :

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2. Why Stackelberg's duopoly model is called as an extension of the Cournot's model ?

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## 2.9 KINKED DEMAND CURVE MODEL OF OLIGOPOLY:

Oligopoly is an important market form where there are a few firms or producers of a product in the market. Oligopoly is said to exist where two or more than two but not many firms are producing and selling a product. Competition prevails among the few firms for capturing more and more market share. Therefore, oligopoly is also termed as 'competition among the few'.

The main characteristic of oligopolistic firms is their interdependence on each other in decision-making. This is because, any change in the price-output combination of a firm has great impact on the other firms' price-output decision. Before taking any decision, a firm has to analyse the possible reactions of its rival firms.

Existence of advertising and other selling costs is another feature of oligopoly. Each firm has to spend adequate amount on advertising and other sale promotion activities to capture highest possible market share.

P. M. Sweezy, an American economist forwarded a model of oligopoly which is popularly known as the kinked demand curve model. According to this model, the demand curve faced by an oligopolist has a kink at the existing market price. This kink divides the demand into two segments. The segment above the existing price is highly elastic while the segment below the existing price is inelastic. This difference in price elasticities is created by different action-reaction behaviours of the few oligopolistic firms of a product. It is assumed by the kinky demand curve model that if an oligopolist increases the price of his product above the existing level, his competitors will not increase their prices. On the other hand, if the oligopolist reduces price below the existing level, his rival competitors will follow him by reducing their prices.

If the oligopolist reduces his price below the prevailing level, its competitors will feel that their customers will go away from them to the oligopolist with price cut. To retain their customers, competitor firms also reduce their prices. The increase in total market demand due to

price cut will be shared proportionately among all the firms. A firm cannot gain much market share by reducing price. Thus, a reduction in price below the prevailing level leads to a little increase in sales. Therefore, the demand curve below the existing price is less elastic.

On the other hand, if the oligopolist increases price above the existing level, its competitor firms will not increase their prices. Customer will go away from the oligopolist to other firms because of its higher price. Thus, increase in price above the prevailing level leads to heavy fall in sale and therefore, the demand curve above the prevailing price is highly elastic.

In Fig. 2.16,  $DD'$  is the demand curve faced by an oligopolist which has a kink at point A on the prevailing price  $OP$ . The portion  $DA$  of the demand curve above the prevailing price  $OP$  is highly elastic while the  $AD'$  portion below the  $OP$  existing price is inelastic.

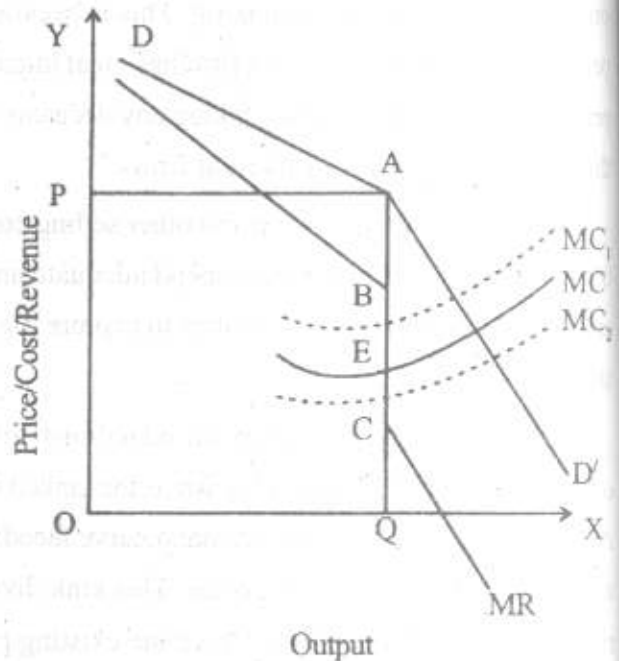


Fig. 2.16

Since an oligopolist confronting a kinked demand curve will not gain much market share by lowering price below the existing level and will suffer losses by raising price above the existing level, he finds no incentive to change his price. Thus, price become rigid. At the current price, profit maximizing output level of the oligopolist is determined. In the above figure,  $MR$  is the marginal revenue curve associated with the  $DD'$  demand curve. The  $MR$  curve has a discontinuous portion  $BC$  due to the kink of the  $DD'$  curve at  $A$ . The length of this discontinuous portion of the  $MR$  curve depends on the relative elasticities of the two

segments of the DD' curve. The discontinuity will be longer if the difference between the two elasticities is higher.

Now, if the marginal cost curve passes through the discontinuous portion of the MR curve, then the oligopolist will maximize profit by charging the existing price level. In the figure, MC passes through BC portion of MR. Equilibrium is achieved at point E which determines profit maximizing price at the existing price OP for OQ quantity. If there is any change in the cost, the price will remain stable so long as the marginal cost curve passes through the discontinuous portion of the MR curve. For instance, if MC shifts upward to  $MC_1$ , equilibrium price-output will remain the same. Thus, the oligopolist remains sticky to the prevailing price level. For any change in price to occur, the MC must cut MR curve outside the discontinuous portion.

#### **STOP TO CONSIDER :**

The kinked demand curve model does not explain price and output decisions of the firm. It says once price is determined, it remains rigid. But it does not explain how price is determined. The kinked demand curve can explain the 'stickiness' of prices in a situation of changing costs and of high rivalry. The kink is the consequence (manifestation) of the uncertainty of the oligopolists and of their expectations that competitors will match price cuts, but not price increases. However, it does not explain the level of the price at which kink will occur. Thus the kink-demand hypothesis is not a theory of pricing, but rather a fool for explaining why the price, once determined in one way or another, will tend to remain fixed.

#### **2.10 COLLUSIVE OLIGOPOLY :**

The interdependence among the firms in oligopolistic markets induce firms to enter into collusive arrangements. Firms enter into such agreements to avoid uncertainty that may arise from harmful reactions undertaken by rival firms. Collusion enables firms to behave

monopolistically and maximise profits by reducing competition among the few firms. Moreover, collusion among the existing firms restricts entry of new firms into the oligopolistic group.

Collusion among firms can be classified into two main types—cartels and price leadership. These two types of collusion imply tacit agreements among the firms since open agreement is considered to be illegal in most countries. In the following, a few price leadership models of collusive oligopoly are discussed.

## 2.11 PRICE LEADERSHIP MODELS :

Price leadership indicates a form of tacit collusion among oligopolistic firms where a firm emerges as the leader and sets its price-output combination which maximises profit. The other firms act as the followers and accept the leader's price though it may divert them from their profit-maximising position. The other firms follow the leader's price to avoid uncertainty that they may face otherwise.

The most popular price-leadership models are—

- (a) Price leadership by a low-cost firm.
- (b) Price leadership by a dominant firm
- (c) Barometric price leadership

In these traditional price leadership models, the leader sets his price on marginalistic rules, i.e., price is set at the intersection point of marginal cost and marginal revenue curves. The other firms act as price-takers and they may not maximise their profit at the price set by the leader. In the following, the traditional price leadership models are explained—

### *(a) Low-cost price Leadership Model :*

This model can be easily explained by assuming two firms— firm A and firm B in the market producing a homogeneous product at different costs. As depicted in the figure 2.17, firm A is the low-cost firm since its cost curves (i.e.,  $AC_A$  and  $MC_A$ ) lie below the cost curves of firm B (i.e.,  $AC_B$  and  $MC_B$ ).

Symbolically,  $AC_A < AC_B$  and  $MC_A < MC_B$ .



The firm A, being the lowcost firm, emerges as the leader and sets a lower price  $OP_A$  for  $OM_1$  output defined by the equality of its marginal cost and marginal revenue at point e ( $MC_A=MR_1$ ). The firm B will follow the price of the leader though it is not its profit maximising price. Firm B's profit maximising price defined by the condition  $MC_B=MR_2$  is  $OP_B$  for  $OM_B$  output. But it sets the leader's price  $OP_A$  and sells a higher quantity  $OM_2 (=OM_1)$ . The total quantity supplied by both the firms is  $OM (OM_1+OM_2)$ .

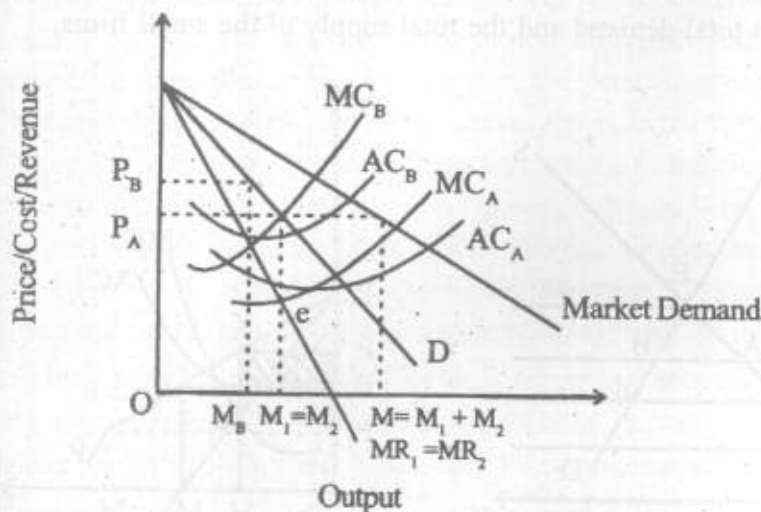


Fig. 2.17

It is noteworthy here that to maintain the price set by the leader, both the firms should come to an agreement to supply equal quantities (or unequal quantities according to the agreement). If the follower accepts the price of the leader but produces a lower quantity than the required level, then the leader will be forced to a profit non-maximising position. Thus, the follower in such a model is not a passive participant. There should be a share-of-the market agreement among the leader and the followers to maintain the leader's price in the market.

**SELF ASKING QUESTION**

Analyse a low-cost price leadership model where the leader and the follower share total market unequally.

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**(b) Dominant Firm Price Leadership Model :**

In this model, there is a large (dominant) firm with a significant share of the total market. The other smaller firms have lower market shares. The dominant firm is supposed to know the market demand as represented by the DD curve in figure 2.18(a) and the total supply (S) by the smaller firms at different prices. After observing the total supply by the small firms, the large firm supplies that quantity of the total market demand which is not supplied by the small firms. Thus the demand for the leader's product at each price will be the difference between total demand and the total supply of the small firms.

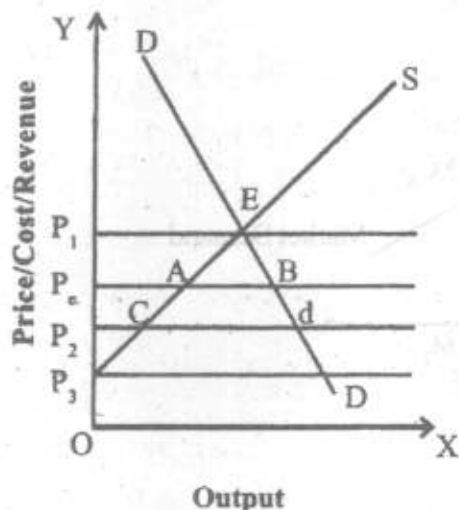


Fig. 2.18(a)

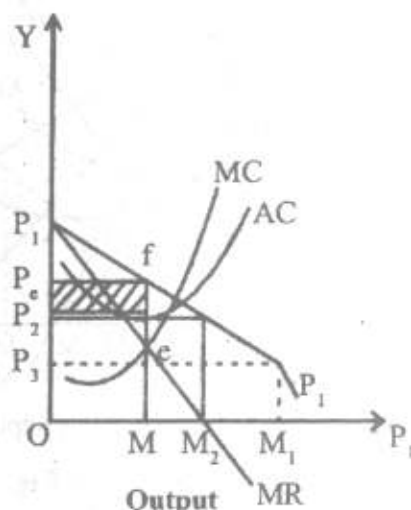


Fig. 2.18 (b)

In figure 2.18(a), at price  $OP_1$ , the total market demand is supplied by the smaller firms and hence the leader's supply is zero. At  $OP_2$  price, total demand is  $P_2d$  out of which  $P_2C$  is supplied by the smaller firms. Therefore, the leader will supply the remaining  $Cd (= OM_2)$  part. At  $OP_3$  price, supply of the smaller firms is zero and the leader, therefore, supplies the entire market demand i.e.  $P_3D (= OM_1)$ . It can be easily observed that as price falls, supply of the leader increases. Below price  $OP_3$ , the market demand coincides with the leader's demand curve  $d_L$ .

The dominant firm will set price  $OP_e$  which is given by the equating of its marginal cost (MC) and marginal revenue (MR) curves at point e in figure 2.18(b). At this price, the dominant or leader firm supplies  $OM$  quantity. At  $OP_e$  price, total market demand is  $P_eB$  as shown in figure 2.18(a). The part  $P_eA$  is supplied by the smaller firms and the remaining part  $AB (=OM)$  becomes the leader's supply.

In such a situation, the dominant firm maximises profits by equalising its marginal cost to marginal revenue. But the smaller firms which accept

the leader's price, may or may not maximise their profits. To retain the leader's maximum profit, there should be a sharing-the-market agreement among the leader and the smaller firms ensuring that the smaller firms will produce the right quantity. Otherwise, they may produce a smaller quantity than  $P_c A$  as shown in figure 2.18(a) and push the leader to a profit non-maximising position.

**(c) Barometric Price Leadership :**

In this price leadership model, all firms will follow the price of a firm which has emerged over time as the most reliable one. This firm is assumed to have adequate knowledge of the prevailing market situations and therefore, can accurately predict the changes that may occur in the future. Like a barometer, it can forecast the future changes in the market and change its pricing behaviour accordingly. Since this firm has good reputation of being an efficient forecaster of economic changes, the other firms in the industry follow the change in price of the barometric firm. Thus the barometric firm emerges as the leader.

It is important to note here that the leader firm may not be a low-cost or a dominant firm. The only requirement to be the leader is the established reputation of a good forecaster of economic environment.

Barometric price leadership may be established for various reasons. Firstly, rivalry between several large firms in an industry may make it impossible to accept one among them as leader. Secondly, followers avoid the continuous recalculation of costs, as economic conditions change. Thirdly, the barometric firm usually has proved itself as a 'reasonably' good forecaster of changes in cost and demand conditions in the particular industry and the economy as a whole, and by following it the other firms can be 'reasonably' sure that they choose the correct price policy.

**SELF ASKING QUESTION**

Do you think there is any point on which the three models of price leadership are similar? Also consider on what note do they vary from one another?

**2.12 Cartels :**

Cartels imply direct (although secret) agreement among the competing oligopolists with the aim of reducing the uncertainty arising from their natural interdependence. We will examine two typical forms of cartels here :

(a) Cartels aiming at joint profit maximization.

(b) Cartels aiming at the sharing of the market.

