GLOSSARY 151 GLOSSARY The Association of South-East Asian Nations (ASEAN) : It is a political, economic, and cultural organisation of countries located in South-east Asia—Thailand, Indonesia, Malaysia, Singapore, the Philippines, Brunei Darussalam, Cambodia, Laos, Myanmar and Vietnam. Balance of Payments (BOP) : It is a statistical statement summarising all the external transactions (receipts and payments) on current and capital account in which a country is involved over a period of time, say, a year. As the BOP shows the total assets and obligations over a time-period, it always balances. Barriers to Entry : This refers to the factors which make it disadvantageous for new entrants to enter an industry as compared with the firms already established within the industry. Better Compliance : Obeying or complying with the Government regulation. It is referred to usually in case of payment of taxes and dues to the Government. Bilateral Trade Agreements : The agreements relating to exchange of commodities or services between two countries. Brundtland Commission : A Commission established by United Nations Organisation in 1983 to study the world's environmental problems and propose agenda for addressing them. It came out with a report. The definition provided by the Commission for the term, 'sustainable development', is very popular and widely cited all over the world. Budgetary Deficit : A situation when the government's income and tax receipts fail to cover its expenditures. Bureau of Energy Efficiency (BEE) : It is a government organisation that aims to develop policies and strategies with a thrust on self regulation and market principles. It promotes energy conservation in different sectors of the economy and undertakes measures against the wasteful uses of electricity. Business Process Outsourcing (BPO) : Outsourcing of business processes (activities constituting a service) by companies to other companies. This term is frequently associated with outsourcing of such activities (e.g. receiving and making calls on behalf of other companies popularly known as call centres), by foreign companies to Indian companies in the field of IT-enabled services. Rationalised 2023-24 152 INDIAN ECONOMIC DEVELOPMENT Carrying Capacity : It is the measure of habitat to indefinitely sustain a population at a particular density. A more technical definition for carrying capacity is the largest size of a density-dependent population for which the population growth rate is zero. Hence, below carrying capacity, populations will tend to increase, while they will decrease above carrying capacity. Population size decreases above carrying capacity due to either reduced survivorship (e.g. due to insufficient space or food) or reproductive success (e.g. due to insufficient food, or behavioural interactions), or both. The carrying capacity of an environment will vary for different species in different habitats, and can change over time due to a variety factors, including trends in food availability, environmental conditions and space. Cascading Effect : When tax imposition leads to a disproportionate rise in prices, i.e. by an extent more than the rise in the tax, it is known as cascading effect. Cash Reserve Ratio (CRR) : A proportion of the total deposits and reserves of the commercial banks that is to be kept with the central bank (RBI) in liquid form. It is used as a measure of control of RBI over the commercial banks. Casual Wage Labourer : A person who is casually engaged in others' farm or non-farm enterprises and, in return, receives wages according to the terms of the daily or periodic work contract. Colonialism : The practice of acquiring colonies by conquest or other means and making them dependent. It also means extending power, control or rule by a country over the political and economic life of areas outside its borders. The main feature of colonialism is exploitation. Commercialisation of Agriculture : It implies production of crops for the market rather than for self-consumption i.e. family consumption. During the British rule, the commercialisation of agriculture acquired a different meaning —it became basically commercialisation of crops. The British started offering higher price to farmers for producing cash crops rather than for food crops. They used these cash crops as raw materials for industries in Britain. Communes : Known as people's communes, or renmin gongshe in China, were formerly the highest of three administrative levels in rural areas in the period from 1958 to 1982-85, when they were replaced by townships. Communes, the largest collective units, were divided in turn into production brigades and production teams. The communes

had governmental, political, and economic functions. Consumption Basket : Group of goods and services consumed by a household. In order to estimate the consumption pattern of people, statistical agencies identify such items. For instance NSSO has identied 19 groups of items in the consumption basket. Some of them are (i) cereals (ii) pulses Rationalised 2023-24 GLOSSARY 153 (iii) milk and milk products (iv) edible oil (v) vegetables (vi) fuel and light and (vii) clothing. Default : Failure to make repayment of the principal and interest on a debt e.g. sovereign debt (loan obtained by the government) to the lenders, say, international financial institutions, on the scheduled date, causing loss of credibility as a debtor. Deficit Financing : A situation where the expenditure of the government exceeds its revenue. Demographic Transition : It is a concept developed by demographer Frank Notestein in 1945 to describe the typical pattern of falling death and birth rates in response to better living conditions associated with economic development. Notestein identified three phases of demographic transition, pre-industrial, developing and modern industrialised societies. Later another phase, post-industrial was also included. Dereservation : Allowing an individual or group of enterprises to produce goods and services which were hitherto produced by a particular individual or group of enterprises. In India, it refers to allowing large-scale industries to produce goods and services which were produced only by the smallscale industries. Devaluation : A fall in the exchange rate which reduces the value of a currency in terms of other currencies. Disinvestment : A deliberate sale of a part of the capital stock of a company to raise resources and change the equity and/or management structure of a company. Employers : Those self-employed workers who by and large, run their enterprises by hiring labourers. Enterprise : An undertaking owned and operated by an individual or by group of individuals to produce and/or distribute goods and/or services mainly for the purpose of sale, whether fully or partly. Equities : Shares in the paid up capital or stock of a company whose holders are considered as owners of the company with voting rights and dividends in the profit. Establishment : An enterprise which has got at least one hired worker for major part of the period of operation in a year. European Union : It is a union of twenty-five independent states founded to enhance political, economic and social cooperation within the European continent. The member countries of European Union are Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Rationalised 2023-24 154 INDIAN ECONOMIC DEVELOPMENT Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom, Malta, Poland, Slovakia and Slovenia. Export Duties : Taxes imposed on goods exported from a country. Export Promotion : A set of measures (including fiscal and commercial support measures and steps aimed at removal of trade barriers) taken by a government to promote the export of goods with a view to achieve higher economic growth and accumulation of foreign exchange earnings. Export-Import Policy : The economic policies of the government relating to its exports and imports. Family labour/worker : A member who works without receiving wages in cash or in kind in a farm, an industry, business or trade conducted by the members of the family. Financial Institutions : Institutions that engage in mobilisation and allocation of savings. They include commercial banks, cooperative banks, developmental banks and investment institutions. Fiscal Management : The use of taxation and government expenditure to regulate the economic activities. Fiscal Policy : All the planned actions of a government in mobilising financial resources for meeting its expenditure and regulating the economic activities in a country. Foreign Direct Investment : Investment of foreign assets into domestic structures, equipment and organisations. It does not include foreign investment into the stock markets. Foreign direct investment is thought to be more useful to a country than investments in the equity of its companies because equity investments are potentially ‘hot money’ which can leave at the first sign of trouble, whereas FDI is durable and generally useful whether things go well or badly. Foreign Exchange : Currency or bonds of another country. Foreign Exchange Markets : A market in which currencies are bought and sold at rates of exchange fixed now, for delivery at specified dates in the future. Foreign Institutional Investment :

Foreign investments which come in the form of stocks, bonds, or other financial assets. This form of investment does not entail active management or control over the firms or investors. Foreign Institutional Investors (FIIs) : Banking and non-banking financial institutions of foreign origin e.g. commercial banks, investment banks, mutual funds, pension funds or other such institutional investors (as distinct from the domestic financial institutions investing) whose investment Rationalised 2023-24 GLOSSARY 155 in stocks and bonds in the country through stock markets have significant influence. Formal Sector Establishments : All the public sector establishments and those private sector establishments which employ 10 or more hired workers. G-20 : A forum of countries that intents to promote global economic stability and sustainable growth. This forum brings together finance ministers and central bank governors from 19 countries: Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, The Republic of Korea, Mexico, Russia, Saudi Arabia, South Africa, Turkey, The United Kingdom, The United States of America. The European Union is also a member of G-20 and is represented by the President of the European Council and by Head of the European Central Bank. G-8 : The Group of Eight (G-8) consists of Canada, France, Germany, Italy, Japan, the United Kingdom of Great Britain and Northern Ireland, the United States of America, and Russian Federation. The hallmark of the G-8 is an annual economic and political summit meeting of the heads of government with international officials, though there are numerous subsidiary meetings and policy research.The Presidency of the group rotates every year. For the year 2006 it was held by Russia. Goods and Services Tax : It is a single indirect tax on the supply of goods and services. It was introduced in July 2017 by abolishing a variety of taxes, such as sales tax and excise that prevailed in India. Under GST, tax is imposed on the basis of value addition at each stage of the movement of goods and services. Different slabs of tax rates, such as 0 per cent, 5 per cent, 12 per cent, 18 per cent and 28 per cent, are imposed on almost all goods and services. This slab is same throughout the country. Gratuity : An amount of money given by the employer to the employee at the time of retirement for services rendered by the employee. Gross Domestic Product : The total value of final goods and services produced within a country's borders in a year, regardless of ownership. It is used as one of many indicators of the standard of living in a country, but there are limitations with this view. Gross Value Added: The sum of a country's GDP and net of subsidies and taxes in the economy (GVA=GDP+Subsidies–indirect taxes). Household : A group of persons normally living together and taking food from a common kitchen. The word 'normally' means that temporary visitors are excluded and those who temporarly staying away are included. Import Licensing : Permission required from the government to import goods into a country. Import Substitution : A policy of the state for development of economy in which import of goods is generally substituted by domestic production (through import controls, tariffs and other restrictions) with a view to encourage domestic industry on grounds of self-sufficiency and domestic employment. Rationalised 2023-24 156 INDIAN ECONOMIC DEVELOPMENT Infant Mortality Rate : It is the number of deaths of infants before reaching the age of one, in a particular year, per 1,000 live births during that year. Inflation : A sustained rise in the general price level. Informal Sector Enterprises : Those private sector enterprises, which employ less than 10 workers on a regular basis. Integration of Domestic Economy : A situation where the policies of government facilitate free trade and investment with other countries making the domestic economy work together with other economies in an efficient and mutually interdependent way. Invisibles : Various items enter in the current account of the balance of payments, some of which are not visible goods. Invisibles are mainly services, like tourism, transport by shipping or by airways, and financial services such as insurance and banking. They also include gifts sent abroad or received from abroad and private transfer of funds, government grants and interests, profits and dividends. Labour Laws : All the rules and regulations framed by the government to protect the interests of the workers. Land/Revenue Settlement : With the British acquiring territorial rights in different parts of India, administration of territories was formulated on

the basis of survey of land. It was decided in the interests of government in terms of revenues to be collected from each parcel of land in possession of either a ryot (means peasant) or a mahal (revenue village) or a zamindar (a proprietary land holder). Decision in each of these cases was meant for the rights of the latter over land for the purposes of either ownership of land or rights to cultivation. This system is known as land/revenue settlement. There were different land settlements formulated in India. They are (i) system of permanent settlement, which is also known as the zamindari system (ii) ryotwari system (a system of revenue settlement entered into by the government with individual tenants) (iii) mahalwari system (a system of revenue settlement entered into by the government with a mahal). Life Expectancy at Birth (years) : The number of years a newborn infant would live if prevailing patterns of age-specific mortality rates at the time of birth were to stay the same throughout the child's life. Maternal Mortality Rate : It is the relationship between the number of maternal deaths due to childbearing by the number of live births or by the sum of live births and foetal deaths in a given year. Merchant Bankers : Banks or financial institutions, also known as investment bankers, that specialise in advising the companies and managing their equity and debt requirement (often referred to as portfolio management) through floatation and sale/purchase of stocks and bonds. Morbidity : It is the propensity to fall ill. It affects a person's work by making him or her temporarily disabled. Prolonged morbidity may lead to mortality. Rationalised 2023-24 GLOSSARY 157 In our country, acute respiratory infections and diarrhoea are two major causes of morbidity. Mortality rate : The word 'mortality' comes from 'mortal' which originates from the Latin word mors (meaning death). It is the annual number of deaths (from a disease or in general) per 1,000 people. It is distinct from morbidity rate, which refers to the number of people who have a disease compared to the total number of people in a population. MRTP Act : An Act (Monopolies Restrictive Trade Practices Act) framed to prevent monopolistic practices and regulate the conduct or business practices of firms that are not in public interest. Multilateral Trade Agreements : Trade agreements made by a country with more than two nations to exchange goods and services. National Product/Income : Total value of goods and services produced in a country plus income from abroad. Nationalisation : Transfer of ownership from private sector to public sector. This involves take over of companies owned by individuals or group of individuals by either state or central government. In some contexts, it also involves transfer of ownership from state government to central government. New Economic Policy : A term used to describe the policies adopted in India since 1991. Non-renewable Resources : Resources that cannot be renewed. They have a finite, even if large, stock. Some examples are fossils fuels such as oil and coal and mineral resources—iron, lead, aluminum, uranium. Non-tariff Barriers : All the restrictions on imports by a government in the form other than taxes. They mainly include restrictions on quantity and quality of goods imported. Opportunity Cost : It is defined with respect to a particular value or action and is equal to the value of the foregone alternative choice or action. Pension : A monthly payment to a worker who has retired from work. Per Capita Income : Total national income of a country divided by its population in a specific period. Permit License Raj : A term used to denote the rules and regulations framed by the government to start, run and operate an enterprise for production of goods and services in India. Planning Commission : An organisation set up by the Government of India. It is responsible for making assessment of all resources of the country, augmenting deficient resources, formulating plans for the most effective and balanced utilisation of resources and determining priorities. Poverty Line : The per capita expenditure on certain minimum needs of a person including food intake of a daily average of 2,400 calories in rural areas and 2,100 calories in urban areas. Private Sector Establishments : All those establishments, which are owned and operated by individuals or group of individuals. Rationalised 2023-24 158 INDIAN ECONOMIC DEVELOPMENT Productivity : Output per unit of input employed. Increase in the efficiency on the part of capital or labour leads to increase in productivity. This term is generally used to refer to productivity increase in labour inputs. Provident