**(a) Cartels aiming at joint profit maximization :** Let us assume a homogeneous or pure oligopoly, where all firms produce a homogeneous product. Here, the firms appoint a central agency which decides four key things in the model :

(i) Total quantity of output to be produced

(ii) The profit maximizing price

(iii) Allocation of productions among the members of the cartel

(iv) Distribution of maximum profit among the members of the cartel. The process is explained with the help of figure 2.19

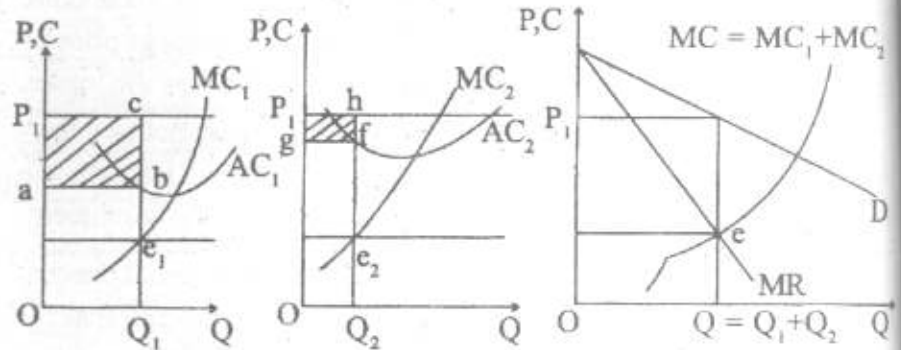


Fig. 2.19(a)

Fig. 2.19(b)

Fig. 2.19(c)

In fig. 2.19(c), the central agency, acting as a multi-plant monopolist, sets price determined by intersection of industry MR. and MC curves. MC is the horizontal summation of  $MC_1$  and  $MC_2$ . Given the market demand curve D in 2.19(c), e is the equilibrium point, OQ is the equilibrium quantity and OP, is the equilibrium price. Now the central agency equates the MR to individual MCs. Thus, firm A in fig. 2.19(a) will produce  $OQ_1$  and B in fig. 2.19(b) will produce  $OQ_2$ . Note, that the firm with lower cost produces larger output.

The total industry profit is the sum of the profits from the output of the two firms, denoted by the shaded areas of figures 2.19(a) and 2.19(b). The distribution of profits is decided by the central agency of the cartel.

**(b) Cartels aiming at sharing of the market :**

This again is classified into two sub-headings :

**(i) Non-price competition agreements :**

In this form of 'loose' cartel the member firms agree on a common price, at which each of them can sell any quantity demanded. The price is set by bargaining, with the low-cost firms pressing for a lower price and the high-cost firms for a high price, the agreed price must be such that as to allow some profit to all members. The firms agree not to sell at a price below the cartel price, but they are free to vary the style of their product and, or their selling activities to attain a higher share of the market. In other words, the firm competes on a non-price basis.

**(ii) Sharing of the market by agreements on quotas :**

The second method is the agreement on the quantities that each member may sell at the agreed price. If all firms have identical costs, the monopoly solution will emerge, with the market being shared equally among member firms. For example, if there are only two firms with identical costs, each firm will sell at the monopoly price, one-half of the total quantity demanded in the market at that price.

**CHECK YOUR PROGRESS**

1. Explain the rationale behind the kinked demand curve in Sweezy's model of oligopoly .

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2. Discuss the price leadership models found in oligopolistic markets .

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3. Discuss the Cartels in brief. What is the basic difference between Cartels and price leadership model ?

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### 2.12 SUMMING UP

As discussed in this unit, the system through which exchange of goods and services takes place among buyers and sellers at agreed price is called market. Markets can be classified into different forms. The market system where large number of buyers and sellers exchange a homogeneous product is known as perfect competition. In perfect competition, though super-normal profit, normal profit or losses may occur to the firms in the short-run, only normal profit occurs in the long-run. Monopoly is a form of imperfectly competitive markets where there is a single producer of a product. A monopolist maximises his profit by setting a price for his product at which his marginal revenue is equal to marginal cost. In some situations, the monopolist discriminates prices in different markets to extract a portion or whole of the consumers' surplus so that his profit will be the maximum. But government may regulate a monopoly market either by operating the monopoly plant itself or by setting the price for the monopolist in order to protect the consumers from excessive monopolistic exploitation. Another important form of imperfect competition is monopolistic competition where a large number of producers produce differentiated products.

In oligopoly markets, there are a few producers of a product. Duopoly is a limiting case of oligopoly where there are only two producers. The duopoly model developed by Cournot assumes that each firm acts on the assumption that its rival firm will keep output constant. On the other hand, Bertrand's duopoly model assumes each firm to act on the assumption that its rival firm will keep price constant. Again, Stackelberg's duopoly model assumes that one firm is sophisticated which can recognise its rival's actions. In all these models, though each individual firm maximises profit, industry profit is not maximised due to the naive behaviour of the firms which do not learn from past experience. According to the Sweezy's kinked demand curve model of oligopoly,



the demand curve of an oligopolist has a kink at the existing market price. Due to this kink, the marginal revenue curve has a discontinuous portion and the oligopolist maximises profit by charging the existing price so long as his marginal cost curve passes through the discontinuous portion of the marginal revenue curve.

Because of the interdependence of firms in oligopoly, firms often enter into tacit or open collusive agreements. An important tacit collusion among firms discussed in this unit is price leadership. There are various price leadership models where one firm emerges as the leader which sets the price and the other firms act as the followers and accept the leader's price. In low-cost price leadership model, the firm with the lowest cost of production becomes the leader while the large or dominant firm in the oligopolistic industry becomes the leader in the dominant firm price leadership model. But according to the barometric price leadership model, a firm with good reputation of an efficient forecaster of future economic changes is considered to be the leader. While Cartels imply direct agreements among the competing oligopolists with the aim of reducing uncertainty arising from their mutual interdependence.

#### 2.14 GLOSSARY :

at stake	: risked.
barrier	: obstacle.
cartel	: an organisation of firms where price-output policies are jointly determined through agreements.
collusion	: secret understanding.
connotation	: meaning.
consumer's surplus	: The difference between what a consumer is prepared to pay and what he actually pays.
emolument	: profit, salary.
forecast	: predict for future.
kink	: short backward twist.
naive	: unconscious and amusingly simple.
price elasticity of demand	: ratio of percentage change in demand to a percentage change in price.
reconcile	: harmonize.
rival	: one's competitor.



sophisticated	: highly developed.
stock exchange	: place where stocks and shares are publicly bought and sold.
tacit	: secret
take over	: succeed to ownership.

#### 2.14. REFERENCES & SUGGESTED READINGS.

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- Koutsoyiannis, A. (1997) : "Modern Microeconomics", Second Edition, Mc Millan, Chap. 5—17.
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**UNIT-3**  
**THEORY OF DISTRIBUTION AND**  
**PRICING OF FACTORS**

**STRUCTURE :**

- 3.0 Introduction
- 3.1 Objectives
- 3.2 Neo-classical approach : Marginal productivity theory of determination of factor price
- 3.3 Pricing of factors under perfect competition
- 3.4 Factor shares
- 3.5 Technical Progress and factor shares
- 3.6 The Backward bending supply curve of labour
- 3.7 Wage determination when there is monopoly in the product market and monopsony in the factor market.
- 3.8 Wage determination under bilateral monopoly
- 3.9 Summing Up
- 3.10 Glossary
- 3.11 References & Suggested readings.

**3.0 INTRODUCTION :**

Determination of factor price and factor share in national income has been a crucial issue before the economists from time immemorial. From time to time, different economists forwarded different distribution theories and views regarding factor price determination and share of factors in total output. In this unit the marginal productivity theory of factor price determination have been discussed. Again factor pricing under perfect competition have been analysed briefly. Also factor shares and changes in factor shares with technical progress have been discussed. Moreover, the backward bending supply curve of labour have also been included. Lastly, a situation of pricing of factors under imperfect competition (monopsony) have been studied. A special case of bilateral monopoly have also been discussed.

**3.1 OBJECTIVES :**

After going through this unit, you will be able to

- i) explain the neo-classical marginal productivity theory of determination of factor price.

- ii) analyse the determination of factor price under conditions of perfect competition.
- iii) understand the changes in factor shares in national income with and without technical progress.
- iv) illustrate the situation when the supply curve of labour becomes backward bending.
- v) analyse a situation of factor pricing when a firm is a monopolist in the product market and a monopsonist in the factor market.
- vi) understand the special case of bilateral monopoly.

### 3.2. NEO-CLASSICAL APPROACH : MARGINAL PRODUCTIVITY THEORY OF DETERMINATION OF FACTOR PRICE

The neo-classical approach to the determination of factor price was first developed by the American economist J. B. Clark in the late nineteenth century. Clark in his theory states that price of any factor of production is determined by its marginal product. Therefore, this theory is also called as the marginal productivity theory of determination of factor price.

**Assumptions :** The marginal productivity theory is based on the following assumptions :

1. All factors of production are homogeneous.
2. There is perfect competition in the factor market.
3. Stock of each factor is assumed to be given and there is full employment of all the factors.
4. Production technique is given and constant.

Every entrepreneur tries to utilise his factors in such a way so that he can maximise his profit. He, therefore, hires as many factors as can be profitably used in production. The marginal product, i.e., the addition to the total product when one more unit of the variable factor is employed, amount of other factors remaining constant, for an individual firm goes on declining as more and more factors are employed. An employer will go on employing a factor as long as the marginal product of the factor is greater than the price paid for it. He will attain equilibrium when the price paid for a factor is just

equal to its marginal product. The following figure helps to describe this idea -

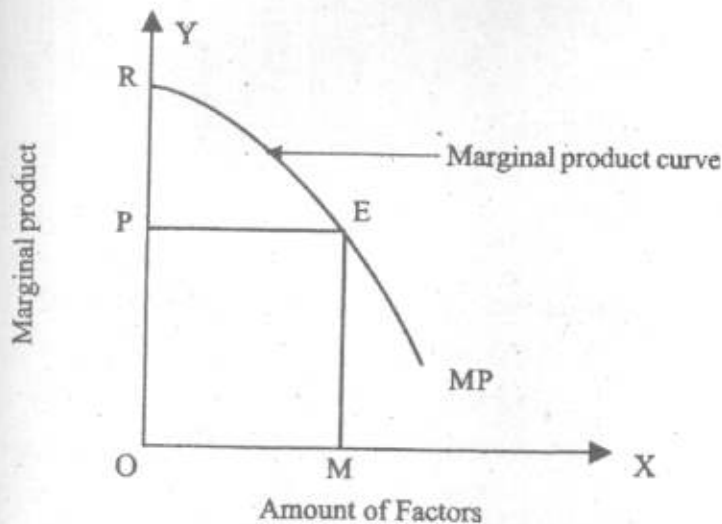


Fig.3.1

In figure 3.1, the downward slope of the marginal product curve shows diminishing marginal productivity of factors as more and more units are employed. If the existing price of a factor is given as  $OP$ , then the employer finds it profitable to employ additional units of the factor until its marginal product becomes equal to the prevailing price  $OP$ . At given price  $OP$  in figure, he will employ  $OM$  units since marginal product is equal to  $OP (=ME)$  at  $OM$  employment level. If he employs more than  $OM$  units, marginal product will be less than the price of the factor and the employer will suffer losses. At a lower employment level than  $OM$ , marginal product of the factor is higher than its price and it is profitable for the employer to hire more units. Thus, he will reach equilibrium and maximise his profit by employing at that point where marginal product of the factor equals price.

Since there is perfect competition in the factor market, an individual firm has no control over the price of factors. Again, Clark assumes a given amount of factors in the economy. Given the total amount of factors, their prices will be determined according to marginal productivity. However, if there is competition among the units of a factor for being employed, it will impact upon the prevailing factor price. When some factors remain unemployed, i.e., when supply is higher than demand, factor price will be lowered down. On the contrary, when marginal productivity of factors is

higher than their prices, demand will be more than supply because employees try to engage more and more factors. Therefore, factor price will go up. In the following figure 3.2, at OM full employment level, equilibrium factor price is determined as  $EM (= OP)$  because EM is the marginal productivity of OM amount of factors.

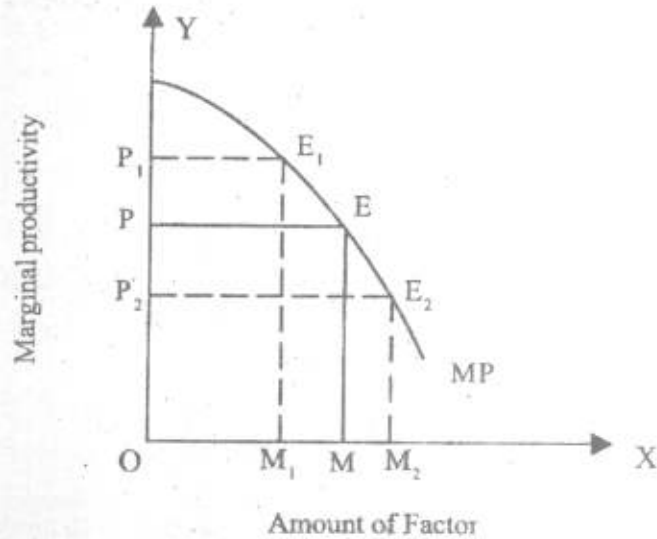


Fig.3.2

At a higher price  $E_1M_1 (= OP_1)$ ,  $OM_1$  factors are employed. Here,  $MM_1$  unemployed factors try to get employment and force the factor price to come down to  $EM$  at which all available factors ( $OM$ ) are employed.

On the other hand, at a lower-price  $E_2M_2$ , demand for factor ( $OM_2$ ) will be higher than supply ( $OM$ ) by  $MM_2$  amount which will push up the factor price upto  $EM$  that is just equal to the marginal productivity of the factors. Thus, given the available factors in an economy, factor price is determined by their marginal productivity.

#### STOP TO CONSIDER

##### Criticism of the marginal productivity theory :

Marginal productivity theory has important contribution towards the problem of determination of factor price. But this theory is not free from criticism. The main criticisms against the theory are :

1. The marginal productivity theory assumes a stationary economy; perfect competition and full employment of factors. Thus, the theory is not based on real world situation.

2. This theory can determine rewards of only the variable factors. But it is not able to determine rewards of the fixed factors like entrepreneur.

3. Marginal productivity theory is applicable when the factors are substitutable and are divisible. But if some factors are utilised in fixed proportion, then it is not possible to determine marginal productivity of a single factor. In such a situation, this theory cannot be applied for determination of factor price.

### 3.3 Pricing of Factors under perfect competition.

Factor prices are determined in market under the forces of demand and supply. Economists classify factor inputs into four groups — land, labour, capital and entrepreneurship and the prices of these factors are called rent, wage, interest and profit respectively. Labour being the most important input, we speak of “demand for labour” or “supply of labour.” First we will look at the demand for labour by a single firm. The aggregate demand will then be derived from the summation of the individual demands. The same approach will be adapted for market supply.

#### 1. The demand for labour in perfectly competitive markets.

Here we study the demand for labour in two cases (i) when labour is the only variable factor of production, (ii) where there are several variable factors.

##### (i) Demand of a firm for a single variable factor.

Here, there is a single variable factor, labour whose market is perfectly competitive. Hence the price of labour,  $\bar{w}$ , is given for all firms. This implies that the supply of labour to individual firm is perfectly elastic. This is a straight line through  $\bar{w}$  parallel to the horizontal axis (fig. 3.3.). At this wage rate the firm can employ any amount of labour it wants.



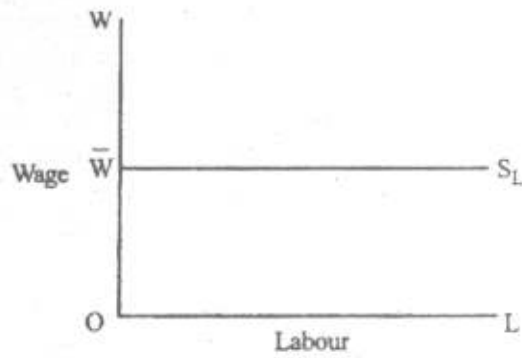


Fig. 3.3

Again technology is given and the slope of the production function is the marginal physical product of labour  $\frac{dX}{dL} = MPP_L$ .

If we multiply the  $MPP_L$  by the given price of output,  $P_x$ , we get the value-of-marginal product curve  $VMP_L$ . This curve shows the value of output produced by an additional unit of labour employed (Fig. 3.4).