Fund : A savings fund in which both employer and employee contribute regularly in the interest of the employee. It is maintained by the government and given to the employee when he or she resigns or retires from work. Public Sector Establishments : All those establishments which are owned and operated by the government. They may be run either by local government, state government or by central government independently or jointly. Quantitative Restrictions : Restrictions in the form of total quantities or quotas imposed on imports to reduce balance of payments (BOP) deficit and protect domestic industry. Regular Salaried/Wage Employee : Persons who work in others' farm or non-farm enterprises and, in return, receive salary or wages on a regular basis (i.e. not on the basis of daily or periodic renewal of work contract). They include not only persons getting time wage but also persons receiving piece wage or salary and paid apprentices, both full time and part-time. Renewable Resources : Resources that can be renewed through natural processes if they are used wisely. Forests, animals and fishes, if not overexploited, get easily renewed. Water is also in that category. South Asian Association for Regional Cooperation (SAARC) : It is an association of eight countries of South Asia — Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka and Afghanistan. SAARC provides a platform for the peoples of South Asia to work together in a spirit of friendship, trust and understanding. It aims to accelerate the process of economic and social development in member countries. Self-employed : Those who operate their own farm or non-farm enterprises or are engaged independently in a profession or trade with one or a few partners. They have freedom to decide how, where and when to produce and sell or carry out their operation. Their earning is determined wholly or mainly by sales or profits from their enterprises. Social Security : A government or privately established system of measures, which ensures material security for the elderly, disabled, destitute, widows and children. It includes pension, gratuity, provident fund, maternal benefits, health care etc. Special Economic Zone (SEZ) : It is a geographical region that has economic laws different from a country's typical economic laws. Usually the goal is to increase foreign investment. Special Economic Zones have been established in several countries, including the People's Republic of China, India, Jordan, Poland, Kazakhstan, the Philippines and Russia. Rationalised 2023-24 GLOSSARY 159 Stabilisation Measures : Fiscal and monetary measures adopted to control fluctuations in the balance of payments and high rate of inflation. State Electricity Boards (SEBs) : These are part of the state administration that generate, transmit and distribute electricity in different states. Statutory Liquidity Ratio (SLR) : A minimum proportion of the total deposits and reserves to be maintained by the banks in liquid form as per the regulations of the central bank (RBI). Maintenance of SLR, in addition to the Cash Reserve Ratio (CRR), is an obligation of the banks. Stock Exchange : A market in which the securities of governments and public companies are traded. It provides the facilities for stock brokers to trade company stocks and other securities. Stock Market : An institution where stocks and shares are traded. Structural Reform Policies : Long-term measures like liberalisation, deregulation and privatisation aimed to improve the efficiency and competitiveness of the economy. Tariff : A tax on imports, which can be levied either on physical units, e.g. per tonne (specific) or on value. Tariffs may be imposed for a variety of reasons including: to raise government revenue, to protect domestic industry from subsidised or low-wage imports, to boost domestic employment, or to ease a deficit on the balance of payments. Apart from the revenue that they raise tariffs achieve little good—they reduce the volume of trade and increase the price of the imported commodity to consumers. Tariff Barriers : All the restrictions on imports by a government in the form of taxes. Trade Union : An organisation of workers formed for the purpose of addressing its members' interests in respect of wages, benefits, and working conditions. Unemployment : A situation in which all those who, owing to lack of work, are not working but either seek work through employment exchanges, intermediaries, friends or relatives or by making applications to prospective employers or express their willingness or availability for work under the prevailing condition of work and remunerations. Urbanisation : Expansion of a metropolitan area,

namely the proportion of total population or area in urban localities or areas (cities and towns), or the increase of this proportion over time. It can thus represent a level of urban population relative to total population of the area, or the rate at which the urban proportion is increasing. Both can be expressed in percentage terms, the rate of change expressed as a percentage per year, decade or period between censuses. Worker-Population Ratio : Total number of workers divided by the population. It is expressed in percentage. Rationalised 2023-24 NOTESo Rationalised 2023-24INDIAN ECONOMIC DEVELOPMENT TEXTBOOK FOR CLASS XI Rationalised 2023-24 OFFICES OF THE PUBLICATION DIVISION, NCERT NCERT Campus Sri Aurobindo Marg New Delhi 110 016 Phone : 011-26562708 108, 100 Feet Road Hosdakere Halli Extension Banashankari III Stage Bengaluru 560 085 Phone : 080-26725740 Navjivan Trust Building P.O. Navjivan Ahmedabad 380 014 Phone : 079-27541446 CWC Campus Opp. Dhankal Bus Stop Panihati Kolkata 700 114 Phone : 033-25530454 CWC Complex Maligaon Guwahati 781 021 Phone : 0361-2674869 ISBN 81-7450-551-2 11100 – INDIAN ECONOMIC DEVELOPMENT Textbook for Class XI First Edition February 2006 Phalguna 1927 Reprinted October 2006, December 2007, December 2008, January 2010, January 2011, March 2012, January 2013, January 2014, December 2014, February 2016, January 2017, January 2018, February 2019, December 2019, February 2021 Revised Edition January 2023 Pausha 1944 PD 50T HK © National Council of Educational Research and Training, 2006, 2023 ` 105.00 Publication Team Head, Publication : Anup Kumar Rajput Division Chief Production Officer : Arun Chitkara Chief Business Manager : Vipin Dewan Chief Editor (In Charge) : Bijnan Sutar Assistant Editor : Ram Niwas Bharadwaj Assistant Production : Deepak Jaiswal Officer Cover and Illustrations Sarita Verma Mathur Printed on 80 GSM paper with NCERT watermark Published at the Publication Division by the Secretary, National Council of Educational Research and Training, Sri Aurobindo Marg, New Delhi 110 016 and printed at India Offset Printers Pvt. Ltd., B-20/1, Okhla Industrial Area, Phase-II, New Delhi 110 020 Rationalised 2023-24 FOREWORD The National Curriculum Framework (NCF) 2005, recommends that children's life at school must be linked to their life outside the school. This principle marks a departure from the legacy of bookish learning which continues to shape our system and causes a gap between the school, home and community. The syllabi and textbooks developed on the basis of NCF signify an attempt to implement this basic idea. They also attempt to discourage rote learning and the maintenance of sharp boundaries between different subject areas. We hope these measures will take us significantly further in the direction of a child-centred system of education outlined in the National Policy on Education (1986). The success of this effort depends on the steps that school principals and teachers will take to encourage children to reflect on their own learning and to pursue imaginative activities and questions. We must recognise that, given space, time and freedom, children generate new knowledge by engaging with the information passed on to them by adults. Treating the prescribed textbook as the sole basis of examination is one of the key reasons why other resources and sites of learning are ignored. Inculcating creativity and initiative is possible if we perceive and treat children as participants in learning, not as receivers of a fixed body of knowledge. These aims imply considerable change in school routines and mode of functioning. Flexibility in the daily time-table is as necessary as rigour in implementing the annual calendar so that the required number of teaching days are actually devoted to teaching. The methods used for teaching and evaluation will also determine how effective this textbook proves for making children's life at school

a happy experience, rather than a source of stress or boredom. Syllabus designers have tried to address the problem of curricular burden by restructuring and reorienting knowledge at different stages with greater consideration for child psychology and the time available for teaching. The textbook attempts to enhance this endeavour by giving higher priority and space to opportunities for contemplation and wondering, discussion in small groups, and activities requiring hands-on experience. Rationalised 2023-24 The National Council of Educational Research and Training (NCERT) appreciates the hard work done by the textbook development committee responsible for this book. We wish to thank the Chairperson of the advisory group in Social Sciences, Professor Hari Vasudevan and the Chief Advisor for this book, Professor Tapas Majumdar for guiding the work of this committee. Several teachers contributed to the development of this textbook; we are grateful to their principals for making this possible. We are indebted to the institutions and organisations which have generously permitted us to draw upon their resources, material and personnel. We are especially grateful to the members of the National Monitoring Committee, appointed by the Department of Secondary and Higher Education, Ministry of Human Resource Development under the Chairpersonship of Professor Mrinal Miri and Professor G.P. Deshpande, for their valuable time and contribution. As an organisation committed to systemic reform and continuous improvement in the quality of its products, NCERT welcomes comments and suggestions which will enable us to undertake further revision and refinement. Director New Delhi National Council of Educational 20 December 2005 Research and Training iv Rationalised 2023-24 RATIONALISATION OF CONTENT IN THE TEXTBOOKS In view of the COVID-19 pandemic, it is imperative to reduce content load on students. The National Education Policy 2020, also emphasises reducing the content load and providing opportunities for experiential learning with creative mindset. In this background, the NCERT has undertaken the exercise to rationalise the textbooks across all classes. Learning Outcomes already developed by the NCERT across classes have been taken into consideration in this exercise. Contents of the textbooks have been rationalised in view of the following: • Overlapping with similar content included in other subject areas in the same class • Similar content included in the lower or higher class in the same subject • Difficulty level • Content, which is easily accessible to students without much interventions from teachers and can be learned by children through self-learning or peer-learning • Content, which is irrelevant in the present context This present edition, is a reformatted version after carrying out the changes given above. Rationalised 2023-24 Rationalised 2023-24 TEXTBOOK DEVELOPMENT COMMITTEE CHAIRPERSON, ADVISORY COMMITTEE FOR TEXTBOOKS IN SOCIAL SCIENCES AT HIGHER SECONDARY LEVEL Hari Vasudevan, Professor, Department of History, University of Calcutta, Kolkata CHIEF ADVISOR Tapas Majumdar, Emeritus Professor, Jawaharlal Nehru University, New Delhi MEMBERS Bharat C. Thakur, PGT, Government Pratibha Vikas Vidyalaya, Surajmal Vihar, Delhi Gopinath Perumula, Lecturer, Tata Institute of Social Sciences, Mumbai Jaya Singh, Lecturer, DESS, NCERT, New Delhi Nishit Ranjan Das, PGT, New Alipore Multipurpose School, Behala, Kolkata Naushad Ali Azad, Professor, Department of Economics, Jamia Millia Islamia, New Delhi Neeraja Rashmi, Reader, DESS, NCERT, New Delhi Rama Gopal, Professor, Department of Economics, Annamalai University, Annamalai Nagar, Tamil Nadu Pratima Kumari, Lecturer, DERPP, NCERT, New Delhi Poonam Bakshi, Senior Lecturer, Department of Economics, Punjab University, Chandigarh R. Srinivasan, S.G. Lecturer, Department of Economics, Arignar Anna Government Arts College, Villupuram, Tamil Nadu Sabitha Patnaik, PGT, Demonstration School, Regional Institute of Education, Sachivalaya Marg, Bhubaneswar Sharmista Banerjee, Headmistress, Bidya Bharti Girls High School, Kolkata MEMBER–COORDINATOR M.V. Srinivasan, Lecturer, DESS, NCERT, New Delhi Rationalised 2023-24 ACKNOWLEDGEMENTS Many friends and colleagues have helped in preparing this textbook. The National Council of Educational Research and Training acknowledges M. Karpagam, Lecturer, Department of Economics, Meenakshi College, Chennai; J. John, Director, Centre for Education and Communication, New Delhi; Pratyusa K. Mandal, Reader,

DESS, NCERT, New Delhi; Nandana Reddy, Director (Development), Concern for Working Children, Bangalore; V. Selvam, Research Scholar, Centre for Study of Regional Development and Satish Jain, Professor, Centre for Economic Studies and Planning, Jawaharlal Nehru University, New Delhi; Pooja Kapoor, Modern School, Barakhamba Road, New Delhi; Priya Vaidya, Sardar Patel Vidyalaya, Lodhi Estate, New Delhi; and Nalini Padmanabhan, DTEA Senior Secondary School, Janakpuri, New Delhi for providing their feedback and inputs. The Council expresses its gratitude to Jan Breman and Parthiv Shah for using photographs from their book, Working in the mill no more, published by Oxford University Press, Delhi. Some stories were taken from the book, Everybody Loves a Good Drought, authored by P. Sainath and published by Penguin Books, New Delhi. A photo relating to farmers committing suicides has been used from The Hindu. A few photographs and text materials on environmental issues have been used from the State of India's Environment 1 and 2 published by the Centre for Science and Environment, New Delhi. The Council thanks the authors, copyright holders and publishers of these reference materials. The Council also acknowledges the Press Information Bureau, Ministry of Information and Broadcasting, New Delhi; National Rail Museum, New Delhi for allowing to use photographs available in their photo library. Some photographs were given by S. Thirumal Murugan, Principal, Adhiyaman Matriculation School, Uthangarai, Tamil Nadu; John Suresh Kumar, Synodical Board of Social Service; Sindhu Menon of Labour File, New Delhi; R. C. Das of CIET, New Delhi; Renuka of National Institute of Health and Family Welfare, New Delhi. The Council acknowledges their contribution as well. Special thanks are due to Savita Sinha, Professor and Head, Department of Education in Social Sciences and Humanities for her support. The Council gratefully acknowledges the contributions of Mamta and Arvind Sharma, DTP Operators; Neena Chandra, Copy Editor; Dillip Kumar Agasti, Proof Reader; and Dinesh Kumar, Incharge Computer Station in shaping this book. The efforts of the Publication Department, NCERT are also duly acknowledged. The Council also acknowledges the efforts of Neerja Rashmi, Professor, DESS, NCERT; M.V. Srinivasan, DESS, NCERT; Jaya Singh, DESS, NCERT; Pratima Kumari, Associate Professor, DESS, NCERT; Ashita Raveendran, Associate Professor, PMD, NCERT; Sabita Patnaik, PGT Economics, DMS, RIE, Bhubaneshwar; Anita Raveendra PGT Economics, DMS, RIE, Mysore, towards the rationalisation of content of the textbook. Rationalised 2023-24 HOW TO USE THIS BOOK The main objective of this book, Indian Economic Development, is to expose you to some of the key issues facing the Indian economy. In this process, as young adults, you are expected to be sensitised about these issues, appreciate and learn to critically assess the role of the government in various economic spheres. The book also provides opportunities for knowing what economic resources are and how these resources are being utilised in different sectors. You are also exposed to numerical information relating to various aspects of Indian economy and India's economic policies. You are expected to develop analytical skills, interpret the economic events and visualise the economic future of India. Nevertheless, conscious effort has been made not to burden with concepts and data. With regard to various economic issues and trends, this book attempts to bring out alternative views on every issue so that you can engage yourself in well-informed debates. On completion of the course, Indian Economic Development, you are expected to acquire skills to understand macroeconomic events which occur around you, and to critically evaluate and interpret the relevant information provided by the media. This course comprises of many activities with each chapter. You need to carry out those activities under the guidance of teachers. In fact, the role of the teacher in enriching the understanding of the Indian economy is greater in this course. The activities include classroom discussions, collecting information from government documents such as Economic Survey, archival materials, from newspapers, television, internet and other sources. Learners should also be encouraged to read the original works of scholars on various topics. For all this to happen, the teachers have to initiate the process by taking some steps before starting the course. At the beginning of the academic year, you can collect clippings from newspapers and magazines relating to