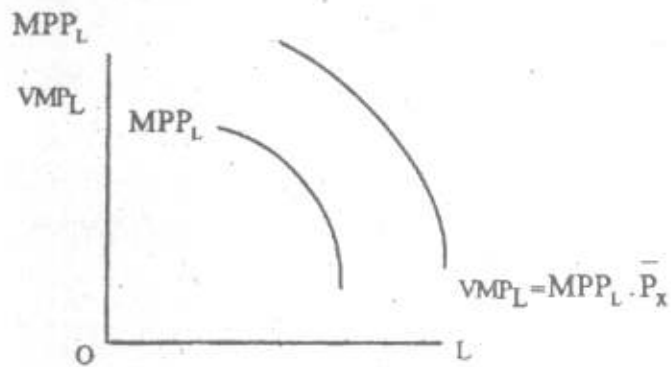


Fig. 3.4

The firm being a profit maximiser, hires a factor as long as it adds more to total revenue than to total cost. Thus the condition of equilibrium in the labour market is

$$MC_L = VMP_L \text{ where } MC_L = \text{marginal cost of labour}$$

$$\text{or, } \bar{w} = VMP_L \text{ Given } MC_L = \bar{w}$$

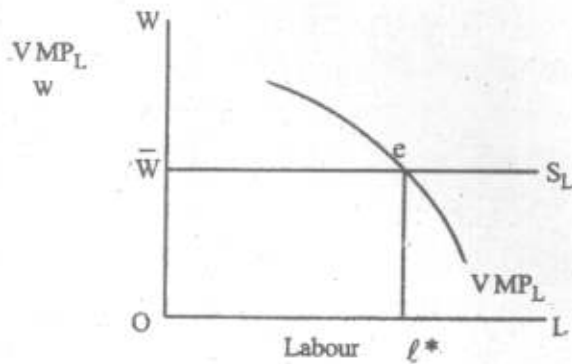


Fig. 3.5

In figure 3.5, equilibrium of the firm is denoted at  $e$ . At wage rate  $\bar{w}$  the firm maximises profit by using  $l^*$  unit of labour. To the right of  $l^*$  each unit of labour costs less than the value of its product ( $VMP_L > \bar{w}$ ), hence profit will be increased by hiring more workers. conversely, to right of  $l^*$  the  $VMP_L < \bar{w}$ , hence profits are reduced. Thus profits are at a maximum when  $VMP_L = \bar{w}$  Thus the demand curve of a firm for a single variable factor is its value-of-marginal-product curve.

(ii) **Demand of a firm for several variable factors :** For a firm with more than one variable factor, the VMP curve of an input is not its demand curve. This is because the various resources are used simultaneously in the production of goods so that a change in the price of one factor leads to changes in the use of others. The latter, thus shifts the MPP curve of the input whose price initially changed. Given the price of the final commodity,  $\bar{P}_X$ , the  $VMP_L$  shifts to the right when several variable factors are used in the production process. This is shown in the figure below :

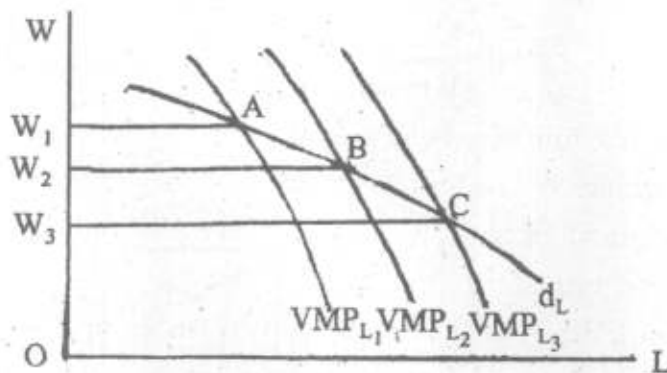


Fig. 3.6

The new equilibrium demand for labour is denoted by point B on  $VMP_{L_2}$ . Again with different wage rates we can generate a series of points such as A and C. The locus of these points is the demand for labour by the firm when several factors are variable and is also referred as the long-run demand for labour by the firm. In summary, the demand of the firm for a single variable factor is its VMP curve. The demand for a factor when several resources are variable is the locus of points belonging to shifting VMP curves. This long run demand for a factor is negatively sloped.

(iii) the market demand for a factor.

Here we use the demand curves of the individual firms in order to derive the market demand curve for the input. This can be shown by the following figures [3.7 (a) and 3.7 (b)].

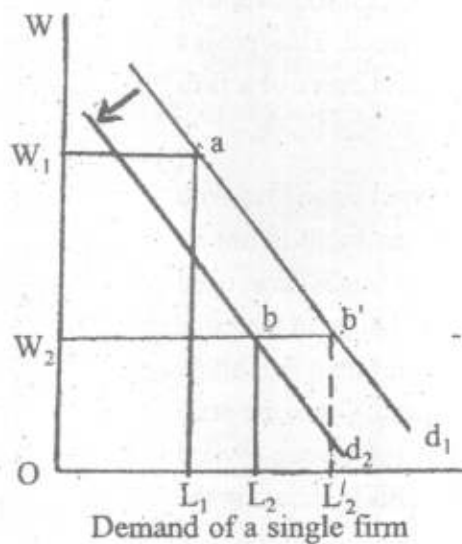


Fig. 3.7(a)

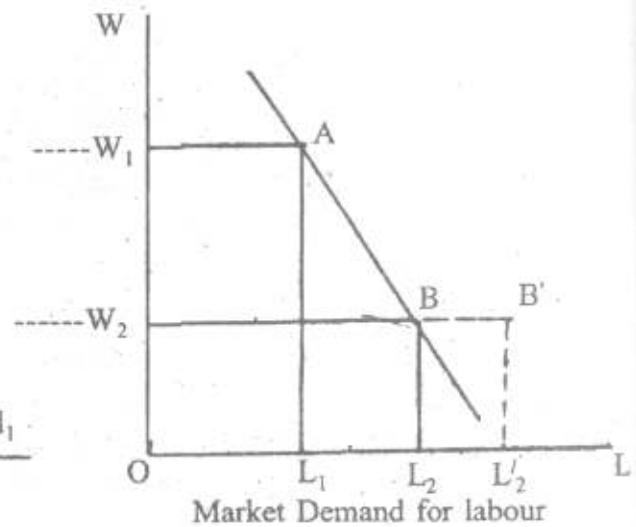


Fig. 3.7(b)

In figure 3.7(a),  $d_1$  is the demand curve of an individual firm for labour. Let the firm be at point a on its demand curve with  $L_1$  units of labour and wage  $W_1$ . Now summing over all employing firms to obtain the total demand for labour we get point A in figure 3.7(b) as a point on the market demand for labour.

Now if the wage rate declines to  $W_2$  then the firm would move from a to b' on demand curve  $d_1$  and labour employment increases to  $L'_2$  in fig. 3.7(a). If other things do not remain equal then as wage rate falls, demand for labour increases and in turn increases total output. The market supply curve for the commodity produced shifts to the right, and

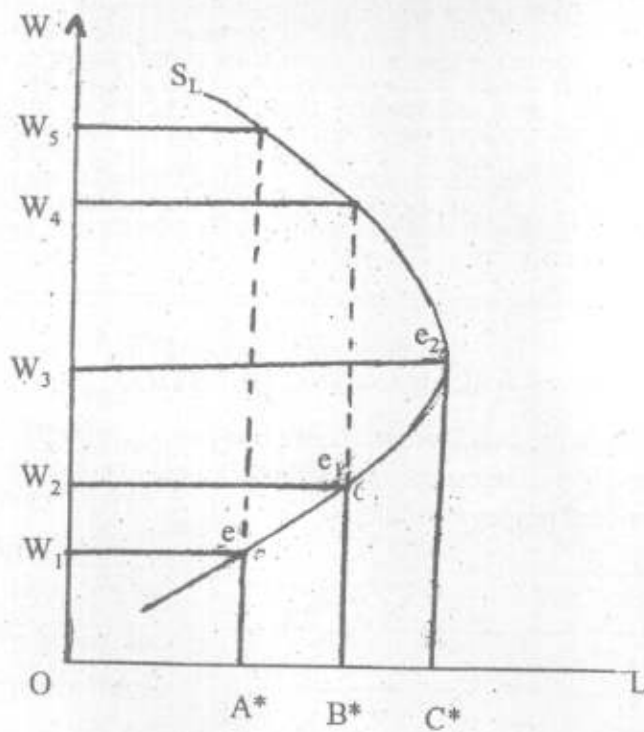
the price of the commodity falls. As a result the  $VMP_L$  decreases and thus shifts downward. Figure 3.7(a) shows  $d_2$  as the new demand curve. When wage rate falls to  $W_2$  the firm is in equilibrium at point b on the new demand curve  $d_2$ . Summing horizontally over all firms we obtain point B of the market demand curve in fig. 3.7 (b). If fall in commodity price was not taken into account, we could have over estimated the demand for labour following a fall in wage rate. In fig. 3.7(b),  $B'$  represents the demand for labour given the price of the commodity constant.

## 2. The supply of labour (a variable factor) in perfectly competitive markets.

The relationship between the supply of labour and the wage rate defines the supply curve. The market supply is the summation of the supply of labour by individuals.

### (i) The supply of labour by an individual :

A labourer usually allocates his time between work and leisure. The supply curve of labour can be explained by the following figure (fig.



Labour measured in work-hours

Fig. 3.8

3.8).

Here the x-axis shows the labour measured in work hours and y-axis shows the wage rate. At  $W_1$  wage rate, the labourer supplies  $OA^*$  amount of work hours and obtains equilibrium at the point  $e$ . Again when wage rate increases to  $W_2$  and  $W_3$ , the labour supplies more amount of work hours which amounts to  $OB^*$  and  $OC^*$  as shown in figure 3.8 at equilibrium points  $e_1$  and  $e_2$  respectively. This increase in wage rate in turn increases their income. The locus of the equilibrium points  $e, e_1, e_2$  etc. gives us the supply curve of labour.

But at some higher wage rate the hours offered for work may decline. Higher wage rates create a disincentive for longer hours of work implying less leisure hours. Thus beyond  $w_3$ , if the wage rate increases to  $w_4$ , the work hours decrease from  $C^*$  to  $B^*$ . Hence, beyond a certain wage rate the supply curve becomes backward bending. The supply of labour decreases as the worker prefers to use his income on more leisure activities.

**(ii) The market supply of labour :**

Economists argue with the shape of the supply curve of labour. Some argue that in the short run, the market supply curve of labour have segments of positive and negative slope. But in the long run, the supply must have a positive shape. Some economists argue that the backward-bending supply curve applies for markets of rich nations. But this is also not free from criticism.

**SELF ASKING QUESTION**

Have you ever thought about a backward bending labour curve? Why might a labour supply curve be backward bending? Justify your answer with proper examples.

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3. **The determination of factor price in perfect markets :**

Given the market demand and the market supply of an input, its price is determined by the intersection of the two curves. This can be shown in the following figure.

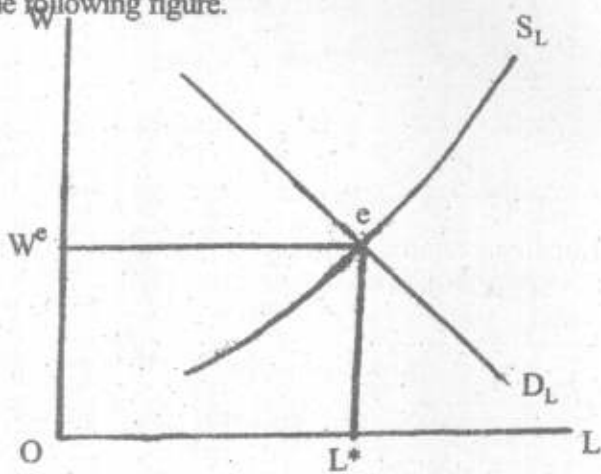


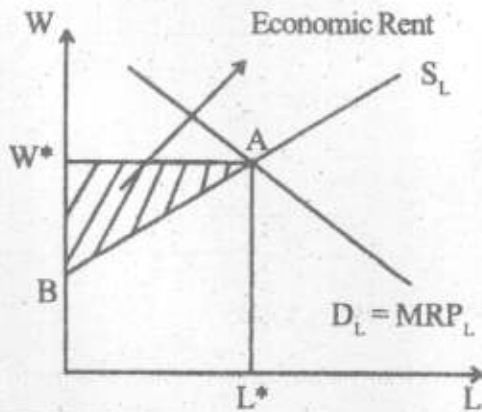
Fig. 3.9

Here  $D_L$  is the market demand and  $S_L$  is the market supply of the factor. The equilibrium is obtained at  $e$  with the intersection of  $S_L$  and  $D_L$ . Thus at  $e$ , the equilibrium wage is  $W^e$  and the employment level is  $L^*$ . The demand for factors is not a direct demand like a product but a derived demand which is derived from the requirements of the production process. Again the supply of labour is not cost determined like the supply of commodities, but involves the attitudes of individuals towards work and leisure.

**STOP TO CONSIDER**

**Economic rent :**

The concept of economic rent helps explain how factor market work. Economic rent is the difference between the payments made to a factor of production and the minimum amount that





must be spent to obtain the use of that factor. As shown in the accompanying diagram, the equilibrium wage is given by A, at the intersection of the labour supply and labour demand curves. Because the supply curve is upward sloping, some workers would have accepted jobs for a wage less than W. The shaded area ABW is the economic rent received by all workers.

### CHECK YOUR PROGRESS

1. Critically examine the marginal productivity theory of determination of factor price.

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2. Explain how factor price is determined under perfect competition.

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3. Explain how the market demand curve for a factor is derived.

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### 3.4. FACTOR SHARES

Determination of factor shares in production when there are changes in factor prices is one of the important problems in front of the

economists. change in the prices of factors leads to change in factor employment and factor shares. A firm substitutes a cheaper factor for a dearer one when there is change in factor prices. If we assume two factors of production, i.e., labour and capital, capital-labour ratio as well as relative shares of labour and capital change with change in their prices.

This change in relative shares of factors due to change in factor prices can be better understood with the help of elasticity of substitution. Elasticity of substitution ( $\sigma$ ) is the ratio of percentage change in capital-labour ratio  $\left(\frac{K}{L}\right)$  and the percentage change in marginal rate of technical substitution between labour and capital, i.e.,

$$\sigma = \frac{\frac{d\left(\frac{K}{L}\right)}{\left(\frac{K}{L}\right)}}{\frac{d(\text{MRTS}_{LK})}{(\text{MRTS}_{LK})}} \dots\dots\dots(1)$$

If factor market is perfectly competitive, a firm attains equilibrium utilising that factor combination at which marginal rate of technical substitution between labour and capital is equal to the ratio of factor prices, i.e.,  $\text{MRTS}_{LK} = \frac{w}{r}$ , where,  $w$  is the wage rate and  $r$  is the rental rate of capital.

Therefore, in equilibrium,

$$\sigma = \frac{\frac{d\left(\frac{K}{L}\right)}{\left(\frac{K}{L}\right)}}{\frac{d\left(\frac{w}{r}\right)}{\left(\frac{w}{r}\right)}} \dots\dots\dots(2)$$

Now, we can show share of labour and capital in total output as:

$$\text{Share of labour} = \frac{w.L}{Q}, \quad \text{Share of Capital} = \frac{r.K}{Q} \quad \text{where,}$$

Q is the total output

Thus, relative factor shares will be

$$\frac{\text{Share of labour}}{\text{Share of capital}} = \frac{w.L/Q}{r.K/Q} = \frac{wL}{rK}$$

$$\text{or, } \frac{\text{Share of labour}}{\text{Share of capital}} = \left( \frac{w}{r} \right) \left( \frac{K}{L} \right)$$

From this, it becomes easy to find out the effect of change in  $\left( \frac{w}{r} \right)$  ratio on the relative shares of the two factors.