different topics under the course — five year plans and the role of NITI Aayog in planning; allocation of funds to various sectors like agriculture, industry, services and for specific causes such as poverty and employment; key issues of rural Rationalised 2023-24 development, environment, various infrastructure— health, education and energy; and economic events in China and Pakistan. You may maintain these clippings, and when the teacher starts teaching a particular topic, you can cull out those news items, which you have collected from the beginning of the course, and display/use them in the classroom. It is necessary you to build this collection right from the beginning of the course so that the relevent information is at hand as and when needed; this habit will also come in handy during later stages of education. The schools will have to buy a hard copy of the Economic Survey for the latest year. You will notice that information relating to the Indian Economy is updated in the Economic Survey. It is necessary for you to familiarise yourselves with such reports and work on relevant activities. The statistical tables available as Appendix in the Economic Survey would be immensely helpful in understanding various issues. While discussing a particular issue, discussion of the numerical information about the issue is inevitable. For instance, when we talk of growth rates — overall growth rates and growth of different sectors — though it may be necessary for you to have a rough idea about the trends in growth rates, the process involved in reaching the level of growth and factors contributing to the trend rather than mere reproduction of tabular data of growth rate. You will notice numbered boxes in all chapters. These boxes supplement the information given in the text. Through these boxes, an attempt has been made to lend a humane touch and, thus, bring the issue under discussion closer to real life. However, these boxes, as also 'Work These Out' activities, are not meant for examination/evaluation purposes. Besides the relatively conventional 'Exercises', each chapter has 'Suggested Additional Activities' at the end and 'Work This/These Out' as part of the text; the more elaborate activities of these can be treated as projects. You may explore beyond the text while attempting these activities. Understandably, Information Technology facilities may not be available in all the schools, however, it is important to take note that various information relating to the Indian economy are available on the internet. You need to learn to use the internet and access the websites of various government departments to get the required information. For instance, the details relating to poverty are published x Rationalised 2023-24 by the NITI Aayog. You need to know that the NITI Aayog of the Government of India has a website in which various reports relating to different aspects of India, including poverty, are available in the form of reports. Since it may not be always possible to procure such reports in hard copy, students and teachers may attempt to download such reports from websites and use them in the classroom. The reports such as Economic Surveys of the last 10 years are available on the website: http://www.indiabudget.gov.in. Many organisations change their website addresses. In case a website given in this book is not accessible, kindly search those websites through search engines such as Google (www.google.co.in). For the first time, each chapter has been briefly summed up in the 'Recap' to facilitate learning. Also, please take note that sources for all tables have not been given with the table as these tables were sourced from various research material which have been covered under 'References' for each chapter. We wish to reiterate the fact that the prime objective of this course on Indian economy is to introduce the basic macro issues of the Indian economy to the student community and to initiate a well-informed debate on our economy. We also stress that collaborative learning is an important aspect of this course, hence the involvement of students, as well as, teachers in collecting information on the Indian economy from other sources is necessary and such collected information should be used as important inputs for both teaching, as well as, learning about the Indian economy. You can send your queries and feedback relating to any part of this book to the following address. Programme Coordinator (Economics) Department of Education in Social Sciences National Council of Educational Research and Training Sri Aurobindo Marg New Delhi 110 016. Email: headdess@gmail.com xi Rationalised 2023-24 WE, THE PEOPLE OF INDIA, [SOVEREIGN SOCIALIST SECULAR DEMOCRATIC

REPUBLIC] JUSTICE, LIBERTY EQUALITY FRATERNITY IN OUR CONSTITUENT ASSEMBLY HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION. having solemnly resolved to constitute India into a and to secure to all its citizens : social, economic and political; of thought, expression, belief, faith and worship; of status and of opportunity and to promote among them all; assuring the dignity of the individual and the [unity and integrity of the Nation]; this twenty-sixth day of November, 1949 do 1 2 1. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2, for "Sovereign Democratic Republic" (w.e.f. 3.1.1977) 2. Subs. by the Constitution (Forty-second Amendment) Act, 1976, Sec.2, for "Unity of the Nation" (w.e.f. 3.1.1977) THE CONSTITUTION OF INDIA PREAMBLE Rationalised 2023-24 CONTENTS FOREWORD iii RATIONALISATION OF CONTENT IN THE TEXTBOOKS v UNIT I: DEVELOPMENT POLICIES AND EXPERIENCE (1947–90) 1–35 CHAPTER 1: INDIAN ECONOMY ON THE EVE OF INDEPENDENCE 3 – LOW LEVEL OF ECONOMIC DEVELOPMENT UNDER THE COLONIAL RULE 4 – AGRICULTURAL SECTOR 5 – INDUSTRIAL SECTOR 7 – FOREIGN TRADE 8 – DEMOGRAPHIC CONDITION 9 – OCCUPATIONAL STRUCTURE 10 – INFRASTRUCTURE 11 CHAPTER 2: INDIAN ECONOMY 1950-1990 16 – THE GOALS OF FIVE YEAR PLANS 19 – AGRICULTURE 22 – INDUSTRY AND TRADE 27 – TRADE POLICY: IMPORT SUBSTITUTION 30 UNIT II: ECONOMIC REFORMS SINCE 1991 36–56 CHAPTER 3: LIBERALISATION, PRIVATISATION AND GLOBALISATION: AN APPRAISAL 38 – BACKGROUND 39 – LIBERALISATION 41 – PRIVATISATION 44 – GLOBALISATION 45 – INDIAN ECONOMY DURING REFORMS: AN ASSESSMENT 48 UNIT III: CURRENT CHALLENGES FACING THE INDIAN ECONOMY 57–74 CHAPTER 4: HUMAN CAPITAL FORMATION IN INDIA 58 – WHAT IS HUMAN CAPITAL? 60 – SOURCES OF HUMAN CAPITAL 60 Rationalised 2023-24 – HUMAN CAPITAL AND HUMAN DEVELOPMENT 66 – STATE OF HUMAN CAPITAL FORMATION IN INDIA 67 – EDUCATION SECTOR IN INDIA 68 – FUTURE PROSPECTS 70 CHAPTER 5: RURAL DEVELOPMENT 75–91 – WHAT IS RURAL DEVELOPMENT? 76 – CREDIT AND MARKETING IN RURAL AREAS 77 – AGRICULTURAL MARKET SYSTEM 80 – DIVERSIFICATION INTO PRODUCTIVE ACTIVITIES 82 – SUSTAINABLE DEVELOPMENT AND ORGANIC FARMING 86 CHAPTER 6: EMPLOYMENT: GROWTH, INFORMALISATION AND OTHER ISSUES 92–114 – WORKERS AND EMPLOYMENT 94 – PARTICIPATION OF PEOPLE IN EMPLOYMENT 95 – SELF-EMPLOYED AND HIRED WORKERS 96 – EMPLOYMENT IN FIRMS, FACTORIES AND OFFICES 99 – GROWTH AND CHANGING STRUCTURE OF EMPLOYMENT 100 – INFORMALISATION OF INDIAN WORKFORCE 103 – UNEMPLOYMENT 106 – GOVERNMENT AND EMPLOYMENT GENERATION 108 CHAPTER 7: ENVIRONMENT AND SUSTAINABLE DEVELOPMENT 115–131 – ENVIRONMENT — DEFINITION AND FUNCTIONS 116 – STATE OF INDIA’S ENVIRONMENT 120 – SUSTAINABLE DEVELOPMENT 124 – STRATEGIES FOR SUSTAINABLE DEVELOPMENT 125 UNIT IV: DEVELOPMENT EXPERIENCES OF INDIA: A COMPARISON 132–150 WITH NEIGHBOURS CHAPTER 8: COMPARATIVE DEVELOPMENT EXPERIENCES OF 134 INDIA AND ITS NEIGHBOURS – DEVELOPMENTAL PATH — A SNAPSHOT VIEW 135 – DEMOGRAPHIC INDICATORS 138 xiv Rationalised 2023-24 – GROSS DOMESTIC PRODUCT AND SECTORS 139 – INDICATORS OF HUMAN DEVELOPMENT 142 – DEVELOPMENT STRATEGIES — AN APPRAISAL 143 GLOSSARY 151–159 xv Rationalised 2023-24 Constitution of India Fundamental Duties It shall be the duty of every citizen of India — (a) to abide by the Constitution and respect its ideals and institutions, the National Flag and the National Anthem; (b) to cherish and follow the noble ideals which inspired our national struggle for freedom; (c) to uphold and protect the sovereignty, unity and integrity of India; (d) to defend the country and render national service when called upon to do so; (e) to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practices derogatory to the dignity of women; (f) to value and preserve the rich heritage of our composite culture; (g) to protect and improve the natural environment including forests, lakes, rivers, wildlife and to have compassion for living creatures; (h) to develop the scientific temper, humanism and the spirit of inquiry and reform; (i) to safeguard public property and to abjure violence; (j) to strive towards excellence in all spheres of individual and

collective activity so that the nation constantly rises to higher levels of endeavour and achievement; *(k) who is a parent or guardian, to provide opportunities for education to his child or, as the case may be, ward between the age of six and fourteen years. Note: The Article 51A containing Fundamental Duties was inserted by the Constitution (42nd Amendment) Act, 1976 (with effect from 3 January 1977). *(k) was inserted by the Constitution (86th Amendment) Act, 2002 (with effect from 1 April 2010). Part IV A (Article 51 A) Rationalised 2023-24DEVELOPMENT POLICIES AND EXPERIENCE (1947-90) UNIT III UNIT I Rationalised 2023-24 The two chapters in this unit give us an overview of the state of the Indian economy as it was at the eve of independence till after four decades of planned development, which was a path that India chose. This meant that the Government of India had to take a series of steps such as the establishment of the Planning Commission and announcement of five year plans. An overview of the goals of five year plans and a critical appraisal of the merits and limitations of planned development has been covered in this unit. Rationalised 2023-24 1 After studying this chapter, the learners will • become familiar with the state of the Indian economy in 1947, the year of India's Independence • understand the factors that led to the underdevelopment and stagnation of the Indian economy. INDIAN ECONOMY ON THE EVE OF INDEPENDENCE Rationalised 2023-24 4 INDIAN ECONOMIC DEVELOPMENT 1.1 INTRODUCTION The primary objective of this book, Indian Economic Development, is to familiarise you with the basic features of the Indian economy, and its development, as it is today, in the aftermath of Independence. However, it is equally important to know something about the country's economic past even as you learn about its present state and future prospects. So, let us first look at the state of India's economy prior to the country's independence and form an idea of the various considerations that shaped India's post-independence development strategy. The structure of India's presentday economy is not just of current making; it has its roots steeped in history, particularly in the period when India was under British rule which lasted for almost two centuries before India finally won its independence on 15 August 1947. The sole purpose of the British colonial rule in India was to reduce the country to being a raw material supplier for Great Britain's own rapidly expanding modern industrial base. An understanding of the exploitative nature of this relationship is essential for any assessment of the kind and level of development which the Indian economy has been able to attain over the last seven and half decades. 1.2 1.2 LOW LEVEL OF ECONOMIC DEVELOPMENT UNDER THE COLONIAL RULE India had an independent economy before the advent of the British rule. Though agriculture was the main source of livelihood for most people, yet, the country's economy was characterised by various kinds of manufacturing activities. India was particularly well known for its handicraft industries in the fields of cotton and silk textiles, metal and precious stone works etc. These products enjoyed a worldwide market based on the reputation of the fine quality of material used and the high standards of craftsmanship seen in all imports from India (See Box 1.1). "India is the pivot of our Empire... If the Empire loses any other part of its Dominion we can survive, but if we lose India, the sun of our Empire will have set." Victor Alexander Vruce, the Viceroy of British India in 1894 Box 1.1: Textile Industry in Bengal Muslin is a type of cotton textile which had its origin in Bengal, particularly, places in and around Dhaka (spelled during the pre-independence period as Dacca), now the capital city of Bangladesh. 'Daccai Muslin' had gained worldwide fame as an exquisite type of cotton textile. The finest variety of muslin was called malmal. Sometimes, foreign travellers also used to refer to it as malmal shahi or malmal khas implying that it was worn by, or fit for, the royalty. Rationalised 2023-24 INDIAN ECONOMY ON THE EVE OF INDEPENDENCE 5 The economic policies pursued by the colonial government in India were concerned more with the protection and promotion of the economic interests of their home country than with the development of the Indian economy. Such policies brought about a fundamental change in the structure of the Indian economy — transforming the country into supplier of raw materials and consumer of finished industrial products from Britain. Obviously, the colonial government never

made any sincere attempt to estimate India's national and per capita income. Some individual attempts which were made to measure such incomes yielded conflicting and inconsistent results. Among the notable estimators — Dadabhai Naoroji, William Digby, Findlay Shirras, V.K.R.V. Rao and R.C. Desai — it was Rao, whose estimates during the colonial period was considered very significant. However, most studies did find that the country's growth of aggregate real output during the first half of the twentieth century was less than two per cent coupled with a meagre half per cent growth in per capita output per year. 1.3 AGRICULTURAL SECTOR India's economy under the British colonial rule remained fundamentally agrarian — about 85 per cent of the country's population lived mostly in villages and derived livelihood directly or indirectly from agriculture (See Box 1.2). However, despite being the occupation of such a large population, the agricultural Fig. 1.1 India's agricultural stagnation under the British colonial rule Box 1.2: Agriculture During Pre-British India The French traveller, Bernier, described seventeenth century Bengal in the following way: "The knowledge I have acquired of Bengal in two visits inclines me to believe that it is richer than Egypt. It exports, in abundance, cottons and silks, rice, sugar and butter. It produces amply — for its own consumption — wheat, vegetables, grains, fowls, ducks and geese. It has immense herds of pigs and flocks of sheep and goats. Fish of every kind it has in profusion. From rajmahal to the sea is an endless number of canals, cut in bygone ages from the Ganges by immense labour for navigation and irrigation." ÿ Take note of the agricultural prosperity in our country in the seventeenth century. Contrast it with agricultural stagnation around the time when the British left India, around 200 years later. Rationalised 2023-24 6 INDIAN ECONOMIC DEVELOPMENT sector continued to experience stagnation and, not infrequently, unusual deterioration. Agricultural pro-ductivity became low though, in absolute terms, the sector experienced some growth due to the expansion of the aggregate area under cultivation. This stagnation in the agricultural sector was caused mainly because of the various systems of land settlement that were introduced by the colonial government. Particularly, under the zamindari system which was implemented in the then Bengal Presidency comprising parts of India's present-day eastern states, the profit accruing out of the agriculture sector went to the zamindars instead of the cultivators. However, a considerable number of zamindars, and not just the colonial government, did nothing to improve the condition of agriculture. The main interest of the zamindars was only to collect rent regardless of the economic condition of the cultivators; this caused immense misery and social tension among the latter. To a very great extent, the terms of the revenue settlement were also responsible for the zamindars adopting such an attitude; dates for depositing specified sums of revenue were fixed, failing which the zamindars were to lose their rights. Besides this, low levels of technology, lack of irrigation facilities and negligible use of fertilisers, all added up to aggravate the plight of the farmers and contributed to the dismal level of agricultural productivity. There was, of course, some evidence of a relatively higher yield of cash crops in certain areas of the country due to commercialisation of agriculture. Work These Out ÿ Compare the map of British India with that of independent India and find out the areas that became parts of Pakistan. Why were those parts so important to India from the economic point of view? (Refer, to your advantage, Dr Rajendra Prasad's book, India Divided). ÿ What were the various forms of revenue settlement adopted by the British in India? Where did they implement them and to what effect? How far do you think those settlements have a bearing on the current agricultural scenario in India? (In your attempt to find answers to these questions, you may refer to Ramesh Chandra Dutt's Economic History of India, which comes in three volumes, and B.H. Baden-Powell's The Land Systems of British India, also in two volumes. For better comprehension of the subject, you can also try and develop an illustrated agrarian map of British India either by hand or with the help of your school computer. Remember, nothing helps better than an illustrated map to understand the subject at hand). Rationalised 2023-24 INDIAN ECONOMY ON THE EVE OF INDEPENDENCE 7 But this could hardly help farmers in improving their economic condition as,

instead of producing food crops, now they were producing cash crops which were to be ultimately used by British industries back home. Despite some progress made in irrigation, India's agriculture was starved of investment in terracing, flood-control, drainage and desalinisation of soil. While a small section of farmers changed their cropping pattern from food crops to commercial crops, a large section of tenants, small farmers and sharecroppers neither had resources and technology nor had incentive to invest in agriculure. 1.4 INDUSTRIAL SECTOR As in the case of agriculture, so also in manufacturing, India could not develop a sound industrial base under the colonial rule. Even as the country's world famous handicraft industries declined, no corresponding modern industrial base was allowed to come up to take pride of place so long enjoyed by the former. The primary motive of the colonial government behind this policy of systematically deindustrialising India was two-fold. The intention was, first, to reduce India to the status of a mere exporter of important raw materials for the upcoming modern industries in Britain and, second, to turn India into a sprawling market for the finished products of those industries so that their continued expansion could be ensured to the maximum advantage of their home country — Britain. In the unfolding economic scenario, the decline of the indigenous handicraft industries created not only massive unemployment in India but also a new demand in the Indian consumer market, which was now deprived of the supply of locally made goods. This demand was profitably met by the increasing imports of cheap manufactured goods from Britain. During the second half of the nineteenth century, modern industry began to take root in India but its progress remained very slow. Initially, this development was confined to the setting up of cotton and jute textile mills. The cotton textile mills, mainly dominated by Indians, were located in the western parts of the country, namely, Maharashtra and Gujarat, while the jute mills dominated by the foreigners were mainly concentrated in Bengal. Subsequently, the iron and steel industries began coming up in the beginning of the twentieth century. The Tata Iron and Steel Company (TISCO) was incorporated in 1907. A few other industries in the fields of sugar, cement, paper etc. came up after the Second World War. However, there was hardly any capital goods industry to help promote further industrialisation in India. Capital goods industry means industries which can produce machine tools which are, in turn, used for producing articles for current consumption. The establishment of a few manufacturing units here and Rationalised 2023-24 8 INDIAN ECONOMIC DEVELOPMENT there was no substitute to the near wholesale displacement of the country's traditional handicraft industries. Furthermore, the growth rate of the new industrial sector and its contribution to the Gross Domestic Product (GDP) or Gross Value Added remained very small. Another significant drawback of the new industrial sector was the very limited area of operation of the public sector. This sector remained confined only to the railways, power generation, communications, ports and some other departmental undertakings. 1.5 FOREIGN TRADE India has been an important trading nation since ancient times. But the restrictive policies of commodity production, trade and tariff pursued by the colonial government adversely affected the structure, composition and volume of India's foreign trade. Consequently, India became an exporter of primary products such as raw silk, cotton, wool, sugar, indigo, jute etc. and an importer of finished consumer goods like cotton, silk and woollen clothes and capital goods like light machinery produced in the factories of Britain. For all practical purposes, Britain maintained a monopoly control over India's exports and imports. As a result, more than half of India's foreign trade was restricted to Britain while the rest was allowed with a few other countries like China, Ceylon (Sri Lanka) and Persia (Iran). The opening of the Suez Canal further intensified British control over India's foreign trade (see Box 1.3). The most important characteristic of India's foreign trade throughout the colonial period was the generation of a large export surplus. But this surplus came at a huge cost to the country's economy. Several essential commodities—food grains, clothes, Work These Out ÿPrepare a list showing where and when other modern industries of India were first set up. Can you also find out what the basic requirements are for setting up any modern industry? What, for example, might have

been the reasons for the setting up of the Tata Iron and Steel Company at Jamshedpur, which is now in the state of Jharkhand? ÿ How many iron and steel factories are there in India at present? Are these iron and steel factories among the best in the world or do you think that these factories need restructuring and upgradation? If yes, how can this be done? There is an argument that industries which are not strategic in nature should not continue to be in the public sector. What is your view? ÿ On a map of India, mark the cotton textiles, jute mills and textile mills that existed at the time of independence. Rationalised 2023-24 INDIAN ECONOMY ON THE EVE OF INDEPENDENCE 9 kerosene etc. — were scarcely available in the domestic market. Furthermore, this export surplus did not result in any flow of gold or silver into India. Rather, this was used to make payments for the expenses incurred by an office set up by the colonial government in Britain, expenses on war, again fought by the British government, and the import of invisible items, all of which led to the drain of Indian wealth. 1.6 DEMOGRAPHIC CONDITION Various details about the population of British India were first collected through a census in 1881. Though suffering from certain limitations, it revealed the unevenness in India's population growth. Subsequently, Fig.1.2 Suez Canal: Used as highway between India and Britain Box 1.3: Trade Through the Suez Canal Suez Canal is an artificial waterway running from north to south across the Isthmus of Suez in north-eastern Egypt. It connects Port Said on the Mediterranean Sea with the Gulf of Suez, an arm of the Red Sea. The canal provides a direct trade route for ships operating between European or American ports and ports located in South Asia, East Africa and Oceania by doing away with the need to sail around Africa. Strategically and economically, it is one of the most important waterways in the world. Its opening in 1869 reduced the cost of transportation and made access to the Indian market easier. Not to scale Work These Out ÿ Prepare a list of items that were exported from and imported into India during the British rule. ÿ Collect information from the Economic Survey for various years published by the Ministry of Finance, Government of India, on various items of export from India and its imports. Compare these with imports and exports from the pre-independence era. Also find out the names of prominent ports which now handle the bulk of India's foreign trade. Not to scale Rationalised 2023-24 10 INDIAN ECONOMIC DEVELOPMENT every ten years such census operations were carried out. Before 1921, India was in the first stage of demographic transition. The second stage of transition began after 1921. However, neither the total population of India nor the rate of population growth at this stage was very high. The various social development indicators were also not quite encouraging. The overall literacy level was less than 16 per cent. Out of this, the female literacy level was at a negligible low of about seven per cent. Public health facilities were either unavailable to large chunks of population or, when available, were highly inadequate. Consequently, water and air-borne diseases were rampant and took a huge toll on life. No wonder, the overall mortality rate was very high and in that, particularly, the infant mortality rate was quite alarming—about 218 per thousand in contrast to the present infant mortality rate of 33 per thousand. Life expectancy was also very low—32 years in contrast to the present 69 years. In the absence of reliable data, it is difficult to specify the extent of poverty at that time but there is no doubt that extensive poverty prevailed in India during the colonial period which contributed to the worsening profile of India's population of the time. 1.7 OCCUPATIONAL STRUCTURE During the colonial period, the occupational structure of India, i.e., distribution of working persons across different industries and sectors, showed little sign of change. The agricultural sector accounted for Fig. 1.3 A large section of India's population did not have basic needs such as housing Rationalised 2023-24 INDIAN ECONOMY ON THE EVE OF INDEPENDENCE 11 the largest share of workforce, which usually remained at a high of 70-75 per cent while the manufacturing and the services sectors accounted for only 10 and 15-20 per cent respectively. Another striking aspect was the growing regional variation. Parts of the then Madras Presidency (comprising areas of the present-day states of Tamil Nadu, Andhra Pradesh, Kerala and Karnataka), Bombay and Bengal witnessed a decline in the dependence of the workforce on the

agricultural sector with a commensurate increase in the manufacturing and the services sectors. However, there had been an increase in the share of workforce in agriculture during the same time in states such as Orissa, Rajasthan and Punjab. 1.8 INFRASTRUCTURE Under the colonial regime, basic infrastructure such as railways, ports, water transport, posts and telegraphs did develop. However, the real motive behind this development was not to provide basic amenities to the people but to subserve various colonial interests. Roads constructed in India prior to the advent of the British rule were not fit for modern transport. The roads that were built primarily served the purposes of mobilising the army within India and drawing out raw materials from the countryside to the nearest railway station or the port to send these to far away England or other lucrative foreign destinations. There always remained an acute shortage of allweather roads to reach out to the rural areas during the rainy season. Naturally, therefore, people mostly living in these areas suffered grievously during natural calamities and famines. The British introduced the railways in India in 1850 and it is considered as one of their most important contributions. The railways affected the structure of the Indian economy in two important ways. On the one hand it enabled people to undertake long distance travel and thereby break geographical and cultural barriers while, on the other hand, it fostered commercialisation of Indian agriculture which adversely affected the self-sufficiency of the village economies in India. The volume of India's exports undoubtedly expanded but its benefits rarely accrued to the Indian people. The social benefits, which the Work These Out ÿ Can you find out the reasons behind frequent occurrence of famines in India before independence? You may read from Nobel Laureate Amartya Sen's book, Poverty and Famines. ÿPrepare a pie chart for the occupational structure in India at the time of independence. Rationalised 2023-24 12 INDIAN ECONOMIC DEVELOPMENT Indian people gained owing to the introduction of the railways, were thus outweighed by the country's huge economic loss. Along with the development of roads and railways, the colonial dispensation also took measures for developing the inland trade and sea lanes. However, these measures were far from satisfactory. The inland waterways, at times, also proved uneconomical as in the case of the Coast Canal on the Orissa coast. Though the canal was built at a huge cost to the government exchequer, yet, it failed to compete with the railways, which soon traversed the region running parallel to the canal, and had to be ultimately abandoned. The introduction of the expensive system of electric telegraph in India, similarly, served the purpose of maintaining law and order. The postal services, on the other hand, despite serving a useful public purpose, remained all through inadequate. Fig.1.5 Tata Airlines, a division of Tata and Sons, was established in 1932 inaugurating the aviation sector in India Fig. 1.4 First Railway Bridge linking Bombay with Thane, 1854 Work This Out ÿ There is a perception still going around that in many ways the British administration in India was quite beneficial. This perception needs an informed debate. How would you look at this perception? Argue this out in your class —'Was the British Raj good for India'? Rationalised 2023-24 INDIAN ECONOMY ON THE EVE OF INDEPENDENCE 13 1.9 CONCLUSION By the time India won its independence, the impact of the two-century long British colonial rule was already showing on all aspects of the Indian economy. The agricultural sector was already saddled with surplus labour and extremely low productivity. The industrial sector was crying for modernisation, diversification, capacity building and increased public investment. Foreign trade was oriented to feed the Industrial Revolution in Britain. Infrastructure facilities, including the famed railway network, needed upgradation, expansion and public orientation. Prevalence of rampant poverty and unemployment required welfare orientation of public economic policy. In a nutshell, the social and economic challenges before the country were enormous. Recap ÿ An understanding of the economy before independence is necessary to know and appreciate the level of development achieved during the postindependence period. ÿ Under the colonial dispensation, the economic policies of the government were concerned more with the protection and promotion of British economic interests than with the need to develop the economic condition of the colonised country