When  $\sigma < 1$ , due to a given percentage change in  $\frac{w}{r}$  ratio, it will result in a smaller percentage change in  $\frac{K}{L}$  ratio. With increase in  $\frac{w}{r}$  ratio, i.e., with increase in relative price of labour,  $\frac{K}{L}$  ratio will increase though not significantly. It means that relative share of labour increases as compared to share of capital. A decrease in the  $\frac{w}{r}$  ratio will have opposite effects on the share of labour relative to capital share.

If  $\sigma > 1$ , a change in  $\frac{w}{r}$  ratio leads to a higher percentage change in  $\frac{K}{L}$  ratio. Thus, with increase in  $\frac{w}{r}$  ratio, i.e., with increase in labour price relative to capital price,  $\frac{K}{L}$  ratio will increase showing a decrease in relative share of labour and increase in relative share of capital.

In the same line of thinking, it is obvious that when  $\sigma = 1$ , relative shares of labour and capital will remain unchanged.

### STOP TO CONSIDER

Numerical example of effect of change in elasticity of factor substitution on factor shares :

If  $\sigma < 1$  An increase in the w/r Ratio increase the distributive share of labour. For instance, if  $\sigma = 0.5$ , then a 10% increase in w/r results in a 5% increase in K/L ratio [from (2)]. Then new relative shares are-

$$\left(\frac{wL}{rK}\right)^* = \frac{(w/r)(1+0.10)}{(K/L)(1+0.05)} = \frac{1.10}{1.05} \cdot \frac{(w/r)}{(K/L)} > \frac{wL}{rK}$$

clearly, (new relative share ratio) > (initial relative share ratio)

If  $\sigma > 1$  a change in w/r leads to a fall in distributive share of labour. For instance, if  $\sigma = 2$ , then a 20% increase in w/r ratio leads to a 40% increase in K/L [from (2)]. The new relative share ratio is-

$$\left(\frac{wL}{rK}\right)^* = \frac{(w/r)(1+0.2)}{(K/L)(1+0.4)} = \frac{1.2}{1.4} \left(\frac{wL}{rK}\right) < \left(\frac{wL}{rK}\right)$$

Thus, (new relative share ratio) < (initial relative share ratio)

### 3.5. TECHNICAL PROGRESS AND FACTORS SHARES

In the above, change in factor share due to change in factor price is analysed assuming a constant production function. But when there is technological change in production function, changes occur to  $\frac{K}{L}$  ratio and elasticity of substitution. Thus, technical progress leads to changes in factor shares.

Technological progress are of three types - neutral, capital deepening and labour deepening. Here we are discussing technical progress in terms of Hicksian definition. Isoquants shift downward when technical progress takes place showing production of same level of output with smaller quantities of factor inputs.

Technical progress is said to be neutral if it increases marginal productivity of both labour and capital by the same percentage so that the

ratio of marginal productivity of labour to that of capital, i.e.,  $\frac{MP_L}{MP_K}$  does not change on a given capital labour ratio (OR). Isoquants shift downward parallelly to the previous one as shown in the figure below. Therefore, in case of neutral technical progress,  $\frac{K}{L}$  ratio and  $\frac{w}{r}$  ratio remain unchanged and consequently, relative shares of factors are not affected.

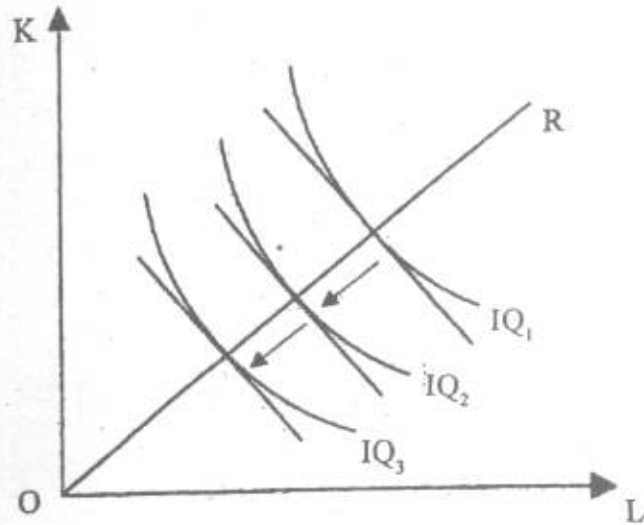


Fig. 3.10

Technical progress is labour deepening or labour using if it increases marginal productivity of labour by more than that of capital so that the ratio  $\frac{MP_L}{MP_K}$  increases on a given  $\frac{K}{L}$ . Producers use relatively more labour than capital as a result of which  $\frac{K}{L}$  ratio decreases as shown in the figure 3.11.

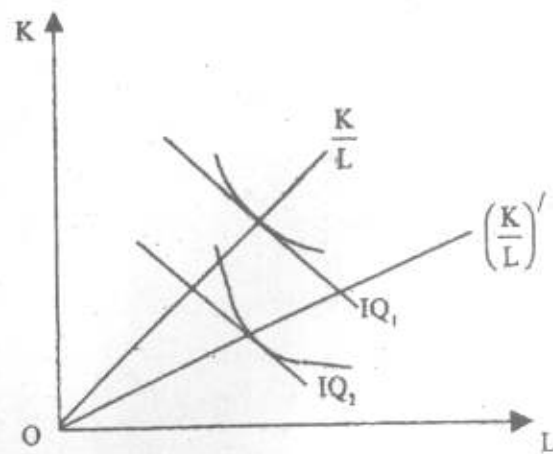


Fig. 3.11

In figure 3.11,  $\frac{K}{L}$  is capital-labour ratio before technical progress and  $\left(\frac{K}{L}\right)$  is capital-labour ratio after technical progress. Since producers substitute more labour for capital, as primary effect, share of labour increases and that of capital decreases.

In case of capital deepening technical progress, marginal productivity of capital increases at a higher rate than that of labour and the  $\frac{MP_L}{MP_K}$  ratio decreases on a given  $\frac{K}{L}$ .

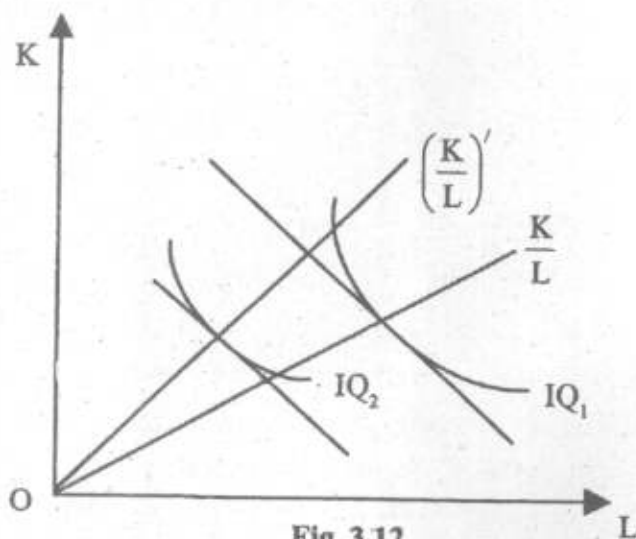


Fig. 3.12

As shown in figure 3.12,  $\frac{K}{L}$  ratio increases. Capital-labour ratio after technical progress  $\left(\frac{K}{L}\right)$  is higher than the capital-labour ratio before technical progress  $\left(\frac{K}{L}\right)$ . Since producers substitute capital for labour, as the primary effect, share of capital increases and that of labour decreases.



### SELFASKING QUESTION

What will be the shape of the isoquants in case of neutral, labour-deepening and capital-deepening technical progress if you show them on the same K/L ratio. Try to draw yourself.

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### 3.6. THE BACKWARD RISING SUPPLY CURVE OF LABOUR

Labourers generally work for money. At the same time, they also prefer to have leisure. Thus, both income and leisure can be considered as goods.

It is important to analyse the impact of rise in the wage rate on a labour's work-leisure combination. This impact of rise in the wage rate on the willingness of a labour to work more or less can be examined in terms of the income and substitution effects of the rise in the wage rate. As wage-rate is increased, leisure becomes dearer relatively to other consumer goods (leisure is considered as a normal good). This is because leisure now costs more while prices of other consumer goods remain the same. In such a situation, a labour substitutes other cheaper consumer goods for dearer leisure, i.e., he consumes less leisure or works for longer periods. This is the substitution effect of rise in wage-rate. Again, with rise in wage rate, income of the labour increases even if he works for the same hours as in before the rise in wage rate. With increase in income, the labourer will demand more of all goods including leisure. This implies that the labourer is now willing to work for shorter hours. This is the income effect of rise in wage rate. These two effects always move in opposite directions. The net effect on supply of labour will, thus, depends on the relative strength of these two effects.

Upto a particular wage level, substitution effect remains stronger than income effect. Therefore, to that point, labourers work for longer hours with rise in wage rate. But beyond that particular wage level, income effect

becomes stronger than substitution effect and labourers go on reducing work hours with every rise in the wage rate. At that particular wage level, income of the labourer reaches a significantly high level due to which he can meet his fixed minimum wants for goods and services. Therefore, with rise in the wage rate after that particular level, labourer is willing to work less and enjoy more leisure. As a result, supply curve of labour becomes backward rising as shown in the fig.3.13 :

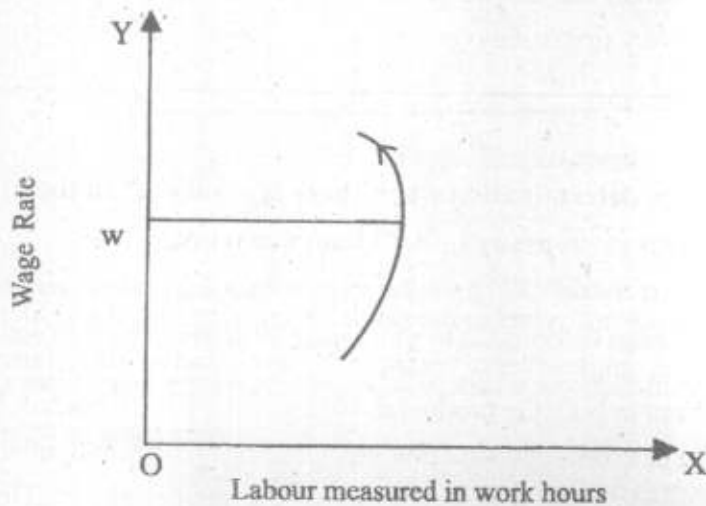


Fig. 3.13

In fig. 3.13, upto wage rate  $OW$ , substitution effect is stronger than income effect and supply curve of labour is upward sloping to the right. But further increase in wage rate beyond  $OW$  makes income effect more stronger than substitution effect. So, labour supply curve slopes backward to the left. It should be noted here that even when supply curve of labour becomes backward sloping, a labour will not reduce work hour so much with rise in wage rate which may lead his level of income to be less than before.

#### STOP TO CONSIDER

##### Supply curve of labour for an industry or occupation :

Generally, supply curve of labour for an industry or occupation will not be having the backward bending portion.

So for as supply of labour to a particular industry is concerned, it is elastic and upward rising because as wages in an industry are increased, labourers from other industries will shift to this industry.

Similar is the case with supply of workers to a particular occupation. If wages in one particular occupation goes up, some persons from other similar occupations would be attracted to it and thus the supply of labour to a particular occupation is elastic and rises upward. The long run supply of labour is more elastic than the short run supply of labour since in the long run besides occupational shifts in present labour force, new entrants to the labour market (who are now children) can also adopt that occupation by getting training for it in the very first instance.

### 3.7 Wage determination when there is monopoly in the product market and monopsony in the factor market :

Monopsony refers to the single buyer of the input and monopoly refers to the single seller of the input. Now we study a case of imperfect competition in both the product market and the Factor Market.

Let us consider a situation when the firm is a monopolist in the product market and a monopsonist in the factor market. Here the equilibrium condition will be marginal revenue product = marginal supply price i.e.  $MRP = MSP$ . As the product market is imperfect, the marginal revenue is less than the price. Thus  $MRP_L$  (Marginal revenue product of labour) lies below the  $VMP_L$  (value of marginal product of labour) though both the curves are downward sloping. Again as firm is a monopsonist in the factor market, it will face an upward rising supply curve indicating higher prices for every additional employment of the factor. This supply curve is the average supply price (ASP) curve from which we then derive the marginal supply price (MSP) curve. The MSP curve lies above the ASP curve because for every additional unit, the firm must have to pay more than the prevailing price.

This can be shown in the figure 3.14. The firm is in equilibrium at point B where MRP curve intersects MSP curve. Here the equilibrium level of employment is OE and equilibrium price of factor is AE which is less than VMP and MRP. The gap between ASP and VMP by AC shows total exploitation of the factor. This exploitation can be split into two parts. The gap between MRP and ASP is due to the existence of monopsony power of the firm in the factor market. Hence this gap is the

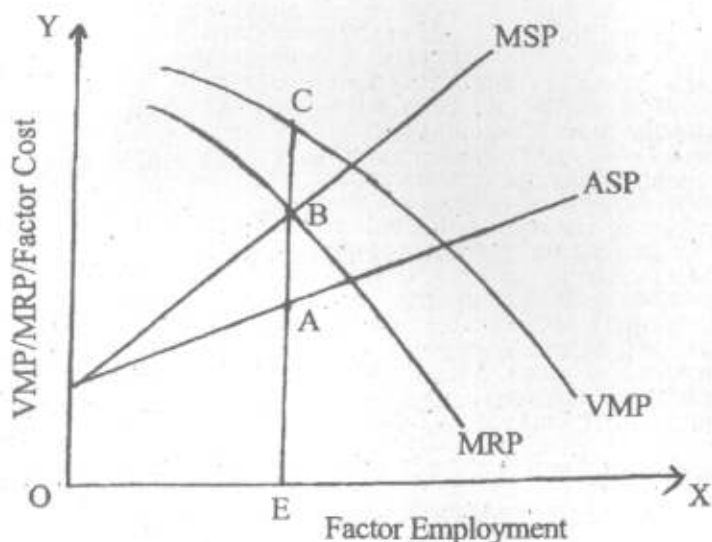


Fig. 3.14

monopsonistic exploitation. Again the gap BC between MRP and VMP is due to the existence of monopoly in the product market. Hence, BC represents monopolistic exploitation of the factor. Here firms equilibrium condition can be shown as

$$VMP > MRP = MSP > \text{price of the factor.}$$

### 3.8 Wage determination under Bilateral Monopoly model :

Again a special case is that of bilateral Monopoly. Bilateral Monopoly is said to exist when the single buyer of a product or input (monopsonist) face the single seller of the product or input (monopolist). The solution to a bilateral monopoly is indeterminate and can be determined by the relative bargaining strength of the monopsonist buyer and the monopolist seller of the product or input. This is shown in the figure 3.15.