and its people. ÿ The agricultural sector continued to experience stagnation and deterioration despite the fact that the largest section of Indian population depended on it for sustenance. ÿ The rule of the British-India government led to the collapse of India's world famous handicraft industries without contributing, in any significant manner, to its replacement by a modern industrial base. ÿ Lack of adequate public health facilities, occurrence of frequent natural calamities and famines pauperised the hapless Indian people and resulted in engendering high mortality rates. ÿ Some efforts were made by the colonial regime to improve infrastructure facilities but these efforts were spiced with selfish motives. However, the independent Indian government had to built on this base through planning. Rationalised 2023-24 14 INDIAN ECONOMIC DEVELOPMENT 1. What was the focus of the economic policies pursued by the colonial government in India? What were the impacts of these policies? 2. Name some notable economists who estimated India's per capita income during the colonial period. 3. What were the main causes of India's agricultural stagnation during the colonial period? 4. Name some modern industries which were in operation in our country at the time of independence. 5. What was the two-fold motive behind the systematic deindustrialisation effected by the British in pre-independent India? 6. The traditional handicrafts industries were ruined under the British rule. Do you agree with this view? Give reasons in support of your answer. 7. What objectives did the British intend to achieve through their policies of infrastructure development in India? 8. Critically appraise some of the shortfalls of the industrial policy pursued by the British colonial administration. 9. What do you understand by the drain of Indian wealth during the colonial period? 10. Which is regarded as the defining year to mark the demographic transition from its first to the second decisive stage? 11. Give a quantitative appraisal of India's demographic profile during the colonial period. 12. Highlight the salient features of India's pre-independence occupational structure. 13. Underscore some of India's most crucial economic challenges at the time of independence. 14. When was India's first official census operation undertaken? 15. Indicate the volume and direction of trade at the time of independence. 16. Were there any positive contributions made by the British in India? Discuss. EXERCISES Rationalised 2023-24 INDIAN ECONOMY ON THE EVE OF INDEPENDENCE 15 SUGGESTED ADDITIONAL ACTIVITIES REFERENCES 1. Prepare a list of goods and services that were available to people in pre-independence India in rural and urban areas. Compare it with the consumption pattern of such goods and services by the people today. Highlight the perceptible difference in the people's standard of living. 2. Find pictures of towns/villages, in your vicinity, of the preindependence period and compare these with their present scenario. What changes can you mark? Are such changes for better or for worse? Discuss. 3. Rally around your teacher and organise a group discussion on 'Has the zamindari system really been abolished in India'? If the consensus is negative, then what measures would you think should be taken to banish it and why? 4. Identify the major occupations followed by the people of our country at the time of independence. What major occupations do the people follow today? In the light of reform policies, how would you visualise the occupational scenario in India 15 years from now—say, 2035? BADEN-POWELL, B.H. 1892. The Land Systems of British India, Vols I, II and III. Oxford Clarendon Press, Oxford. BUCHANAN, D.H. 1966. Development of Capitalist Enterprise in India. Frank Cass and Co, London. CHANDRA, BIPAN. 1993. 'The Colonial Legacy' in Bimal Jalan (Ed.), The Indian Economy: Problems and Prospects. Penguin Books, New Delhi. DUTT, R.C. 1963. Economic History of India, Vols I and II. Ministry of Information and Broadcasting, Government of India, New Delhi. KUMAR, D. AND MEGHNAD DESAI (Eds.). 1983. Cambridge Economic History of India. Cambridge University Press, Cambridge. MILL, JAMES.1972. History of British India. Associated Publishing House, New Delhi. PRASAD, RAJENDRA. 1946. India Divided. Hind Kitabs, Bombay. SEN, AMARTYA. 1999. Poverty and Famines. Oxford University Press, New Delhi. Government Reports Economic Survey (for various years). Ministry of Finance, Government of India. Rationalised 2023-24After studying this chapter, the learners will • come to know the goals of India's five year plans • know about the

development policies in different sectors such as agriculture and industry from 1950-1990 • learn to think about the merits and limitations of a regulated economy. 2 INDIAN ECONOMY 1950–1990 Rationalised 2023-24 INDIAN ECONOMY 1950-1990 17 2.1 INTRODUCTION On 15 August 1947, India woke to a new dawn of freedom. Finally we were masters of our own destiny after some two hundred years of British rule; the job of nation building was now in our own hands. The leaders of independent India had to decide, among other things, the type of economic system most suitable for our nation, a system which would promote the welfare of all rather than a few. There are different types of economic systems (see Box 2.1) and among them, socialism appealed to Jawaharlal Nehru the most. However, he was not in favour of the kind of socialism established in the former Soviet Union where all the means of production, i.e. all the factories and farms in the country, were owned by the government. There was no private property. It is not possible in a democracy like India for the government to change the ownership pattern of land and other properties of its citizens in the way that it was done in the former Soviet Union. Nehru, and many other leaders and thinkers of the newly independent India, sought an alternative to the extreme versions of capitalism and socialism. Basically sympathising with the socialist outlook, they found the answer in an economic system which, in their view, combined the best features of socialism without its drawbacks. In this view, India would be a socialist society with a strong public sector but also with private property and democracy; the government would plan (see Box 2.2) for the The central objective of Planning in India... is to initiate a process of development which will raise the living standards and open out to the people new opportunities for a richer and more varied life. First Five Year Plan Work These Out ÿ Prepare a chart on the different types of economic systems prevalent in the world. List out the countries as capitalist, socialist and mixed economy. ÿ Plan a class trip to an agriculture farm. Divide the class into seven groups with each group to plan a specific goal, for example, the purpose of the visit, money expenditure involved, time taken, resources, people accompanying the group and who need to be contacted, possible places of visit, possible questions to be asked etc. Now, with the help of your teacher, compile these specific goals and compare with long-term goals of successful visit to an agricultural farm. Rationalised 2023-24 18 INDIAN ECONOMIC DEVELOPMENT Box 2.1: Types of Economic Systems Every society has to answer three questions ÿWhat goods and services should be produced in the country? ÿHow should the goods and services be produced? Should producers use more human labour or more capital (machines) for producing things? ÿHow should the goods and services be distributed among people? One answer to these questions is to depend on the market forces of supply and demand. In a market economy, also called capitalism, only those consumer goods will be produced that are in demand, i.e., goods that can be sold profitably either in the domestic or in the foreign markets. If cars are in demand, cars will be produced and if bicycles are in demand, bicycles will be produced. If labour is cheaper than capital, more labour-intensive methods of production will be used and vice-versa. In a capitalist society the goods produced are distributed among people not on the basis of what people need but on the basis of Purchasing Power—the ability to buy goods and services. That is, one has to have the money in the pocket to buy it. Low cost housing for the poor is much needed but will not count as demand in the market sense because the poor do not have the purchasing power to back the demand. As a result this commodity will not be produced and supplied as per market forces. Such a society did not appeal to Jawaharlal Nehru, our first prime minister, for it meant that the great majority of people of the country would be left behind without the chance to improve their quality of life. A socialist society answers the three questions in a totally different manner. In a socialist society the government decides what goods are to be produced in accordance with the needs of society. It is assumed that the government knows what is good for the people of the country and so the desires of individual consumers are not given much importance. The government decides how goods are to be produced and how they should be distributed. In principle, distribution under socialism is supposed to be based on what people need

and not on what they can afford to purchase. Unlike under capitalism, for example, a socialist nation provides free health care to all its citizens. Strictly, a socialist society has no private property since everything is owned by the state. In Cuba and China, for example, most of the economic activities are governed by the socialistic principles. Most economies are mixed economies, i.e. the government and the market together answer the three questions of what to produce, how to produce and how to distribute what is produced. In a mixed economy, the market will provide whatever goods and services it can produce well, and the government will provide essential goods and services which the market fails to do. Rationalised 2023-24 INDIAN ECONOMY 1950-1990 19 economy with the private sector being encouraged to be part of the plan effort. The 'Industrial Policy Resolution' of 1948 and the Directive Principles of the Indian Constitution reflected this outlook. In 1950, the Planning Commission was set up with the Prime Minister as its Chairperson. The era of five year plans had begun. 2.2 THE GOALS OF FIVE YEAR PLANS A plan should have some clearly specified goals. The goals of the five year plans were: growth, modernisation, self-reliance and equity. This does not mean that all the plans have given equal importance to all these goals. Due to limited resources, a choice has to be made in each plan about which of the goals is to be given primary importance. Nevertheless, the planners have to ensure that, as far as possible, the policies of the plans do not contradict these four goals. Let us now learn about the goals of planning in some detail. Growth: It refers to increase in the country's capacity to produce the output of goods and services within the country. It implies either a larger stock of productive capital, or a larger size of supporting services like transport and banking, or an increase in the efficiency of productive capital and services. A good indicator of economic growth, in the language of Box 2.2: What is a Plan? A plan spells out how the resources of a nation should be put to use. It should have some general goals as well as specific objectives which are to be achieved within a specified period of time; in India plans were of five years duration and were called five year plans (we borrowed this from the former Soviet Union, the pioneer in national planning). Our plan documents upto the year 2017 not only specify the objectives to be attained in the five years of a plan but also what is to be achieved over a period of twenty years. This long-term plan is called 'perspective plan'. The five year plans were supposed to provide the basis for the perspective plan. It will be unrealistic to expect all the goals of a plan to be given equal importance in all the plans. In fact the goals may actually be in conflict. For example, the goal of introducing modern technology may be in conflict with the goal of increasing employment if the technology reduces the need for labour. The planners have to balance the goals, a very difficult job indeed. We find different goals being emphasised in different plans in India. India's five year plans did not spell out how much of each and every good and service is to be produced. This is neither possible nor necessary (the former Soviet Union tried to do this and failed). It is enough if the plan is specific about the sectors where it plays a commanding role, for instance, power generation and irrigation, while leaving the rest to the market. Rationalised 2023-24 20 INDIAN ECONOMIC DEVELOPMENT Box 2.3: Mahalanobis: the Architect of Indian Planning Many distinguished thinkers contributed to the formulation of India's five year plans. Among them, the name of the statistician, Prasanta Chandra Mahalanobis, stands out. Planning, in the real sense of the term, began with the Second Five Year Plan. The Second Plan, a landmark contribution to development planning in general, laid down the basic ideas regarding goals of Indian planning; this plan was based on the ideas of Mahalanobis. In that sense, he can be regarded as the architect of Indian planning. Mahalanobis was born in 1893 in Calcutta. He was educated at the Presidency College in Calcutta and at Cambridge University in England. His contributions to the subject of statistics brought him international fame. In 1945 he was made a Fellow (member) of Britain's Royal Society, one of the most prestigious organisations of scientists; only the most outstanding scientists are made members of this Society. Mahalanobis established the Indian Statistical Institute (ISI) in Calcutta and started a journal, Sankhya, which still serves as a respected forum for statisticians to discuss their ideas. Both,

the ISI and Sankhya, are highly regarded by statisticians and economists all over the world to this day. During the second plan period, Mahalanobis invited many distinguished economists from India and abroad to advise him on India's economic development. Some of these economists became Nobel Prize winners later, which shows that he could identify individuals with talent. Among the economists invited by Mahalanobis were those who were very critical of the socialist principles of the second plan. In other words, he was willing to listen to what his critics had to say, the mark of a great scholar. Many economists today reject the approach to planning formulated by Mahalanobis but he will always be remembered for playing a vital role in putting India on the road to economic progress, and statisticians continue to profit from his contribution to statistical theory. Source: Sukhamoy Chakravarty, 'Mahalanobis, Prasanta Chandra' in John Eatwell et.al, (Eds.) The New Palgrave Dictionary: Economic Development, W.W. Norton, New York and London. Rationalised 2023-24 INDIAN ECONOMY 1950-1990 21 economics, is steady increase in the Gross Domestic Product (GDP). The GDP is the market value of all the final goods and services produced in the country during a year. You have studied this concept in Class X as well. You can think of the GDP as a cake and growth is increase in the size of the cake. If the cake is larger, more people can enjoy it. It is necessary to produce more goods and services if the people of India are to enjoy (in the words of the First Five Year Plan) a more rich and varied life. The GDP of a country is derived from the different sectors of the economy, namely the agricultural sector, the industrial sector and the service sector. The contribution made by each of these sectors makes up the structural composition of the economy. In some countries, growth in agriculture contributes more to the GDP growth, while in some countries the growth in the service sector contributes more to GDP growth (see Box 2.4). Modernisation: To increase the production of goods and services the producers have to adopt new technology. For example, a farmer can increase the output on the farm by using new seed varieties instead of using the old ones. Similarly, a factory can increase output by using a new type of machine. Adoption of new technology is called modernisation. However, modernisation does not refer only to the use of new technology but also to changes in social outlook such as the recognition that women should have the same rights as men. In a traditional society, women are supposed to remain at home while men work. A modern society makes use of the talents of women in the work place — in banks, factories, schools etc. — and such a society in most occassions is also prosperous. Self-reliance: A nation can promote economic growth and modernisation by using its own resources or by using resources imported from other nations. The first seven five year plans gave importance to self-reliance which means avoiding imports of those goods which could be Box 2.4: The Service Sector As a country develops, it undergoes 'structural change'. In the case of India, the structural change is peculiar. Usually, with development, the share of agriculture declines and the share of industry becomes dominant. At higher levels of development, the service sector contributes more to the GDP than the other two sectors. In India, the share of agriculture in the GDP was more than 50 per cent— as we would expect for a poor country. But by 1990 the share of the service sector was 40.59 per cent, more than that of agriculture or industry, like what we find in developed nations. This phenomenon of growing share of the service sector was accelerated in the post 1991 period (this marked the onset of globalisation in the country which will be discussed in chapter 3). Rationalised 2023-24 22 INDIAN ECONOMIC DEVELOPMENT produced in India itself. This policy was considered a necessity in order to reduce our dependence on foreign countries, especially for food. It is understandable that people who were recently freed from foreign domination should give importance to selfreliance. Further, it was feared that dependence on imported food supplies, foreign technology and foreign capital may make India's sovereignty vulnerable to foreign interference in our policies. Equity: Now growth, modernisation and self-reliance, by themselves, may not improve the kind of life which people are living. A country can have high growth, the most modern technology developed in the country itself, and also have most of its people living in poverty.