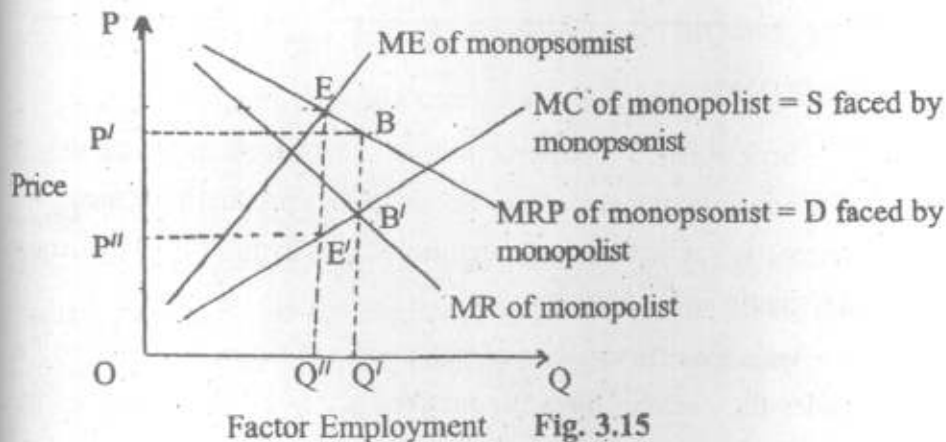


Fig. 3.15

In the figure 3.15, D is the monopsonist's demand (MRP) curve for the product or input. It is also the curve for the product or input. It is also the market demand curve faced by the monopolist seller. MR is the monopolist's marginal revenue curve. MC is the monopolists marginal cost curve. The monopolist will maximise profits at point B' (where  $MC = MR$ ) quantity is  $Q'$  and price is  $P'$  (point B on D curve). The monopolists MC curve is the supply curve of the product that the monopsonist faces. ME is its marginal expenditure curve. Here the monopsonists maximises profits at pt E (Where  $MRP=ME$ ) Here quantity is  $Q''$  and price is  $P''$  (given by point E' on the supply curve that the monopsonist faces).

Thus, to maximise profits, the monopolist seller want to sell  $Q = Q'$  and  $P = P'$ , while monopsonist buyer of the product wants to purchase  $Q = Q''$  at  $P = P''$ . Here the level of output and sales of the product will be between  $Q'$  and  $Q''$  and the price will be between  $P'$  and  $P''$ . Thus the solution is indeterminate.

#### SELF ASKING QUESTION

Do you think there is any difference between wage determination situations in case of bilateral monopoly and in case of monopoly in product market and monopsony in factory market? Try to figure out yourself.

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#### 3.9 SUMMING UP :

Various macro distribution theories analyse share of factors of production in national output. The marginal productivity theory of determination of factor price suggests that the payment of factors equal to their marginal productivity.

Again the determination of factor prices under perfect competition includes the demand for a productive factor and the supply of the

productive factor. First the demand for labour by a single firm is determined then the aggregate demand is derived from the summation of the individual demands. Similar is the case for supply also. The equilibrium condition for a profit maximiser in the labour market is  $\bar{w} = VMP_L$ . Again the demand for labour by a firm with several factors variable is obtained by joining the equilibrium points of the shifting  $VMP_L$  curves. Again the supply curve of labour is initially positive at increasing wage rates but starts bending backward at higher wage rates. The factor price is determined by the point of intersection of the market demand and supply curves.

Changes in factor prices is occupying an important place in the determination of factor shares in production. This is because, every employer wants to employ more of cheaper factors. So, relative share of cheaper factors always become higher than those of dearer ones. Apart from prices of factors, technical changes in production process also impact upon relative factor shares. For example, as neutral technical progress takes place, relative factor shares remain unchanged. But when technical progress is labour using, labour share increases and capital share decreases in relative terms. On the other hand, with capital using technical progress, relative share of capital increases while that of labour decreases.

The normal upward sloping supply curve of labour may change its direction if wage rate increases beyond a significantly high level where the minimum wants of labourers are satisfied. Upto this particular level of wage rate, labourers increase work hours with increase in wage rate. But after this level, with every increase in wage rate, labourers reduce work hours and substitute leisure for work. Therefore, beyond this particular wage level, supply curve of labour becomes backward bending.

Again when a firm is a monopolist in the product market and monopsonist in the factor market, the equilibrium condition is  $VMP > MRP = MSP > \text{Price of the factor}$ .

In the special case of bilateral monopoly, the solution is indeterminate and can be determined by the relative bargaining strength of the monopsonist buyer and monopolist seller of the product or input.



### CHECK YOUR PROGRESS

1. What do you mean by elasticity of substitution? How does it help in determining factor shares with change in factor prices?
2. Explain neutral and non-neutral technical progress. Examine the impact of technical progress upon relative factor shares.
3. In what circumstances, supply curve of labour may become backward bending? Explain.
4. Discuss the situation of factor pricing when a firm is a monopolist in the product market and a monopsonist in the factor market.
5. Examine the situation of factor pricing under bilateral monopoly.

### 3.10 GLOSSARY :

#### **Marginal product of a Factor**

Change in total product due to change in the factor by an additional unit keeping amount of other factors constant

#### **Value of marginal product**

The marginal physical product of a factor multiplied by its price

#### **Marginal Cost :**

Change in total cost due to an additional unit of a factor.

#### **Marginal Revenue :**

Change in total revenue due to an additional unit of a factor

#### **Capital intensive technique :**

A technique of production which uses more capital than other factors.

#### **Labour intensive technique :**

A technique of production which uses more labour than other factors.

### 3.11. REFERENCES & SUGGESTED READINGS.

Koutsoyiannis, A., "Modern Microeconomics", 2nd edition, 1979, Macmillan, Chap. 21.

Maddala, G S. and Miller, E., "Microeconomics- Theory and Applications", 2nd edition, 2004, Tata McGraw Hill, Chap. 15 & 16.

Ray, N. C., "An Introduction to Microeconomics", 1975, Macmillan, Chap. 24, 26 and 30.

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## UNIT - 4

### BASIC FINANCIAL ACCOUNTING

#### CONTENTS:

- 4.1. Introduction
- 4.2. Objectives
- 4.3.1 Meaning of Accounting
- 4.3.2 Scope of Accounting
- 4.3.3 Objects of Accounting
- 4.4.1 Meaning of Account
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- 4.5.1. Meaning of Asset
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- 4.5.3. Meaning of Capital or Equity
- 4.5.4. Income and Expenses
- 4.5.5. Revenue Income and Capital Income
- 4.5.6. Revenue Expenditure and Capital Expenditure
- 4.5.7. Fundamental Accounting Equation
- 4.5.8. Double Entry System
- 4.5.9. Books of Accounts
- 4.5.10 Ledger and its Classification
- 4.6.1. Cash Book and Pass Book
- 4.6.2. Bank Reconciliation Statement
- 4.7.1 Meaning of Financial Statements
- 4.7.2. Preparation of Financial Accounts
- 4.7.3. Trading Account
- 4.7.4. Profit and Loss Account
- 4.7.5. Balance sheet
- 4.8. Meaning of Cash Flow statement
- 4.9. Summing Up
- 4.10. Glossary
- 4.11. Answers to check your progress
- 4.12. References & Suggested readings.

#### 4.1. INTRODUCTION

In the earlier three units you have learnt about the theory of production and cost; market structure and pricing of products and theory

of distribution and pricing of factors. All these have been described in the context of a business firm. These firms perform numerous economic activities related to their business. These economic activities take place everyday. But it is impossible for a businessman to keep in memory all such activities for a long period of time. Hence, the recording of these activities is necessary. If you are a businessman, keeping accurate and organised, records is vital to the success of your business. Developing good record keeping habits can save you thousands of rupees. From such records, the businessman may collect necessary information regarding his business as and when required. For example, a businessman can ascertain the amount receivable from various parties, or the amount payable to the suppliers of goods from the records. He can also ascertain result of the business, i.e., profit or loss; and the financial position of his business at the end of a given period. He can supply such information to other interested persons like bankers to meet their varied needs. Besides, he can use such information to get finance from the banks. From memory it is not possible to do all these unless proper records are maintained. Accounting takes care of all these functions.

In this unit we shall discuss meaning, scope and objects of accounting, concept of cash book and bank reconciliation statement, concept of financial statements and cash flow statement.

## 4.2. OBJECTIVES

After going through this unit you will be able to:

- Describe the meaning, scope and objects of Accounting;
- Define the various terms used in accounting
- Explain the meaning of Cash Book and Bank

Reconciliation statement

- Explain the meaning of Financial Statement

### 4.3.1 MEANING OF ACCOUNTING

Now let us explain the meaning of 'Accounting'. Accounting refers to the system involved in making a financial record of business transactions and in the preparation of statements concerning the assets, liabilities, capital and operating results of the business. It deals with ascertainment of business

income and values of assets, liabilities and capital. Again, 'Accounting' in business is conceived as a system that provides information on the financial condition and the transactions which have led to that status. This system starts with recording of business transactions and ends with interpreting the results thereof. Accountants engage themselves in recording business transactions and in preparing financial statements. They also provide information on costs and gains from new technologies, mergers and acquisitions; track financial performance, tax strategy, and health care benefits etc to the management. Hence accounting is defined by the Committee on Terminology of the American Institute of Accountants (later on known as American Institute of Certified Public Accountants, AICPA) as, "Accounting is the art of recording, classifying and summarizing in a significant manner and in terms of money, transactions and events which are, in part at least, of a financial character, and interpreting the results thereof."

#### **4.3.2 SCOPE OF ACCOUNTING**

Accounting covers the following areas:

1. Recording of business transactions and maintenance of the books of account,
2. Preparation of accounts,
3. Preparation of Trial Balance,
4. Preparation of financial statements, viz., trading account, profit and loss account, balance sheet, cash flow statement,
5. Interpretation of the operating and financial results,
6. Preparation of the reports for the management.

#### **4.3.3 OBJECTS OF ACCOUNTING**

Keeping in view the above scope, the objects of accounting may be list out as below:

1. To record business transactions,
2. To maintain proper books of account,
3. To prepare the required accounts,
4. To prepare Trial Balance to ensure arithmetical accuracy,

5. To find out values of assets and liabilities.
6. To ascertain the amount of capital,
7. To prepare financial statements, viz., trading account, profit and loss account, balance sheet, cash flow statement,
8. To interpret the operating and financial results,
9. To prepare the reports for the use by management.

### **CHECK YOUR PROGRESS**

Explain the meaning of Accounting

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### **STOP TO CONSIDER**

#### **Limitations of Accounting :**

The following are the limitations of accounting:

- (i) Recording of transactions is possible if it is a financial transaction. So the important limitation of accounting is that it fails to record non-monetary transactions.
- (ii) Accounting assumes no inflation. In other words it does not take into account the increase or decrease in money value.
- (iii) Accounting is based on certain principles which may vary from time to time or place to place. This limits the comparability of accounting information among business units.
- (iv) In accounting, provision or reserves are maintained which are estimated on certain assumptions. This may lower the acceptability of accounting information.
- (v) The information provided by accounting is historical in nature. The transactions and events are recorded after it has taken place. So the information included in financial statements is just past records.

- (vi) It is not free from bias and depends sometimes on a number of estimates, personal judgments etc. So it is based on subjective choice which lacks objectivity.
- (vii) In accounting there is a lot of room for window dressing. The management may entry wrong figures to artificially inflate or deflate the figure of profits, assets and liabilities and thus financial statements may not reveal true and fair vie of financial date.

#### 4.4.1 MEANING OF ACCOUNT

After knowing the meaning, of accounting you should be able to define the meaning of 'Account'. An account is a summary record of transactions of similar nature for a certain period. Summary record of transactions relating to a particular person is account of that person for the period concerned; summary record of transactions relating to a particular asset is account of that asset for the period concerned and so on. A businessman should classify and summarise all the business transactions of similar nature under respective groups. Each such group or head is known as an 'Account' or 'Account heads'. For example, all business transactions with 'KK Enterprise' are recorded under the heading 'Account of KK Enterprise' or 'KK Enterprise Account'. All transactions related to stationery are recorded under the heading 'Account of stationery' or 'stationery Account'. Account is abbreviated as 'A/C' or 'a/c'.

##### **Definition of Account:**

The term 'Account' has been defined by different authorities. One of the most important definitions of account has been given by R.N Carter.

According to R.N Carter, 'An account is a ledger record, in summarised form, of all the transactions that have taken place with the particular person and the value specified'. It is a device to record transactions of one single type of item. It may be better explained with the help of its format.



### Format of Account:

An account is generally prepared in "T" shape having two sides, left hand and right hand side. A specimen form of an account is given below.

Dr		Salary Account ('T' Shape)				Cr	
Date	Particulars	J. F	Amount Rs.	Date	Particulars	J. F	Amount Rs.

All accounts are divided into two sides. The left hand side of the account is called 'debit side'. It is indicated by 'Dr.' (abbreviation for debit) on the top corner of the left hand side. Right hand side of the account is called 'credit side'. It is indicated by 'Cr.' (abbreviation for credit) on the top corner of the right hand side of the account. The name of the account is written at the top in the centre. The word 'Account' or its abbreviation A/c is added to the name of the account. For example, Building A/c, Furniture A/c, Salary A/c, etc. The term 'J. F' means 'Journal Folio', i.e., the concerned folio (page) number in the Journal.

There is another type of format used generally by the businessman to record transactions. This format is called 'horizontal format'. This is shown below.

### Salary Account (Horizontal Type)

Date	Particulars	J. F	Dr. Amount Rs.	Cr. Amount Rs.	Balance Amount Rs.		Remark
					Dr	Cr	

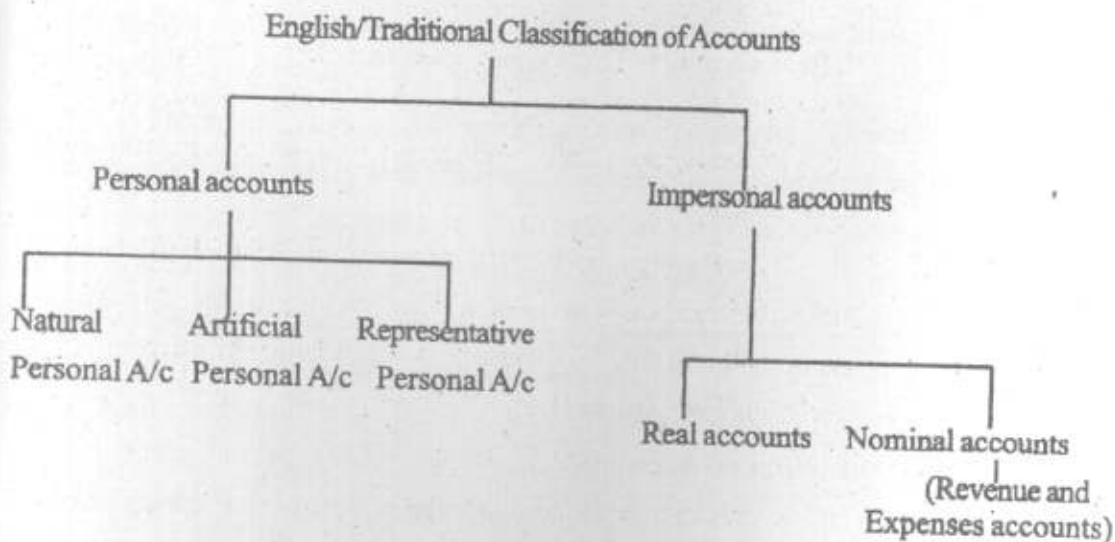
#### 4.4.2 CLASSIFICATION OF ACCOUNTS

For the purpose of recording transactions, classification of accounts (i.e., account heads) are necessary. There are two approaches for classification of accounts. These are:

1. English Approach or Traditional Approach and
2. American Approach or Modern Approach

These are discussed below:

##### 1. English Approach or Traditional Approach



The above classification is explained below:

**(a) Personal accounts:** Account heads relating to persons, firms, companies, etc. are classified into the following categories.

**i) Accounts of Natural persons:**

Account heads recording the transactions of individual human beings fall into the category of natural persons, for example, accounts of Hem, Vikash, Suresh, Jayanata, Raju etc.

**ii) Accounts of artificial persons :**

Accounts recording the transactions concerning a firm, company, institution, association, organisation etc. fall into this category. For example, Gauhati University A/c, Oil India Ltd. A/c, State Bank of India A/c, N.F Railway A/c, Guwahati Club A/c, etc.

**iii) Representative Personal Accounts:**

Representative personal accounts are the accounts which represent a certain person or a group of persons although the name of the concerned person or persons are not mentioned in the account head. Such type of account head occurs in cases of outstanding expenses, prepaid expenses, income receivable and income received in advance. For example, outstanding Salary, Salary Prepaid, Unexpired Insurance or Insurance paid in advance, Commission Received in Advance etc.

**(b) Impersonal accounts :** All those accounts, which are not personal accounts are termed as impersonal accounts. It is again classified into the following categories.

**i) Real Accounts :** The 'account heads' recording transactions relating to tangible things (which can be seen, touched or physically exchanged) such as goods, cash, land, building, machinery, etc. are classified as real accounts.

It may be mentioned here that there are some items which do not have a physical shape and which cannot be seen or touched but it can be bought and sold. For example, goodwill, patents, trademarks, copyrights, etc. also fall within the category of real accounts.

**ii) Nominal Accounts :** The accounts recording transactions relating to losses, expenses, incomes and gains are classified as nominal

accounts. For example, Salaries, Wages, Rent paid, Discount Allowed, Discount Received, Commission Received, Interest Paid, Interest Received etc.

## **2. American Approach or Modern Approach:**

According to the American approach or Modern approach, accounts are classified into five categories as under.

### **(a) Assets Account :**

The meaning of asset is property. Assets account are the accounts of properties such as land, building, plant, machinery, stock, patents, cash in hand, cash at bank, investments, inventory, etc. held by an entity. This category also includes the accounts of debtors.

### **(b) Liabilities Account:**

Liability means obligation to pay. Liabilities accounts are the accounts pertaining to the obligation of the entity to lenders, creditors for goods, creditors for assets, creditors for expenses, etc.

### **(c) Capital Account:**

Capital is the amount with which the business is started. It is the account of the owner who invests money in the business as capital.

### **(d) Revenue Accounts:**

Revenue accounts are the accounts of incomes and gains. For example, sales, discount received, interest received, commission received etc.

### **(e) Expense Accounts:**

Expense accounts are the accounts of expenses incurred and losses suffered by an entity. For examples, purchases, wages paid, depreciation, rent paid, rates and taxes, etc.

However, in case of sole proprietorship or partnership form of business, another account called 'Drawings Account' is also maintained in order to record the transactions relating to withdrawals of cash or goods made by the proprietor or partners for their personal use.

### **STOP TO CONSIDER**

#### **Rules for debit and credit**

**1. Under Buglish or Traditional approach the rules for debit and credit are as follows :**

(a) **Personal A/c** : Debit the receiver of benefit, credit the giver of benefit.

(b) **Real A/c** : Debit what comes in, credit what goes out.

(c) **Nominal A/c** : Debit Expenses and losses, credit gains and incomes.

**2. Under American or Modern approach the rules are :**

(a) **Assets A/c** : Debit when there is an increase in the value of asset. Credit when there is a decrease in the value of asset.

(b) **Liabilities A/c** : Debit when there is a decrease in the amount of liability. Credit when there is an increase in the amount of liability.

(c) **Capital A/c** : Debit when there is a decrease in the amount of capital. Credit when there is an increase in the amount of capital.

(d) **Revenue A/c** : Debit when there is a decrease in revenue. Credit when there is an increase in revenue.

(d) **Expense A/c** : Debit when there is an increase in expenses. Credit when there is a decrease in expenses.

### SELF ASKING QUESTION

Do you think there is any difference between Traditional classification of accounts and modern classification of accounts? Try yourself to compare are both the approaches.

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#### 4.5.1 MEANING OF ASSET

Let us explain the meaning of 'Asset' in accounting. The common meaning of asset is property. In accounting, assets are economic resources from which benefits will flow to the enterprise from its usage. Assets may be tangible or intangible. These are owned or controlled by

the firm to produce income or to generate services for use in generating income. Examples of assets are: land, building, plant, machinery, stock, patents, cash in hand, cash at bank, investments, inventory, etc.

From an accounting perspective, assets are divided into the following categories: current assets (cash and other liquid items of assets), long-term assets (real estate, plant, equipment), prepaid and deferred assets (expenditures for future costs such as insurance, rent, interest), and intangible assets (trademark, patents, copyrights, goodwill).

Again assets may be tangible and intangible. Tangible assets are physical resources like cash, real estate, plant, equipment etc. Intangible assets are nonphysical resources. Examples of intangible assets are trademark, patents, copyrights, goodwill, computer programmes etc.

Long-term assets are also called Fixed Assets. All Fixed assets are used in the business and subject to depreciation. The value of the fixed asset used up in the business in an accounting year is called depreciation. This depreciation (used up value) of the fixed asset is considered as business expense and charged to the income of the year. The balance value is shown in the Balance Sheet at the end of the year.

#### **4.5.2 MEANING OF LIABILITY**

Liability means obligation to pay. A liability is defined as an obligation of an entity arising from past transactions or events. Liabilities accounts are the accounts pertaining to the obligation of the entity to lenders, creditors for goods, creditors for assets, creditors for expanses, etc. When goods or assets are purchased on credit a liability is created. When services are taken/used and payment for the service is delayed or postponed a liability is created. When a loan is taken a liability is created. As and when a liability is created a duty or responsibility to others is also created that entails settlement of such liability by future transfer or use of entity assets. Liabilities are sources of fund.

From accounting point of view there are two types of liabilities. These are long term liabilities and Short term liabilities. Liabilities payable within 12 months of its creation are Short term liabilities and Liabilities payable after 12 months of its creation are long term liabilities. Short term liabilities are commonly called 'Current Liabilities'. Liabilities are shown in the balance sheet.



### **4.5.3 MEANING OF CAPITAL OR EQUITY**

Capital or Equity is the amount supplied or invested in the business by the owner of the business. Generally it is first supplied when the business is started. It is the account of the owner who invests money in the business as capital. Capital is invested in a business to generate income. Capital is represented by total assets less total liabilities. In the context of a company capital refers to share capital representing the owners' or shareholders' initial contribution to the business and the wealth that generates.

Capital is the major source of fund for any business. Capital is also called the residual amount of assets after the liabilities are paid off. In the Balance Sheet of a company it is the first item in the liability side.

### **4.5.4 INCOME AND EXPENSE**

Incomes are the revenues generated by an enterprise by using its resources. For example, sales, discount received, interest received, commission received etc. Expenses are the costs incurred to generate incomes. For examples, purchases, wages paid, depreciation, rent paid, rates and taxes, etc. These expenses and incomes are measured at the end of accounting year and compared to each other to ascertain profit or loss of the year.

It may be mentioned here that incomes and expenses may be measured either on cash basis or on accrual basis. In cash basis, incomes actually received in cash during the year are considered; and expenses incurred and paid during the year only are considered. In accrual basis all incomes, related to the accounting year, whether received in cash or not; and all expenses incurred, cash and credit both, related to the income of the concerned year are considered.

Incomes and expenses are shown in the Trading and Profit & Loss Account to find out profits.

### **4.5.5 REVENUE INCOME AND CAPITAL INCOME**

Revenue income is the inflow of cash, receivables or other consideration arising in the course of the ordinary activities of an enterprise from the sale of goods, from the rendering of services, and from the use by others of enterprise resources yielding interest, royalties and dividends.

Revenue is measured by the charges made to customers or clients for goods supplied and services rendered to them and by the charges and rewards arising from the use of resources by them. In an agency relationship, the revenue is the amount of commission and not the gross inflow of cash, receivables or other consideration (AS- 9).

Capital Income is the inflow of cash or other assets into the enterprise from the sources other than those explained above. For example: income from sale of capital assets like land, machinery etc.

#### **4.5.6 REVENUE EXPENDITURE AND CAPITAL EXPENDITURE**

Expenditure incurred for earning revenue income is called revenue expenditure. In other words these are the expenditure incurred in ordinary course of business. For example: purchase of raw materials, consumables, merchandise (saleable goods), payment of salary to the staff, payment of office rent, office expenses, selling expenses etc.

Expenditure incurred for acquiring long term assets like machinery, land, furniture etc are called capital expenditure. The object of capital expenditure is to increase the earning capacity. In other words, the expenditure, which results in increase in earning capacity of the firm, is called capital expenditure.

#### **SELF ASKING QUESTION**

Ask yourself the following questions,  
which of the following is a capital expenditure?

1. Purchase of furniture, office building etc.
2. Purchase of patent right, copy right etc.
3. Cost of repairing wrong a printer.
4. Cost of car.
5. Interest on borrowed money.

#### **4.5.7 FUNDAMENTAL ACCOUNTING EQUATION**

The Accounting Equation is related to the Elements of Financial statements, namely assets, liabilities, capital, incomes and expenses.

It is stated as below:

$$\text{Assets} + \text{Expenses} = \text{Capital} + \text{Liabilities} + \text{Income.}$$

$$\text{Or, Assets} = \text{Capital} + \text{Liabilities} + \text{Income} - \text{Expenses}$$

$$\text{Or, Assets} = \text{Capital} + \text{Liabilities} + \text{Profit (since Income} - \text{Expenses} = \text{Profit)}$$

$$\text{Or, Assets} = \text{Capital} + \text{Liabilities} - \text{Loss (since Expenses} - \text{Income} = \text{Loss)}$$

The owner will get profit and hence it will increase the capital. In the same way the owner will bear the loss and hence it will decrease the capital. Therefore these two items can be merged with capital. In such case we will get the following equation:

$$\text{Assets} = \text{Capital} + \text{Liabilities}$$

This equation is called Fundamental Accounting Equation.

### STOP TO CONSIDER

#### Example:

Mr. X started a business and invests Rs. 2,00,000. He took a bank loan of Rs. 50,000. Thus he had Rs. 2,50,000 as his fund. Thus Mr. X had Cash Rs. 2,50,000 from Capital Rs. 2,00,000 and Loan Rs. 50,000. Loan is a Liability and Cash is Asset.

This may be expressed in the form of equation:

$$\text{Asset Rs. 2,50,000} = \text{Capital Rs. 2,00,000} + \text{Liability Rs. 50,000}$$

$$\text{Or, Asset} = \text{Capital} + \text{Liability}$$

This is Fundamental Accounting Equation.

After doing some business suppose, he earns Rs. 30,000 income and spends Rs. 17,000 for expenses. This means, he gets Rs. 30,000 cash and spends Rs. 17,000 cash. So, now he has total cash of

$$\text{Rs. 2,50,000} + \text{Rs. 30,000} - \text{Rs. 17,000} = \text{Rs. 2, 63,000 cash.}$$

Now, the equation may be written as below:

$$\text{Asset Rs. 2,63,000} + \text{Expenses Rs. 17,000} = \text{Capital}$$

$$\text{Rs. 2,00,000} + \text{Liability Rs. 50,000} + \text{Income Rs. 30,000}$$

$$\text{Or, Asset Rs. 2,63,000} = \text{Capital Rs. 2,00,000} + \text{Liability Rs. 50,000} \\ + \text{Income Rs. 30,000} - \text{Expenses Rs. 17,000}$$

$$\text{Or, Asset Rs. 2,63,000} = \text{Capital Rs. 2,00,000} + \text{Liability Rs. 50,000} \\ + \text{Profit Rs. 13,000}$$

$$\text{Or, Asset Rs. 2,63,000} = \text{Capital Rs. 2,13,000} + \text{Liability Rs. 50,000}$$

(Profit can be merged with capital)

#### 4.5.8 DOUBLE-ENTRY SYSTEM

The Double-entry system of accounting is based on Dual Aspect concept. According to this concept, every financial transaction involves two - fold aspect - (a) receiving of a benefit (b) giving of a benefit. For example, if a business has acquired an asset, it must have given up some other asset such as cash. Thus a giver necessarily implies a receiver and a receiver necessarily implies a giver. These two aspects are known as 'Debit' aspect and 'Credit' aspect. Thus Double entry system states that each transaction has two fold aspects, debit and credit. The effects of these two fold aspects are opposite in nature. If one aspect, called account, receives a benefit, there must be another aspect or an account to impart that benefit. The system of accounting under which both the aspects of every transaction is recorded in the books of account is known as 'Double-entry system'.

The rules for 'Debit' and 'Credit' as applicable under Modern approach

Sl no.	Type of Account	To be debited in case of	To be credited in case of
(a)	Assets Account	Purchase/Increase	Sale/Decrease
(b)	Liabilities Account	Paid/Decrease	Owed/Increase
(c)	Capital Account	Withdrawn/Decrease	Added/Increase
(d)	Income Account	Decrease	Earned/Increase
(e)	Expense Account	Incurred/Increase	Decrease
(f)	Drawings Account	Made/Increase	Decrease

#### CHECK YOUR PROGRESS 2

What is Double Entry System of Accounting?

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#### 4.5.9 BOOKS OF ACCOUNTS

The book, which contains accounts, is known as the Books of Accounts. In other words, it means the khata or books in which the businessman keeps the records of business transactions.

Normally transactions are recorded in two sets of books step by step. Transactions are first recorded in Journal, which is also known as 'day books', 'book of original entry' or 'Primary Books'. The next step of recording of transactions is in Ledger, which is also known as 'book of final entry' or 'Secondary Books'. These Books of accounts are specially printed and ruled books where the accounts of a firm can be written up. In Journal transactions are recorded as and when they occur in chronological order (in order of date) from source documents. Recording in journal is made showing the accounts to be debited and credited in a systematic manner. Thus, the journal provides a date-wise record of all the transactions with details of the accounts and amounts debited and credited for each transaction with a short explanation, which is known as narration. Journals include :

1. Purchases daybook, for recording all credit purchases made for resale.
2. Sales daybook, for recording all credit sales of the goods purchased as above (Serial No. 1).
3. Purchases Return book, for recording all credit purchase (Serial No. 1) returns to suppliers.
4. Sales Return book, for recording all credit sales (Serial No. 2) returns by customers.
5. Bills Book (i) Bills Receivables and (ii) Bills Payables.
6. Cash book for recording all cash transactions.

#### 4.5.10 LEDGER AND ITS CLASSIFICATION

Ledger is a book of account which contains a condensed and classified record of all transactions of the business posted from the journal. It is also called the book of final entry. In other words, the book, which contains accounts, is known as the ledger, also called the Principal Book. Ledger provides necessary information regarding various accounts. Personal accounts in ledger show how much money firm owes to the creditors and the amount it can recover from its debtors. The real



accounts show the value of properties and also the value of stock. Nominal accounts reflect the sources of income and also the amount spent on various items.

In accounting all transactions are ultimately recorded in the ledger. In this book, separate accounts are opened for each 'account head' and all transactions relating to a particular 'account head' will be posted in the concerned account. An account for each person, each type of revenue, expense, assets and liability is opened in the ledger. For example, all transactions relating to a particular supplier, say Vivek will be posted to the account of Vivek. This helps in ascertaining the amount due to Vivek.

When Ledger is maintained manually it is generally in the form of a bound register. First few pages of the ledger has ordinary horizontal ruling for indexing. Remaining pages area ruled like an account and is consecutively numbered. The index pages are used for writing the names of accounts and the Folio No. (Page No.) where a particular account has been opened for easy location. The ledger may also be maintained in loose-leaf form instead of one bound book.

#### **Sub-divisions of Ledger:**

Ledgers may be sub-divided in the following manner:

##### **A. Personal Ledger**

- (i) Debtors' ledger or Sales Ledger and
- (ii) Creditors' ledger or Bought Ledger.