It is important to ensure that the benefits of economic prosperity reach the poor sections as well instead of being enjoyed only by the rich. So, in addition to growth, modernisation and self-reliance, equity is also important. Every Indian should be able to meet his or her basic needs such as food, a decent house, education and health care and inequality in the distribution of wealth should be reduced. Let us now see how the first seven five year plans, covering the period 1950-1990, attempted to attain these four goals and the extent to which they succeeded in doing so, with reference to agriculture, industry and trade. You will study the policies and developmental issues taken up after 1991 in Chapter 3. 2.3 AGRICULTURE You have learnt in Chapter 1 that during the colonial rule there was neither growth nor equity in the agricultural sector. The policy makers of independent India had to address these issues which they did through land reforms and promoting the use of 'High Yielding Variety' (HYV) seeds which ushered in a revolution in Indian agriculture. Land Reforms: At the time of independence, the land tenure system was characterised by intermediaries Work These Out ÿ Discuss in your class the changes in technology used for (a) Production of food grains (b) Packaging of products (c) Mass communication ÿ Find out and prepare a list of major items that India imported and exported during 1990-91 and 2018-19. (For this, see P. 145 also). (a) Observe the difference (b) Do you see the impact of self-reliance? Discuss. For getting these details you may refer to Economic Survey of the latest year. Rationalised 2023-24 INDIAN ECONOMY 1950-1990 23 (variously called zamindars, jagirdars etc.) who merely collected rent from the actual tillers of the soil without contributing towards improvements on the farm. The low productivity of the agricultural sector forced India to import food from the United States of America (U.S.A.). Equity in agriculture called for land reforms which primarily refer to change in the ownership of landholdings. Just a year after independence, steps were taken to abolish intermediaries and to make the tillers the owners of land. The idea behind this move was that ownership of land would give incentives (see Box 2.5) to the tillers to invest in making improvements provided sufficient capital was made available to them. Land ceiling was another policy to promote equity in the agricultural sector. This means fixing the maximum size of land which could be owned by an individual. The purpose of land ceiling was to reduce the concentration of land ownership in a few hands. The abolition of intermediaries meant that some 200 lakh tenants came into direct contact with the government — they were thus freed from being exploited by the zamindars. The ownership conferred on tenants gave them the incentive to increase output and this contributed to growth in agriculture. However, the goal of equity was not fully served by abolition of intermediaries. In some areas the former zamindars Box 2.5: Ownership and Incentives The policy of 'land to the tiller' is based on the idea that the cultivators will take more interest — they will have more incentive — in increasing output if they are the owners of the land. This is because ownership of land enables the tiller to make profit from the increased output. Tenants do not have the incentive to make improvements on land since it is the landowner who would benefit more from higher output. The importance of ownership in providing incentives is well illustrated by the carelessness with which farmers in the former Soviet Union used to pack fruits for sale. It was not uncommon to see farmers packing rotten fruits along with fresh fruits in the same box. Now, every farmer knows that the rotten fruits will spoil the fresh fruits if they are packed together. This will be a loss to the farmer since the fruits cannot be sold. So why did the Soviet farmers do something which would so obviously result in loss for them? The answer lies in the incentives facing the farmers. Since farmers in the former Soviet Union did not own any land, they neither enjoyed the profits nor suffered the losses. In the absence of ownership, there was no incentive on the part of farmers to be efficient, which also explains the poor performance of the agricultural sector in the Soviet Union despite availability of vast areas of highly fertile land. Source: Thomas Sowell, Basic Economics: A Citizen's Guide to the Economy, New York: Basic Books, 2004, Second Edition. Rationalised 2023-24 24 INDIAN ECONOMIC DEVELOPMENT continued to own large areas of land by making use of some loopholes in the legislation; there were

cases where tenants were evicted and the landowners claimed to be selfcultivators (the actual tillers), claiming ownership of the land; and even when the tillers got ownership of land, the poorest of the agricultural labourers (such as sharecroppers and landless labourers) did not benefit from land reforms. The land ceiling legislation also faced hurdles. The big landlords challenged the legislation in the courts, delaying its implementation. They used this delay to register their lands in the name of close relatives, thereby escaping from the legislation. The legislation also had a lot of loopholes which were exploited by the big landholders to retain their land. Land reforms were successful in Kerala and West Bengal because these states had governments committed to the policy of land to the tiller. Unfortunately other states did not have the same level of commitment and vast inequality in landholding continues to this day. The Green Revolution: At independence, about 75 per cent of the country's population was dependent on agriculture. Productivity in the agricultural sector was very low because of the use of old technology and the absence of required infrastructure for the vast majority of farmers. India's agriculture vitally depends on the monsoon and if the monsoon fell short the farmers were in trouble unless they had access to irrigation facilities which very few had. The stagnation in agriculture during the colonial rule was permanently broken by the green revolution. This refers to the large increase in production of food grains resulting from the use of high yielding variety (HYV) seeds especially for wheat and rice. The use of these seeds required the use of fertiliser and pesticide in the correct quantities as well as regular supply of water; the application of these inputs in correct proportions is vital. The farmers who could benefit from HYV seeds required reliable irrigation facilities as well as the financial resources to purchase fertiliser and pesticide. As a result, in the first phase of the green revolution (approximately mid 1960s upto mid 1970s), the use of HYV seeds was restricted to the more affluent states such as Punjab, Andhra Pradesh and Tamil Nadu. Further, the use of HYV seeds primarily benefited the wheatgrowing regions only. In the second phase of the green revolution (mid-1970s to mid-1980s), the HYV technology spread to a larger number of states and benefited more variety of crops. The spread of green revolution technology enabled India to achieve self-sufficiency in food grains; India no longer had to be at the mercy of America, or any other nation, for meeting its food requirements. Growth in agricultural output is important but it is not enough. If a large proportion of this increase is Rationalised 2023-24 INDIAN ECONOMY 1950-1990 25 consumed by the farmers themselves instead of being sold in the market, the higher output will not make much of a difference to the economy as a whole. If, on the other hand, a substantial amount of agricultural produce is sold in the market by the farmers, the higher output can make a difference to the economy. The portion of agricultural produce which is sold in the market by the farmers is called marketed surplus. A good proportion of the rice and wheat produced during the green revolution period (available as marketed surplus) was sold by the farmers in the market. As a result, the price of food grains declined relative to other items of consumption. The lowincome groups, who spend a large percentage of their income on food, benefited from this decline in relative prices. The green revolution enabled the government to procure sufficient amount of food grains to build a stock which could be used in times of food shortage. While the nation had immensely benefited from the green revolution, the technology involved was not free from risks. One such risk was the possibility that it would increase the disparities between small and big farmers—since only the big farmers could afford the required inputs, thereby reaping most of the benefits of the green revolution. Moreover, the HYV crops were also more prone to attack by pests and the small farmers who adopted this technology could lose everything in a pest attack. Rationalised 2023-24 26 INDIAN ECONOMIC DEVELOPMENT Fortunately, these fears did not come true because of the steps taken by the government. The government provided loans at a low interest rate to small farmers and subsidised fertilisers so that small farmers could also have access to the needed inputs. Since the small farmers could obtain the required inputs, the output on small farms equalled the output on large farms in the course of time. As a result, the green revolution benefited

the small as well as rich farmers. The risk of the small farmers being ruined when pests attack their crops was considerably reduced by the services rendered by research institutes established by the government. You should note that the green revolution would have favoured the rich farmers only if the state did not play an extensive role in ensuring that the small farmer also gains from the new technology. The Debate Over Subsidies: The economic justification of subsidies in agriculture is, at present, a hotly debated question. It is generally agreed that it was necessary to use subsidies to provide an incentive for adoption of the new HYV technology by farmers in general and small farmers in particular. Any new technology will be looked upon as being risky by farmers. Subsidies were, therefore, needed to encourage farmers to test the new technology. Some economists believe that once the technology is found profitable and is widely adopted, subsidies should be phased out since their purpose has been served. Further, subsidies are meant to benefit the farmers but a substantial amount of fertiliser subsidy also benefits the fertiliser industry; and among farmers, the subsidy largely benefits the farmers in the more prosperous regions. Therefore, it is argued that there is no case for continuing with fertiliser subsidies; it does not benefit the target group and it is a huge burden on the government's finances (see also Box 2.6). On the other hand, some believe that the government should continue with agricultural subsidies because farming in India continues to be a risky business. Most farmers are very poor and they will not be able to afford the required inputs without subsidies. Eliminating subsidies will increase the inequality between rich and poor farmers and violate the goal of equity. These experts argue that if subsidies are largely benefiting the fertiliser industry and big farmers, the correct policy is not to abolish subsidies but to take steps to ensure that only the poor farmers enjoy the benefits. Thus, by the late 1960s, Indian agricultural productivity had increased sufficiently to enable the country to be self-sufficient in food grains. This is an achievement to be proud of. On the negative side, some 65 per cent of the country's population continued to be employed in agriculture even as late as 1990. Economists have found that as Rationalised 2023-24 INDIAN ECONOMY 1950-1990 27 a nation becomes more prosperous, the proportion of GDP contributed by agriculture as well as the proportion of population working in the sector declines considerably. In India, between 1950 and 1990, the proportion of GDP contributed by agriculture declined significantly but not the population depending on it (67.5 per cent in 1950 to 64.9 per cent by 1990). Why was such a large proportion of the population engaged in agriculture although agricultural output could have grown with much less people working in the sector? The answer is that the industrial sector and the service sector did not absorb the people working in the agricultural sector. Many economists call this an important failure of our policies followed during 1950-1990. 2.4 INDUSTRY AND TRADE Economists have found that poor nations can progress only if they have a good industrial sector. Industry provides employment which is more stable than the employment in agriculture; it promotes modernisation and overall prosperity. It is for this reason that the five year plans placed a lot of emphasis on industrial development. You might have studied in the previous chapter that, at the time of independence, the variety of industries was very narrow Box 2.6: Prices as Signals You would have learnt in an earlier class about how prices of goods are determined in the market. It is important to understand that prices are signals about the availability of goods. If a good becomes scarce, its price will rise and those who use this good will have the incentive to make efficient decisions about its use based on the price. If the price of water goes up because of lower supply, people will have the incentive to use it with greater care; for example, they may stop watering the garden to conserve water. We complain whenever the price of petrol increases and blame it on the government. But the increase in petrol price reflects greater scarcity and the price rise is a signal that less petrol is available—this provides an incentive to use less petrol or look for alternate fuels. Some economists point out that subsidies do not allow prices to indicate the supply of a good. When electricity and water are provided at a subsidised rate or free, they will be used wastefully without any concern for their scarcity. Farmers will cultivate water intensive crops if water

is supplied free, although the water resources in that region may be scarce and such crops will further deplete the already scarce resources. If water is priced to reflect scarcity, farmers will cultivate crops suitable to the region. Fertiliser and pesticide subsidies result in overuse of resources which can be harmful to the environment. Subsidies provide an incentive for wasteful use of resources. Think about subsidies in terms of incentives and ask yourself whether it is wise from the economic viewpoint to provide free electricity to farmers. Rationalised 2023-24 28 INDIAN ECONOMIC DEVELOPMENT — largely confined to cotton textiles and jute. There were two wellmanaged iron and steel firms — one in Jamshedpur and the other in Kolkata — but, obviously, we needed to expand the industrial base with a variety of industries if the economy was to grow. Public and Private Sectors in Indian Industrial Development: The big question facing the policy makers was — what should be the role of the government and the private sector in industrial development? At the time of independence, Indian industrialists did not have the capital to undertake Work These Out ÿ A group of students may visit an agricultural farm, prepare a case study on the method of farming used, that is, types of seeds, fertilisers, machines, means of irrigation, cost involved, marketable surplus and income earned. It will be beneficial if the changes in cultivation methods could be collected from an elderly member of the farming family (a) Discuss the findings in your class. (b) The different groups can then prepare a chart showing variations in cost of production, productivity, use of seeds, fertilisers, means of irrigation, time taken, marketable surplus and income of the family. ÿ Collect newspaper cuttings related to the World Bank, International Monetary Fund, World Trade Organisation (and meets of G7, G8, G10 countries). Discuss the views shared by the developed and developing countries on farm subsidies. ÿ Prepare pie charts on the occupational structure of the Indian economy available in the following table. Discuss the possible reasons for the change in the shape of pies. Sector 1950–51 1990–91 Agriculture 72.1 66.8 Industry 10.7 12.7 Services 17.2 20.5 ÿStudy the arguments for and against agricultural subsidies. What is your view on this issue? ÿSome economists argue that farmers in other countries, particularly developed countries, are provided with high amount of subsidies and are encouraged to export their produce to other countries. Do you think our farmers will be able to compete with farmers from developed countries? Discuss. Rationalised 2023-24 INDIAN ECONOMY 1950-1990 29 investment in industrial ventures required for the development of Indian economy; nor was the market big enough to encourage industrialists to undertake major projects even if they had the capital to do so. It is principally for these reasons that the erstwhile governments had to play an extensive role in promoting the industrial sector. In addition, the decision to develop the Indian economy on socialist lines led to the policy of the government controlling the commanding heights of the economy, as the Second Five Year plan put it. This meant that the government would have complete control of those industries that were vital for the economy. The policies of the private sector would have to be complimentary to those of the public sector, with the public sector leading the way. Industrial Policy Resolution 1956 (IPR 1956): In accordance with the goal of the state controlling the commanding heights of the economy, the Industrial Policy Resolution of 1956 was adopted. This resolution formed the basis of the Second Five Year Plan, the plan which tried to build the basis for a socialist pattern of society. This resolution classified industries into three categories. The first category comprised industries which would be exclusively owned by the government; the second category consisted of industries in which the private sector could supplement the efforts of the public sector, with the government taking the sole responsibility for starting new units; the third category consisted of the remaining industries which were to be in the private sector. Although there was a category of industries left to the private sector, the sector was kept under state control through a system of licenses. No new industry was allowed unless a license was obtained from the government. This policy was used for promoting industry in backward regions; it was easier to obtain a license if the industrial unit was established in an economically backward area. In addition, such units were given