##### **B. General or Nominal Ledger.**

These are explained below :

**A. Personal Ledger :** The ledger which contains the accounts of persons, firms or organisations to whom goods are sold on credit or from which goods are bought on credit, is known as personal ledger. Generally personal ledgers are sub-divided into

- (i) Debtors' ledger or Sales Ledger and
- (ii) Creditors' ledger or Bought Ledger.

**(i) Debtor' ledger or Sales ledger :** In this ledger, the accounts of all Debtors for goods sold are maintained. Posting is made from Sales Day Book, Purchase Returns Book, Cash Book, Bills Receivable Book and Journal Proper for the transactions affecting the accounts of Debtors.

**(ii) Creditors' Ledger or Bought Ledger :** In this ledger, the



accounts of all Creditors for goods purchased are maintained. Posting is made from Purchases Day Book, Purchase Returns Book, Cash Book, Bill Payment Book and Journal proper for the transactions affecting the accounts of Creditors.

**(B) General Ledger :** This ledger contains all accounts other than the accounts of Debtors and Creditors for goods. All accounts falling in the category of Assets, Liabilities (except debtors and creditors for goods), Capital, Revenue and Expense are maintained in this proper ledger. For example, if a machine is sold to Ram on credit, his account will appear in General Ledger; again, if goods are sold to him on credit, his account will appear in the Debtors' Ledger. General Ledger is also known as Impersonal Ledger or Nominal Ledger.

**Format of a Ledger Account:**

There are two types of forms for writing up Ledger Accounts namely

(a) Horizontal form and (b) Vertical or 'T' form. These are discussed below.

**(a) Horizontal Ledger Account is ruled out as follows:**

**"Nameri Tea" Account**

Date	Particulars	J. F	Debit Amount (Rs.)	Credit Amount (Rs.)	Debit Or Credit	Balance (Rs.)

In this form of ledger, balance is ascertained after every transaction. This method is generally used in bank. Where the accounts are maintained in computers through the use of accounting software like Tally, accounts are also prepared in this form.

(b) A vertical or 'T' shaped form is ruled as under:-

**"Nameri Tea" Account**

Date	Particulars	J. F.	Amount (Rs.)	Date	Particulars	J. F.	Amount (Rs.)
1	2	3	4	1	2	3	4

**Closing and Opening Balance of account:**

The balances of account ascertained at the end of a particular period are known as closing balances. These balances become the opening balances in the next period. While balancing an account; if Debit side is found to be heavier, the balance is called 'Debit balance' and if Credit side is found to be heavier, the balance is called 'Credit balance'

**SELF ASKING QUESTION**

Try yourself to differentiate between a ledger and a journal.

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**4.6.1 CASH BOOK AND PASS BOOK**

Every organization requires cash for its various activities. So it has to keep proper account of cash received and cash expended. Most of the business transactions relate to receipt of cash, payments of cash, sale of goods and purchase of goods. So it is necessary to have proper books for each of such transactions. Cash book is a subsidiary book which records the receipts and payment of cash. With the help of cash book cash and bank balance can be checked at any point of time.

In order to deposit, receive, withdraw, pay any amount through a bank, an account is opened in the bank. The account holder as well as

the bank keeps records of all such deposits and withdrawals. Records of such deposits and withdrawals are made known to the account holder by the bank through a book. This book is called Pass Book. The account holder cannot make entries in the pass book but he can verify the entries with his records in the cash book.

**Types of cash book :**

The type of cash book is dependent upon the type of transactions we want to record in it. Thus the types of cash book may be as below-

**(A) Single column Cash Book**

1. Cash book having one column for Cash
2. Cash book having one column for Bank

**(B) Double Column Cash Book**

1. Cash Book having two columns, one for cash and another for bank.
2. Cash book having two columns - one for cash, another for discount.
3. Cash book having two columns - one for bank, another for discount.

**(C) Triple Column Cash Book**

1. Cash book having three columns - first for cash, second for bank and third for discount.

**(D) Multiple columns Cash Book :**

Cash book having columns for different categories of receipts and payments.

**STOP TO CONSIDER**

**Importance of cash book**

**Helpful in ascertaining the true cash position :** If Cash Book is not maintained the true position of cash can not be known. At any time the balance of cash as shown by the cash book must agree with the physical balance of cash in hand in the cash box.

**Helping in cash Management :** Cash Book helps in the control of cash transactions. It is maintained by every business, whether big or small in size. It is simply because every business must be very cautious about its cash management i.e., cash receipts and cash payments. The business must know the amount of cash that has been

collected/payments and have been made daily weekly and monthly and also the periodic balance of cash in hand, so that effective steps for utilization of cash balance can be taken.

**Helpful in preventing embezzlement :** The maintenance of cash book help in preventing embezzlement and manipulation. Unless cash book is maintained, the business will be in the dark about the daily cash position and this may increase the chance of committing frauds by the concerned staff.

**Serves as a documentary evidence for cash balance :** Cash Book serves as a documentary evidence for the available cash balances because the actual cash balance is compared by the cash balance as shown by Cash Book daily.

**Ascertainment of daily cash transactions :** Since all cash transactions are recorded in cash book, it is easy to ascertain the cash receipt and cash payment on daily basis from the cash book.

**Ascertainment of cash balance :** Cash balance can be known at any time by ascertaining the balance of the cash book at that point of time. There is no need of calculating actual cash in the box.

**Guard against defalcation :** The balance of cash as shown by the cash book can be verified with physical balance of cash in the cash box. This process of verification acts as a guard against defalcation of cash.

**Rectification of errors :** Any mistake or error can be detected as the time of verification of cash book. If there is a difference between the actual cash in the cash box and the balance as per cash book, it means there is some error.

### CHECK YOUR PROGRESS 3

Explain the meaning of Pass Book.

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#### 4.6.2 BANK RECONCILIATION STATEMENT

Bank Reconciliation Statement is a statement prepared to analyse the differences between Pass Book balance and Cash Book balance in order to reconcile the difference. It is an important segment of Final Accounts. Actually on a particular date the cash balance in bank as per pass book entry should be equal to the cash balance in bank as per cash book entry. But there are certain reasons for which there is disagreement between Pass Book balance and Cash Book balance. The Causes of differences are listed below. The causes are grouped into two classes:

**Group A causes** — These are the causes for which the balance in the Pass Book is shown higher than the balance in the Cash Book; Or causes for which the balance in the Cash Book is shown lower than the balance in the Pass Book. Example:

1. Cheque issued for payment but not presented to bank.
2. Interest and dividend credited in the Pass Book but not recorded in the cash book.
3. Any cash and cheque directly deposited into bank by any person without any information.
4. When cash is deposited into bank but no entry is passed in the cash book.

**Group B causes** — These are the causes for which the balance in the Pass Book is shown lower than the balance in the Cash Book; or causes for which the balance in the Cash Book is shown higher than the balance in the Pass Book. Example:

1. Cheque paid into bank for collection but not yet collected.
2. Bank charges and interest on overdraft debited in the Pass Book but no record is made in cash book.
3. Cheques and bills receivable discounted dishonoured and no record is made in cash book.
4. Cheque received is recorded in cash book as deposited into bank but actually no deposit is made.

#### CHECK YOUR PROGRESS

List out the three causes of disagreement of cash book balance and pass book balance.

- 1 .....
- .....

2	.....
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3	.....
	.....

#### 4.7.1 MEANING OF FINANCIAL STATEMENTS

Let us now explain the meaning and components of financial statements. Financial Statements are the end products of the accounting system. So these are also called Final Accounts. These include (i) Trading and profit and loss A/c (ii) Balance sheet and (iii) Cash Flow Statement. All these are also called financial statements. But Trading and profit and loss account are prepared to find out the profit or loss of the concerned accounting period. These are also called as Income Statement. The Balance sheet portrays the financial position of the firm on a particular date. It is also called as Position Statement. These two statements i.e. Trading and P&L account and Balance sheet are prepared to give the final results of the business that is why both are collectively called as Final Accounts. Final Accounts are prepared from the figures appearing in Trial Balance and additional information. Cash Flow Statement is prepared to show the inflow and outflow of fund during the period of accounting.

##### Components of 'financial statements':

Following are the components of financial statements:

(i) **Income statement** which is divided into two parts:

(a) **Trading Account** which shows the gross profit or gross loss;

(b) **Profit and Loss Account** which shows the net profit or net loss; and

(ii) **Balance Sheet.**

(iii) **Cash Flow Statement**

If the business entity carries on manufacturing activities, a Manufacturing account is also prepared by such business entity before the preparation of Trading Account.



### Check Your Progress 5

What are the components of financial statements?

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#### 4.7.2 PREPARATION OF FINANCIAL ACCOUNTS

In this part we shall concentrate to the preparation of financial accounts.

Preparation of Financial Accounts involves the preparation of:

- (a) Trading Account;
- (b) Profit and Loss Account; and
- (c) Balance Sheet.

#### 4.7.3 TRADING ACCOUNT

##### Meaning and Purpose:

Trading account is an account which is prepared for ascertaining the overall result of trading i.e. buying and selling of goods. Ascertainment of overall result of trading is the ascertainment of gross profit earned or gross loss incurred as a result of the trading activities by a business during a particular accounting period. In other words, it is prepared to show the result of buying and selling of goods. Hence, Trading account is an account which is prepared to find out the Gross Profit or Gross Loss of a certain accounting period. The formula for G.P is:

$$\text{Gross Profit} = \text{Sales} - \text{Cost of goods sold (COGS)}$$
$$\text{COGS} = \text{Opening Stock} + \text{Purchases} + \text{all direct expenses} - \text{Closing Stock.}$$

If the amount of sales exceeds the total amount of purchases and expenses directly connected with such purchases, the difference is

termed as gross profit. On the contrary, if the total of purchases and direct expenses exceed the sales, the difference is called gross loss. In this account, the amount of purchases of goods and also the expenses which are incurred in bringing those goods to a saleable state are recorded. In other words, all expenses which relate to either purchase of raw material or manufacturing of goods, called 'Direct Expenses', are recorded in the Trading Account. Thus, Trading account is a part of Income Statement.

#### **Contents of Trading Account:**

Trading Account is an account like any other account. It has two sides - Debit and Credit. All expenses which relate to either purchase or manufacturing of goods are written on the Debit side of the Trading Account.

#### **Items shown on the Debit side of the Trading Account:**

- (1) **Opening Stock (Opening Inventory)**
- (2) **Purchases,**
- (3) **Purchases Returns ,**
- (4) **Direct Expenses,**
  - I. Wages,            II. Carriage or Carriage Inward or Freight,
  - III. Manufacturing Expenses            IV. Dock Charges
  - V. Import Duty or Custom Duty            VI. Excise Duty
  - VII. Octroi            VIII. Royalty
  - IX. Packing Charges/Packing Expenses :

#### **Items shown on the Credit side of the Trading Account:**

- (1) **Sales**
  - (2) **Sales Returns**
  - (3) **Closing Stock (Closing Inventory)**
- (a) **Where the amount of Closing Stock is stated outside the Trial Balance :** Closing stock account will be posted to the credit side of the trading account and on the other hand, debit aspect of the closing stock account will be shown on the Assets side of the Balance Sheet, in order to complete the double entry.
- (b) **Where the amount of Closing Stock is stated inside the Trial Balance :** Closing Stock will not be shown in the Trading Account but will appear only on the Assets side of the Balance Sheet.

Again, the Closing Stock may be given both on the debit side and credit side of the Trial Balance. In such a case, the debit balance will be shown on the asset side of the balance sheet and the balance appearing on the credit will be shown on the credit side of the Trading account.

<p><b>Check Your Progress 6</b></p> <p>How is Gross Profit ascertained?</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p> <p>-----</p>
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**Format of Trading Account:**  
**Trading Account of M/s .....**  
**For the year ended on.....**

Dr

Cr

Particulars To Opening Stock	Amount (Rs.)	Particulars	Amount (Rs.)
To Purchases <i>Less: Purchase Returns</i> or Returns outward To Wages To Wages & Salaries To Direct Expenses To Carriage, or Carriage inward, or Carriage on Purchase To Duty on Purchase To Gas, Fuel and Power To Freight/ cartage To Manufacturing Expenses or Productive Expenses To Factory Expenses, Factory Lighting Factory Rent etc. To Octroi To Dock charges To Clearing charges		By Sales <i>Less: Sales Returns</i> or Returns inward By Closing Stock By Profit and Loss A/c <i>(Gross loss transferred)</i> (Balancing figure)	

To Import Duty or Custom Duty			
To Excise Duty			
To Insurance Premium (factory)			
To Royalty on production			
To Profit and Loss A/c (Gross Profit transferred)			

### STOP TO CONSIDER

#### Illustration

From the following information of M/S Goswami Brothers prepare a Trading Account for the year ended 31st March, 2011.

	Rs.
Stock on 1st April, 2007	8,000
Purchases	30,230
Sales Return	86
Purchases Return	530
Sales	67,500
Wages	7,000
Carriage Inward	400
Manufacturing Expenses	5,000
Stock on 31st March, 1999	7,550
Wages outstanding	50
Carriage outward	400

#### Solution:

#### In the books of M/S Goswami Brothers Trading Account

Dr For the year ended 31st March, 2011 Cr

Particulars	Rs	Particulars	Rs
To Opening stock	8,000	By Sales 67,500	
To Purchases 30,230		Less: Sales Return 86	67,414
Less: Purchases Return 530	29,700	By Closing stock	7,550
To Wages 7,000			
Add: Outstanding 50	7,050		
To Carriage Inward	400		
To Manufacturing expenses	5,000		
To Profit and Loss A/c (Gross Profit transferred)	24,814		
	74,964		74,964

**Note :** Normally, Manufacturing Expenses are taken to Manufacturing A/c., but from the question it appears that the firm is engaged in Trading activities and hence the same has been taken to Trading A/c.

#### 4.7.4 PROFIT AND LOSS ACCOUNT

According to R. N. Carter:

"A Profit & Loss Account is an account into which all gains and losses are collected, in order to ascertain the excess of gains over the losses or vice-versa".

Profit and Loss Account is a part of Income Statement. In this account, all indirect expenses such as administrative, selling, distribution and non-operating expenses are charged with the total of gross profit/gross loss and non-operating income in order to ascertain the Net Profit/Net Loss of the business.

A Profit and Loss Account starts with the amount of gross profit or gross loss brought down from the Trading Account. As such, all those expenses and losses which have not been debited to the Trading Account will now be debited to Profit & Loss Account. These expenses include administrative expenses, selling expenses, distribution expenses etc. These are called 'Indirect Expenses'. Profit and Loss Account is a Nominal Account and as such, all the expenses and losses are shown on its debit side and all the incomes and gains are shown on the credit side of this account.

Items shown on the Debit side of Profit & Loss Account :

(1) **Gross Loss**

(2) **Indirect Expenses**

**(a) Office and Administrative Expenses :** Expenses such as salary of office employees, office rent, lighting, postage, printing, stationery, audit fee, legal charges etc. are treated as Office and Administrative Expenses.

**(b) Selling and Distribution Expenses :** Expenses such as advertisement charges, commission, carriage outwards, bad-debts, packing charges etc. are treated as Selling and Distribution Expenses.

**(c) Financial charges :** Expenses such as interest on loan, interest on capital, interest on overdraft etc. are treated as financial charges.

**(d) Miscellaneous Expenses :** Expenses such as interest on loan, interest on capital, repair charges, depreciation, charity etc. are treated as Miscellaneous Expenses.

**(e) Other Losses :** Such as loss by fire, loss due to accident etc.

(f) **Provisions** : Such as Provision for Doubtful Debts, Provision for Discount on Debtors etc.