certain concessions such as tax benefits and electricity at a lower tariff. The purpose of this policy was to promote regional equality. Even an existing industry had to obtain a license for expanding output or for diversifying production (producing a new variety of goods). This was meant to ensure that the quantity of goods produced was not more than what the economy required. License to expand production was given only if the government was convinced that the economy required a larger quantity of goods. Small-Scale Industry: In 1955, the Village and Small-Scale Industries Committee, also called the Karve Committee, noted the possibility of using small-scale industries for promoting rural development. A 'small-scale industry' is defined with reference to the maximum investment allowed on the assets of a unit. This limit has changed over a period of time. In 1950 a small -scale industrial unit was one which invested Rationalised 2023-24 30 INDIAN ECONOMIC DEVELOPMENT a maximum of rupees five lakh; at present the maximum investment allowed is rupees one crore. It is believed that small-scale industries are more 'labour intensive' i.e., they use more labour than the large-scale industries and, therefore, generate more employment. But these industries cannot compete with the big industrial firms; it is obvious that development of small-scale industry requires them to be shielded from the large firms. For this purpose, the production of a number of products was reserved for the small-scale industry; the criterion of reservation being the ability of these units to manufacture the goods. They were also given concessions such as lower excise duty and bank loans at lower interest rates. 2.5 TRADE POLICY: IMPORT SUBSTITUTION The industrial policy that India adopted was closely related to the trade policy. In the first seven plans, trade was characterised by what is commonly called an inward looking trade strategy. Technically, this strategy is called import substitution. This policy aimed at replacing or substituting imports with domestic production. For example, instead of importing vehicles made in a foreign country, industries would be encouraged to produce them in India itself. In this policy the government protected the domestic industries from foreign competition. Protection from imports took two forms: tariffs and quotas. Tariffs are a tax on imported goods; they make imported goods more expensive and discourage their use. Quotas specify the quantity of goods which can be imported. The effect of tariffs and quotas is that they restrict imports and, therefore, protect the domestic firms from foreign competition. The policy of protection was based on the notion that industries of developing countries were not in a position to compete against the goods produced by more developed economies. It was assumed that if the domestic industries were protected they would learn to compete in the course of time. Our planners also feared the possibility of foreign exchange being spent on import of luxury goods if no restrictions were placed on imports. Nor was any serious thought given to promote exports until the mid-1980s. Effect of Policies on Industrial Development: The achievements of India's industrial sector during the first seven plans are impressive indeed. The proportion of GDP contributed by the industrial sector increased in the period from 13 per cent in 1950-51 to 24.6 per cent in 1990-91. The rise in the industry's share of GDP is an important indicator of development. The six per cent annual growth rate of the industrial sector during the period is commendable. No longer was Indian industry restricted largely to cotton textiles and jute; in fact, the industrial sector became well diversified by 1990, largely due to Rationalised 2023-24 INDIAN ECONOMY 1950-1990 31 the public sector. The promotion of small-scale industries gave opportunities to those people who did not have the capital to start large firms to get into business. Protection from foreign competition enabled the development of indigenous industries in the areas of electronics and automobile sectors which otherwise could not have developed. In spite of the contribution made by the public sector to the growth of the Indian economy, some economists are critical of the performance of many public sector enterprises. It was proposed at the beginning of this chapter that initially public sector was required in a big way. It is now widely held that state enterprises continued to produce certain goods and services (often monopolising them) although this was no longer required. An example is the provision of telecommunication service. This industry

continued to be reserved for the Public Sector even after it was realised that private sector firms could also provide it. Due to the absence of competition, even till the late 1990s, one had to wait for a long time to get a telephone connection. Another instance could be the establishment of Modern Bread, a bread-manufacturing firm, as if the Work These Out ÿ Construct a pie chart for the following table on sectoral contribution to GDP and discuss the difference in the contribution of the sectors in the light of effects of development during 1950-91. Sector 1950-51 1990-91 Agriculture 59.0 34.9 Industry 13.0 24.6 Services 28.0 40.5 ÿ Conduct a debate in your classroom on the usefulness of Public Sector Undertakings (PSUs) by dividing the class into two groups. One group may speak in favour of PSUs and the other group against the motion (involve as many students as possible and encourage them to give examples). Rationalised 2023-24 32 INDIAN ECONOMIC DEVELOPMENT private sector could not manufacture bread! In 2001 this firm was sold to the private sector. The point is that after four decades of Planned development of Indian Economy no distinction was made between (i) what the public sector alone can do and (ii) what the private sector can also do. For example, even now only the public sector supplies national defense. And even though the private sector can manage hotels well, yet, the government also runs hotels. This has led some scholars to argue that the state should get out of areas which the private sector can manage and the government may concentrate its resources on important services which the private sector cannot provide. Many public sector firms incurred huge losses but continued to function because it is difficult to close a government undertaking even if it is a drain on the nation's limited resources. This does not mean that private firms are always profitable (indeed, quite a few of the public sector firms were originally private firms which were on the verge of closure due to losses; they were then nationalised to protect the jobs of the workers). However, a loss-making private firm will not waste resources by being kept running despite the losses. The need to obtain a license to start an industry was misused by industrial houses; a big industrialist would get a license not for starting a new firm but to prevent competitors from starting new firms. The excessive regulation of what came to be called the permit license raj prevented certain firms from becoming more efficient. More time was spent by industrialists in trying to obtain a license or lobby with the concerned ministries rather than on thinking about how to improve their products. The protection from foreign competition was also being criticised on the ground that it continued even after it proved to do more harm than good. Due to restrictions on imports, the Indian consumers had to purchase whatever the Indian producers produced. The producers were aware that they had a captive market; so they had no incentive to improve the quality of their goods. Why should they think of improving quality when they could sell low quality items at a high price? Competition from imports forces our producers to be more efficient. A few economists also point out that the public sector is not meant for earning profits but to promote the welfare of the nation. The public sector firms, on this view, should be evaluated on the basis of the extent to which they contribute to the welfare of people and not on the profits they earn. Regarding protection, some economists hold that we should protect our producers from foreign competition as long as the rich nations continue to do so. Owing to all these conflicts, economists called for a change in our policy. This, alongwith other problems, led the government to introduce a new economic policy in 1991. Rationalised 2023-24 INDIAN ECONOMY 1950-1990 33 2.6 CONCLUSION The progress of the Indian economy during the first seven plans was impressive indeed. Our industries became far more diversified compared to the situation at independence. India became self- sufficient in food production thanks to the green revolution. Land reforms resulted in abolition of the hated zamindari system. In industrial sector, many economists became dissatisfied with the performance of many public sector enterprises. Excessive government regulation prevented growth of entrepreneurship. In the name of selfreliance, Indian producers were protected against foreign competition and this did not give them the incentive to improve the quality of goods that they produced. Indian policies were 'inward oriented' that failed to develop a strong export sector.

The need for reform of economic policy was widely felt in the context of changing global economic scenario, and the new economic policy was initiated in 1991 to make Indian economy more efficient. This is the subject of the next chapter. Recap ÿ After independence, India envisaged an economic system which combines the best features of socialism and capitalism—this culminated in the mixed economy model. ÿ All the economic planning has been formulated through five year plans. ÿ Common goals of five year plans are growth, modernisation, self-sufficiency and equity. ÿ The major policy initiatives in agriculture sector were land reforms and green revolution. These initiatives helped India to become self-sufficient in food grains production. ÿ The proportion of people depending on agriculture did not decline as expected. ÿ Import substitution policy initiatives in the industrial sector raised its contribution to GDP. ÿ One of the major drawbacks in the industrial sector was the inefficient functioning of the public sector as it started incurring losses leading to drain on the nation's limited resources. Rationalised 2023-24 34 INDIAN ECONOMIC DEVELOPMENT 1. Define a plan. 2. Why did India opt for planning? 3. Why should plans have goals? 4. What are High Yielding Variety (HYV) seeds? 5. What is marketable surplus? 6. Explain the need and type of land reforms implemented in the agriculture sector. 7. What is Green Revolution? Why was it implemented and how did it benefit the farmers? Explain in brief. 8. Explain 'growth with equity' as a planning objective. 9. Does modernisation as a planning objective create contradiction in the light of employment generation? Explain. 10. Why was it necessary for a developing country like India to follow self-reliance as a planning objective? 11. What is sectoral composition of an economy? Is it necessary that the service sector should contribute maximum to GDP of an economy? Comment. 12. Why was public sector given a leading role in industrial development during the planning period? 13. Explain the statement that green revolution enabled the government to procure sufficient food grains to build its stocks that could be used during times of shortage. 14. While subsidies encourage farmers to use new technology, they are a huge burden on government finances. Discuss the usefulness of subsidies in the light of this fact. 15. Why, despite the implementation of green revolution, 65 per cent of India's population continued to be engaged in the agriculture sector till 1990? 16. Though public sector is very essential for industries, many public sector undertakings incur huge losses and are a drain on the economy's resources. Discuss the usefulness of public sector undertakings in the light of this fact. EXERCISES Rationalised 2023-24 INDIAN ECONOMY 1950-1990 35 17. Explain how import substitution can protect domestic industry. 18. Why and how was private sector regulated under the IPR 1956? 19. Match the following: 1. Prime Minister A. Seeds that give large proportion of output 2. Gross Domestic B. Quantity of goods that can be imported Product 3. Quota C. Chairperson of the planning commission 4. Land Reforms D. The money value of all the final goods and services produced within the economy in one year 5. HYV Seeds E. Improvements in the field of agriculture to increase its productivity 6. Subsidy F. The monetary assistance given by government for production activities. BHAGWATI, J. 1993. India in Transition: Freeing the Economy. Oxford University Press, Delhi. DANDEKAR, V.M. 2004. Forty Years After Independence, in Bimal Jalan, (Ed.). The Indian Economy: Problems and Prospects. Penguin, Delhi. JOSHI, VIJAY. and I.M.D. LITTLE. 1996. India's Economic Reforms 1991-2001. Oxford University Press, Delhi. MOHAN, RAKESH. 2004. Industrial Policy and Controls, in Bimal Jalan (Ed.). The Indian Economy: Problems and Prospects. Penguin, Delhi. RAO, C.H. HANUMANTHA. 2004. Agriculture: Policy and Performance, in Bimal Jalan, (Ed.). The Indian Economy: Problems and Prospects. Penguin, Delhi. REFERENCES Rationalised 2023-24After studying this chapter, the learners will • come to know the goals of India's five year plans • know about the development policies in different sectors such as agriculture and industry from 1950-1990 • learn to think about the merits and limitations of a regulated economy. 2 INDIAN ECONOMY 1950–1990 Rationalised 2023-24 INDIAN ECONOMY 1950-1990 17 2.1 INTRODUCTION On 15 August 1947, India woke to a new dawn of freedom. Finally we were masters of our own destiny after some two hundred years of British rule; the job of nation building was now

in our own hands. The leaders of independent India had to decide, among other things, the type of economic system most suitable for our nation, a system which would promote the welfare of all rather than a few. There are different types of economic systems (see Box 2.1) and among them, socialism appealed to Jawaharlal Nehru the most. However, he was not in favour of the kind of socialism established in the former Soviet Union where all the means of production, i.e. all the factories and farms in the country, were owned by the government. There was no private property. It is not possible in a democracy like India for the government to change the ownership pattern of land and other properties of its citizens in the way that it was done in the former Soviet Union. Nehru, and many other leaders and thinkers of the newly independent India, sought an alternative to the extreme versions of capitalism and socialism. Basically sympathising with the socialist outlook, they found the answer in an economic system which, in their view, combined the best features of socialism without its drawbacks. In this view, India would be a socialist society with a strong public sector but also with private property and democracy; the government would plan (see Box 2.2) for the The central objective of Planning in India... is to initiate a process of development which will raise the living standards and open out to the people new opportunities for a richer and more varied life. First Five Year Plan Work These Out ÿ Prepare a chart on the different types of economic systems prevalent in the world. List out the countries as capitalist, socialist and mixed economy. ÿ Plan a class trip to an agriculture farm. Divide the class into seven groups with each group to plan a specific goal, for example, the purpose of the visit, money expenditure involved, time taken, resources, people accompanying the group and who need to be contacted, possible places of visit, possible questions to be asked etc. Now, with the help of your teacher, compile these specific goals and compare with long-term goals of successful visit to an agricultural farm. Rationalised 2023-24 18 INDIAN ECONOMIC DEVELOPMENT Box 2.1: Types of Economic Systems Every society has to answer three questions ÿWhat goods and services should be produced in the country? ÿHow should the goods and services be produced? Should producers use more human labour or more capital (machines) for producing things? ÿHow should the goods and services be distributed among people? One answer to these questions is to depend on the market forces of supply and demand. In a market economy, also called capitalism, only those consumer goods will be produced that are in demand, i.e., goods that can be sold profitably either in the domestic or in the foreign markets. If cars are in demand, cars will be produced and if bicycles are in demand, bicycles will be produced. If labour is cheaper than capital, more labour-intensive methods of production will be used and vice-versa. In a capitalist society the goods produced are distributed among people not on the basis of what people need but on the basis of Purchasing Power—the ability to buy goods and services. That is, one has to have the money in the pocket to buy it. Low cost housing for the poor is much needed but will not count as demand in the market sense because the poor do not have the purchasing power to back the demand. As a result this commodity will not be produced and supplied as per market forces. Such a society did not appeal to Jawaharlal Nehru, our first prime minister, for it meant that the great majority of people of the country would be left behind without the chance to improve their quality of life. A socialist society answers the three questions in a totally different manner. In a socialist society the government decides what goods are to be produced in accordance with the needs of society. It is assumed that the government knows what is good for the people of the country and so the desires of individual consumers are not given much importance. The government decides how goods are to be produced and how they should be distributed. In principle, distribution under socialism is supposed to be based on what people need and not on what they can afford to purchase. Unlike under capitalism, for example, a socialist nation provides free health care to all its citizens. Strictly, a socialist society has no private property since everything is owned by the state. In Cuba and China, for example, most of the economic activities are governed by the socialistic principles. Most economies are mixed economies, i.e. the government and the market together answer the three