**Items shown on the Credit side of Profit & Loss Account :**

(1) **Gross Profit** :

(2) **Other Incomes and Gains** : All items of incomes and gains such as income from investments, rent received, discount received, commission earned, interest received, bad debts recovered etc. are shown on the credit side of the Profit & Loss Account.

A general format of a Profit and Loss Account is shown below in the table:

**Format of Profit and loss Account:**  
**Profit and loss Account of M/s .....**  
**For the year ended on.....**

By Trading A/c (Gross Loss transferred)	By Trading A/c (Gross Profit transferred )
<b>Office &amp; Administrative Expenses</b>	By Rent (Cr.)
To Salaries	By Rent of premises sub-let
To Salaries & Wages	By Discount received
To Rent, Rates & Taxes	Or Discount (Cr.)
To Printing & Stationery	By Commission Received
To Postage & Telegram	By Interest on Investments
To Lighting	By Dividend on Shares
To Insurance Premium (office)	By Sundry Receipts
To Telephone Charges	By Bad Debts Recovered
To Legal Charges	By Profit on sale of assets
To Audit Fees	By Income from other Sources
To Travelling Expenses	By Apprenticeship Premium
To Establishment Expenses	By Sale of Scraps
To Trade Expenses [see note (ii)]	By Royalty Received
To General Expenses	By Subsidy from Govt.
To Royalty on sales	By Interest on Drawings
To Establishment	By Capital A/c
To Commission to Office Manager	[Net Loss Transferred to]
<b>Selling and Distribution Expenses:-</b>	
To Carriage Outwards, or Carriage on Sales	
To Advertisement	
To Commission	
To Discount	
To Rebate	
To Brokerage	
To Bad debts	
To Export duty	
To Packing charges	
To Delivery Van Expenses.	
To Wages (Unproductive)	
To Commission to Sales Manager	
<b>Financial Charges :-</b>	
To Interest on .....	
To Bank Charges	
To Interest on Overdraft	



<b>Sundry expenses :-</b> To Sales Tax To Repairs To Depreciation on fixed assets To Entertainment Expenses To Contingencies To Conveyance Expenses To Donation and Charity To Loss on Sale of Assets <b>Provisions :-</b> To Provision for Doubtful Debts To Provision for Discount on Debtors To Capital A/c (Net Profit- Transferred)	
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### CHECK YOUR PROGRESS 7

Explain the meaning of Net Profit?

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### STOP TO CONSIDER

#### Illustration

From the following particulars, prepare a Profit & Loss Account of M/s Dutta & Sons for the year ending 31st March, 2011 :

Particulars	Rs.	Particulars	Rs.
Gross Profit	3,62,000	Discount allowed	2,000
Trade Expenses	2,000	Lighting	780
Carriage on Sales	10,000	Commission Received	840
Office Salaries	65,800	Bad-debts	1,200
Postage and Telegram	820	Discount (Cr.)	700
Office Rent	8,500	Interest on Loan	2,200
Legal Charges	400	Wages (Unproductive)	1,400
Audit fee	1,600	Export Duty	2,300
Donation	1,100	Miscellaneous Receipts	500
Sundry Expenses	360	Advertisement	4,100
Selling Expenses	5,320	Travelling Expenses	2,500

**Solution:**

**In the books of M/s Dutta & Sons**  
**Profit and Loss Account**  
**For the year ending on 31st March, 2011**

Dr.		Cr.	
Particulars	Amount Rs.	Particulars	Amount Rs.
To Trade expenses	2,000	By Trading Account	3,62,000
To Carriage on sales	10,000	(Gross Profit transferred)	
To Office Salaries	65,800	By Commission received	840
To Postage & Telegram	820	By Discount	700
To Office Rent	8,500	By Miscellaneous Receipts	500
To Legal charges	400		
To Audit Fee	1,600		
To Donation	1,100		
To Sundry expenses	360		
To Selling expenses	5,320		
To Discount allowed	2,000		
To Lighting	780		
To Bad Debts	1,200		
To Interest on Loan	2,200		
To Wages (Unproductive)	1,400		
To Export duty	2,300		
To Advertisement	4,100		
To Travelling expenses	2,500		
To Net Profit	2,51,660		
	<b>3,64,040</b>		<b>3,64,040</b>

**4.7.5 BALANCE SHEET**

According to A. Palmer: The Balance Sheet "is a statement at a particular date showing on one side the trader's property and possessions and on the other hand the liabilities."

According to Karlson : "A business form showing what is owed and what the proprietor is worth, is called a Balance Sheet."

According to J. R. Batliboi : "A Balance Sheet is a statement prepared with a view to measure the exact financial position of a business on a certain fixed date."

After ascertaining the net profit or loss of the business enterprise at the end of a particular period, the businessman would also like to know the financial position of his business as on that date. For this purpose a statement, wherein all the Assets and Liabilities of the business

enterprise are included, is prepared. The statement so prepared is called a Balance Sheet. After the transfer of all Revenue and Expense accounts either to the Trading Account or Profit & Loss Account, the balances of all accounts of Assets, liabilities are grouped and shown in the balance sheet. The balance sheet has two sides - Assets side and the Liabilities side. Assets are shown on the right hand side and the liabilities are shown on the left hand side of the Balance Sheet. The balance sheet is based on the equation that what an entity owns on a given date must be equal to what it owes on that date. The total of both sides of the balance sheet i.e. assets side and the liabilities side will always be equal. As this statement shows the position of assets and liabilities of an entity on a particular date, it is also known as 'Position Statement'. The definition of Balance Sheet as given by some authors are as follows :

**A Balance Sheet is prepared mainly for the following purpose:**

- (i) To ascertain the true financial position of the business at a particular point of time,
- (ii) To find out whether the business entity is solvent or not,
- (iii) To ascertain the nature and value of various assets and liabilities of the business at the end of the financial year.
- (iv) To know the exact amount of capital at the end of the year and the addition or deduction made into it in the current year.

**The steps for preparation of a balance sheet are as follows:**

- (i) All accounts of Assets appearing on the debit side of the trial balance will be shown on the 'Assets side of the balance sheet' except drawings account which will be shown on the liabilities side as a deduction from Capital account.
- (ii) All the accounts of appearing on the credit side of the trial balance will be shown on the 'Liabilities side of the balance sheet'.
- (iii) Net profit / Net Loss as shown by the Profit and Loss Account will be added / deducted from capital on the liabilities side of the balance sheet.
- (iv) The assets and liabilities should be shown under proper groups.
- (v) The assets and liabilities should be shown in certain order.

The assets and liabilities as shown in the balance sheet are generally grouped under certain heads. The term 'grouping' means putting

similar items under a common heading. The assets are grouped as (i) Fixed assets; (ii) Current assets; and (iii) Fictitious Assets. The liabilities are grouped as (a) Internal liabilities (Capital, net profit reserve etc.); and (b) External liabilities.

**Following is the Proforma of a Balance Sheet**

<b>BALANCE SHEET</b> as on or as at.....	
<b>LIABILITIES</b>	<b>ASSETS</b>
<p><b>Capital</b>  <i>Add: Net Profit</i>  <i>Less: Net Loss</i>  <i>Less: Drawings</i></p> <p>Reserves</p> <p><b>Fixed Liabilities :</b>            Long term loans</p> <p><b>Current Liabilities :</b>            Unearned Income            Outstanding expenses            Bills Payable            Sundry Creditors            Bank Overdraft</p>	<p><b>Fixed Assets :</b>            Goodwill            Patents            Land and Building            Plant and Machinery            Furniture            Motor Vehicle            Loose Tools            Long Term Investments</p> <p><b>Current Assets :</b>            Prepaid Expenses            Accrued Income            Closing Stock            Sundry Debtors            Short Term Investments            Bills Receivable            Cash at Bank            Cash in hand</p>

There are two different formats for preparation of balance sheet. They are (i) Horizontal form; and (ii) Vertical form.

**(i) Horizontal form:**

Horizontal form is also called 'T form' under which the assets are shown on the right hand side and liabilities are shown on the left hand side. The total of both the sides of a balance sheet must be equal. Generally, non-corporate entities prepare their balance sheets in horizontal form.

**(ii) Vertical form:**

Vertical form is a form under which liabilities and assets are shown one after another in vertical order. Under this form of presentation of

balance sheet an additional column is provided to present figures of previous year along with current years figures. This helps in comparison of business over a period of time. Now-a-days, all the corporate entities present their balance sheet in vertical form.

### STOP TO CONSIDER

#### Illustration

From the following balances of M/S Bora Brothers, prepare a Balance Sheet as on 31st December, 2011.

Debit balances	Amount Rs	Credit balances	Amount Rs
Land and Building	80,000	Bank Overdraft	20,000
Plant and Machinery	52,000	Creditors	21,000
Furniture	10,000	Bills Payable	7,000
Investments	27,000	Reserve	12,000
Cash in hand	3,000	Capital	1,60,000
Debtors	40,000	Net Profit	73,000
Bills Receivable	12,000		
Closing Stock	54,000		
Drawings	15,000		
	<b>2,93,000</b>		<b>2,93,000</b>

**Solution:**

**M/S Bora Brothers**  
**BALANCE SHEET**  
**As on 31st December, 2011**

Liabilities	Amount Rs	Assets	Amount Rs
Bank Overdraft	20,000	Cash in hand	3,000
Bills Payable	7,000	Bills Receivable	12,000
Creditors	21,000	Investments	27,000
Reserve	12,000	Debtors	40,000
Capital	1,60,000	Closing Stock	54,000
Add, Net Profit	73,000	Furniture	10,000
	2,33,000	Plant and Machinery	52,000
Less, drawings	<u>15,000</u>	Land and Building	80,000
	<b>2,18,000</b>		
	<b>2,78,000</b>		<b>2,78,000</b>

#### 4.8 MEANING OF CASH FLOW STATEMENT

Cash Flow Statement (CFS) is the summary statement of a company's cash receipts and cash disbursements over a period of time. It also explains reasons for the changes in cash position of the firm. It is a statement of movement of cash flows. Cash flows are cash inflows and outflows. Transactions which increase the cash position of the entity are called as inflows of cash and those which decrease the cash position as outflows of cash.

The cash flow statement is the financial tool that measures the cash flow of a company. It is statement, which shows the sources from which cash has been generated and how it has been spent during a period of time. In other words it is an analysis of all the changes that affect the cash account during an accounting period. These changes may be shown as either sources or uses of cash.

Cash Flow Statement is one of the mandatory financial statements of a company registered under Companies Act 1956. Cash Flow Statement is prepared by applying the norms given in the Accounting Standard 3 - 'Cash Flow Statement' issued by the Council of the Institute of Chartered Accountants of India.

Accounting Standard 3 requires that the cash flow statement of an enterprise should report cash flows during the period by grouping various activities into three broad classes. These classes of activities are operating, investing and financing activities. An enterprise shall present its cash flows from operating, investing and financing activities in a manner which is most appropriate to its business. For a business enterprise interest received on fixed deposit from a bank is regarded as investing activity while for a bank the interest paid on fixed deposit is regarded as operating activity. Again a single transaction may include cash flows from different activities. For example, when the instalment paid in respect of a fixed asset acquired on instalment payment basis includes both interest and loan, the interest portion is classified under financing activities and the loan portion is classified under investing activities.

Classification by activity provides information that allows users of the statement to assess the impact of those activities on the financial position of the enterprise and the amount of its cash and cash equivalents. This information may also be used to evaluate the relationships among those activities.



#### 4.9 SUMMING UP :

In this unit we have discussed the following points -

- Meaning, scope and objects of Accounting. It is the art of recording, classifying and summarizing in a significant manner and in terms of money, transactions and events which are, in part at least, of a financial character, and interpreting the results thereof.
- Transactions are first recorded in Journal, which is also known as 'Day Books' or 'book of original entry' or 'Primary Books'. The next step of recording of transactions is in Ledger, which is also known as 'book of final entry' or 'Secondary Books'.
- The Double-entry system of accounting is based on Dual Aspect concept: (a) receiving of a benefit (b) giving of a benefit. These two aspects are known as 'Debit' aspect and 'Credit' aspect.
- Financial Statements are the end products of the accounting system. So these are also called Final Accounts. Final accounts include (i) Trading and profit and loss A/c (ii) Balance sheet. All these are also called financial statements.
- Trading account is an account which is prepared for ascertaining the overall result of trading i.e. buying and selling of goods.
- A Profit & Loss Account is an account into which all gains and losses are collected, in order to ascertain the excess of gains over the losses or vice-versa.
- The Balance Sheet is a statement at a particular date showing the trader's property and possessions and the liabilities. It is a statement prepared with a view to measure the exact financial position of a business on a certain fixed date.

#### 4.10 GLOSSARY

- **Accounting** : Accounting refers to the system involved in making a financial record of business transactions and in the preparation of statements concerning the assets, liabilities, capital and operating results of the business.

- **Asset :** In accounting, assets are economic resources from which benefits will flow to the enterprise from its usage.
- **Liability:** A liability is defined as an obligation of an entity arising from past transactions or events.
- **Capital :** Capital or Equity is the amount invested in the business by the owner of the business. Capital is represented by total assets less total liabilities. In the context of a company capital refers to share capital representing the shareholders' contribution to the business.
- **Income:** Incomes are the revenues generated by an enterprise by using its resources.
- **Expense:** Expenses are the costs incurred to generate incomes.
- **Bank Reconciliation Statement:** Bank Reconciliation Statement is a statement prepared to analyse the differences between Pass Book balance and Cash Book balance in order to reconcile the difference.
- **Financial Statements :** Financial Statements are the end products of the accounting system. So these are also called Final Accounts. These include (i) Trading and profit and loss A/c (ii) Balance sheet and (iii) Cash Flow Statement.
- **Balance Sheet :** A Balance Sheet is a statement prepared with a view to measure the exact financial position of a business on a certain fixed date.
- **Cash Flow Statement:** Cash Flow Statement is prepared to show the inflow and outflow of fund during the period of accounting

#### 4.11 ANSWERS TO CHECK YOUR PROGRESS

##### ANSWERS TO CHECK YOUR PROGRESS 1

"Accounting is the art of recording, classifying and summarizing in a significant manner and in terms of money, transactions and events which are, in part at least, of a financial character, and interpreting the results thereof."

### **ANSWERS TO CHECK YOUR PROGRESS 2**

The system of accounting under which both the aspects of every transaction is recorded in the books of account is known as 'Double-entry system'.

### **ANSWERS TO CHECK YOUR PROGRESS 3**

Records of bank deposits and withdrawals are made in a small book by the bank and given to the accountholder; this book is called Pass Book.

### **ANSWERS TO CHECK YOUR PROGRESS 4**

1. Cheque issued for payment but not presented to bank.
2. Interest and dividend credited in the Pass Book but not recorded in the cash book.
3. Any cash and cheque directly deposited into bank by any person without any information.

### **ANSWERS TO CHECK YOUR PROGRESS 5**

The components of financial statements are :

- (i) Income statement which is divided into two parts:
- (ii) Balance Sheet.
- (iii) Cash Flow Statement

### **ANSWERS TO CHECK YOUR PROGRESS 6**

If the amount of sales exceeds the total amount of purchases and expenses directly connected with such purchases, the difference is termed as gross profit.

### **ANSWERS TO CHECK YOUR PROGRESS 7**

Net Profit = Gross Profit - (all indirect expenses such as administrative, selling, distribution and non-operating expenses).

### **4.12. REFERENCES & SUGGESTED READINGS.**

1. Theory and Practice of Financial Accounting by B B Dam, H C Gautam and others; Capital Publishing House, Guwahati
2. Financial Accounting by Ashis Bhattacharya, Prentice hall of India Pvt. Ltd, New Delhi.
3. Financial Accounting, by S. N. Maheshwari, Vikash Publishing House Pvt. LTd., New Delhi.