questions of what to produce, how to produce and how to distribute what is produced. In a mixed economy, the market will provide whatever goods and services it can produce well, and the government will provide essential goods and services which the market fails to do. Rationalised 2023-24 INDIAN ECONOMY 1950-1990 19 economy with the private sector being encouraged to be part of the plan effort. The 'Industrial Policy Resolution' of 1948 and the Directive Principles of the Indian Constitution reflected this outlook. In 1950, the Planning Commission was set up with the Prime Minister as its Chairperson. The era of five year plans had begun. 2.2 THE GOALS OF FIVE YEAR PLANS A plan should have some clearly specified goals. The goals of the five year plans were: growth, modernisation, self-reliance and equity. This does not mean that all the plans have given equal importance to all these goals. Due to limited resources, a choice has to be made in each plan about which of the goals is to be given primary importance. Nevertheless, the planners have to ensure that, as far as possible, the policies of the plans do not contradict these four goals. Let us now learn about the goals of planning in some detail. Growth: It refers to increase in the country's capacity to produce the output of goods and services within the country. It implies either a larger stock of productive capital, or a larger size of supporting services like transport and banking, or an increase in the efficiency of productive capital and services. A good indicator of economic growth, in the language of Box 2.2: What is a Plan? A plan spells out how the resources of a nation should be put to use. It should have some general goals as well as specific objectives which are to be achieved within a specified period of time; in India plans were of five years duration and were called five year plans (we borrowed this from the former Soviet Union, the pioneer in national planning). Our plan documents upto the year 2017 not only specify the objectives to be attained in the five years of a plan but also what is to be achieved over a period of twenty years. This long-term plan is called 'perspective plan'. The five year plans were supposed to provide the basis for the perspective plan. It will be unrealistic to expect all the goals of a plan to be given equal importance in all the plans. In fact the goals may actually be in conflict. For example, the goal of introducing modern technology may be in conflict with the goal of increasing employment if the technology reduces the need for labour. The planners have to balance the goals, a very difficult job indeed. We find different goals being emphasised in different plans in India. India's five year plans did not spell out how much of each and every good and service is to be produced. This is neither possible nor necessary (the former Soviet Union tried to do this and failed). It is enough if the plan is specific about the sectors where it plays a commanding role, for instance, power generation and irrigation, while leaving the rest to the market. Rationalised 2023-24 20 INDIAN ECONOMIC DEVELOPMENT Box 2.3: Mahalanobis: the Architect of Indian Planning Many distinguished thinkers contributed to the formulation of India's five year plans. Among them, the name of the statistician, Prasanta Chandra Mahalanobis, stands out. Planning, in the real sense of the term, began with the Second Five Year Plan. The Second Plan, a landmark contribution to development planning in general, laid down the basic ideas regarding goals of Indian planning; this plan was based on the ideas of Mahalanobis. In that sense, he can be regarded as the architect of Indian planning. Mahalanobis was born in 1893 in Calcutta. He was educated at the Presidency College in Calcutta and at Cambridge University in England. His contributions to the subject of statistics brought him international fame. In 1945 he was made a Fellow (member) of Britain's Royal Society, one of the most prestigious organisations of scientists; only the most outstanding scientists are made members of this Society. Mahalanobis established the Indian Statistical Institute (ISI) in Calcutta and started a journal, Sankhya, which still serves as a respected forum for statisticians to discuss their ideas. Both, the ISI and Sankhya, are highly regarded by statisticians and economists all over the world to this day. During the second plan period, Mahalanobis invited many distinguished economists from India and abroad to advise him on India's economic development. Some of these economists became Nobel Prize winners later, which shows that he could identify individuals with talent. Among the economists invited by Mahalanobis were

those who were very critical of the socialist principles of the second plan. In other words, he was willing to listen to what his critics had to say, the mark of a great scholar. Many economists today reject the approach to planning formulated by Mahalanobis but he will always be remembered for playing a vital role in putting India on the road to economic progress, and statisticians continue to profit from his contribution to statistical theory. Source: Sukhamoy Chakravarty, 'Mahalanobis, Prasanta Chandra' in John Eatwell et.al, (Eds.) The New Palgrave Dictionary: Economic Development, W.W. Norton, New York and London. Rationalised 2023-24 INDIAN ECONOMY 1950-1990 21 economics, is steady increase in the Gross Domestic Product (GDP). The GDP is the market value of all the final goods and services produced in the country during a year. You have studied this concept in Class X as well. You can think of the GDP as a cake and growth is increase in the size of the cake. If the cake is larger, more people can enjoy it. It is necessary to produce more goods and services if the people of India are to enjoy (in the words of the First Five Year Plan) a more rich and varied life. The GDP of a country is derived from the different sectors of the economy, namely the agricultural sector, the industrial sector and the service sector. The contribution made by each of these sectors makes up the structural composition of the economy. In some countries, growth in agriculture contributes more to the GDP growth, while in some countries the growth in the service sector contributes more to GDP growth (see Box 2.4). Modernisation: To increase the production of goods and services the producers have to adopt new technology. For example, a farmer can increase the output on the farm by using new seed varieties instead of using the old ones. Similarly, a factory can increase output by using a new type of machine. Adoption of new technology is called modernisation. However, modernisation does not refer only to the use of new technology but also to changes in social outlook such as the recognition that women should have the same rights as men. In a traditional society, women are supposed to remain at home while men work. A modern society makes use of the talents of women in the work place — in banks, factories, schools etc. — and such a society in most occassions is also prosperous. Self-reliance: A nation can promote economic growth and modernisation by using its own resources or by using resources imported from other nations. The first seven five year plans gave importance to self-reliance which means avoiding imports of those goods which could be Box 2.4: The Service Sector As a country develops, it undergoes 'structural change'. In the case of India, the structural change is peculiar. Usually, with development, the share of agriculture declines and the share of industry becomes dominant. At higher levels of development, the service sector contributes more to the GDP than the other two sectors. In India, the share of agriculture in the GDP was more than 50 per cent—as we would expect for a poor country. But by 1990 the share of the service sector was 40.59 per cent, more than that of agriculture or industry, like what we find in developed nations. This phenomenon of growing share of the service sector was accelerated in the post 1991 period (this marked the onset of globalisation in the country which will be discussed in chapter 3). Rationalised 2023-24 22 INDIAN ECONOMIC DEVELOPMENT produced in India itself. This policy was considered a necessity in order to reduce our dependence on foreign countries, especially for food. It is understandable that people who were recently freed from foreign domination should give importance to selfreliance. Further, it was feared that dependence on imported food supplies, foreign technology and foreign capital may make India's sovereignty vulnerable to foreign interference in our policies. Equity: Now growth, modernisation and self-reliance, by themselves, may not improve the kind of life which people are living. A country can have high growth, the most modern technology developed in the country itself, and also have most of its people living in poverty. It is important to ensure that the benefits of economic prosperity reach the poor sections as well instead of being enjoyed only by the rich. So, in addition to growth, modernisation and self-reliance, equity is also important. Every Indian should be able to meet his or her basic needs such as food, a decent house, education and health care and inequality in the distribution of wealth should be reduced. Let us now see how the first seven five year plans, covering

the period 1950-1990, attempted to attain these four goals and the extent to which they succeeded in doing so, with reference to agriculture, industry and trade. You will study the policies and developmental issues taken up after 1991 in Chapter 3. 2.3 AGRICULTURE You have learnt in Chapter 1 that during the colonial rule there was neither growth nor equity in the agricultural sector. The policy makers of independent India had to address these issues which they did through land reforms and promoting the use of 'High Yielding Variety' (HYV) seeds which ushered in a revolution in Indian agriculture. Land Reforms: At the time of independence, the land tenure system was characterised by intermediaries Work These Out ÿ Discuss in your class the changes in technology used for (a) Production of food grains (b) Packaging of products (c) Mass communication ÿ Find out and prepare a list of major items that India imported and exported during 1990-91 and 2018-19. (For this, see P. 145 also). (a) Observe the difference (b) Do you see the impact of self-reliance? Discuss. For getting these details you may refer to Economic Survey of the latest year. Rationalised 2023-24 INDIAN ECONOMY 1950-1990 23 (variously called zamindars, jagirdars etc.) who merely collected rent from the actual tillers of the soil without contributing towards improvements on the farm. The low productivity of the agricultural sector forced India to import food from the United States of America (U.S.A.). Equity in agriculture called for land reforms which primarily refer to change in the ownership of landholdings. Just a year after independence, steps were taken to abolish intermediaries and to make the tillers the owners of land. The idea behind this move was that ownership of land would give incentives (see Box 2.5) to the tillers to invest in making improvements provided sufficient capital was made available to them. Land ceiling was another policy to promote equity in the agricultural sector. This means fixing the maximum size of land which could be owned by an individual. The purpose of land ceiling was to reduce the concentration of land ownership in a few hands. The abolition of intermediaries meant that some 200 lakh tenants came into direct contact with the government — they were thus freed from being exploited by the zamindars. The ownership conferred on tenants gave them the incentive to increase output and this contributed to growth in agriculture. However, the goal of equity was not fully served by abolition of intermediaries. In some areas the former zamindars Box 2.5: Ownership and Incentives The policy of 'land to the tiller' is based on the idea that the cultivators will take more interest — they will have more incentive — in increasing output if they are the owners of the land. This is because ownership of land enables the tiller to make profit from the increased output. Tenants do not have the incentive to make improvements on land since it is the landowner who would benefit more from higher output. The importance of ownership in providing incentives is well illustrated by the carelessness with which farmers in the former Soviet Union used to pack fruits for sale. It was not uncommon to see farmers packing rotten fruits along with fresh fruits in the same box. Now, every farmer knows that the rotten fruits will spoil the fresh fruits if they are packed together. This will be a loss to the farmer since the fruits cannot be sold. So why did the Soviet farmers do something which would so obviously result in loss for them? The answer lies in the incentives facing the farmers. Since farmers in the former Soviet Union did not own any land, they neither enjoyed the profits nor suffered the losses. In the absence of ownership, there was no incentive on the part of farmers to be efficient, which also explains the poor performance of the agricultural sector in the Soviet Union despite availability of vast areas of highly fertile land. Source: Thomas Sowell, Basic Economics: A Citizen's Guide to the Economy, New York: Basic Books, 2004, Second Edition. Rationalised 2023-24 24 INDIAN ECONOMIC DEVELOPMENT continued to own large areas of land by making use of some loopholes in the legislation; there were cases where tenants were evicted and the landowners claimed to be selfcultivators (the actual tillers), claiming ownership of the land; and even when the tillers got ownership of land, the poorest of the agricultural labourers (such as sharecroppers and landless labourers) did not benefit from land reforms. The land ceiling legislation also faced hurdles. The big landlords challenged the legislation in the courts, delaying its implementation. They used this delay to register their lands in the name of

close relatives, thereby escaping from the legislation. The legislation also had a lot of loopholes which were exploited by the big landholders to retain their land. Land reforms were successful in Kerala and West Bengal because these states had governments committed to the policy of land to the tiller. Unfortunately other states did not have the same level of commitment and vast inequality in landholding continues to this day. The Green Revolution: At independence, about 75 per cent of the country's population was dependent on agriculture. Productivity in the agricultural sector was very low because of the use of old technology and the absence of required infrastructure for the vast majority of farmers. India's agriculture vitally depends on the monsoon and if the monsoon fell short the farmers were in trouble unless they had access to irrigation facilities which very few had. The stagnation in agriculture during the colonial rule was permanently broken by the green revolution. This refers to the large increase in production of food grains resulting from the use of high yielding variety (HYV) seeds especially for wheat and rice. The use of these seeds required the use of fertiliser and pesticide in the correct quantities as well as regular supply of water; the application of these inputs in correct proportions is vital. The farmers who could benefit from HYV seeds required reliable irrigation facilities as well as the financial resources to purchase fertiliser and pesticide. As a result, in the first phase of the green revolution (approximately mid 1960s upto mid 1970s), the use of HYV seeds was restricted to the more affluent states such as Punjab, Andhra Pradesh and Tamil Nadu. Further, the use of HYV seeds primarily benefited the wheatgrowing regions only. In the second phase of the green revolution (mid-1970s to mid-1980s), the HYV technology spread to a larger number of states and benefited more variety of crops. The spread of green revolution technology enabled India to achieve self-sufficiency in food grains; India no longer had to be at the mercy of America, or any other nation, for meeting its food requirements. Growth in agricultural output is important but it is not enough. If a large proportion of this increase is Rationalised 2023-24 INDIAN ECONOMY 1950-1990 25 consumed by the farmers themselves instead of being sold in the market, the higher output will not make much of a difference to the economy as a whole. If, on the other hand, a substantial amount of agricultural produce is sold in the market by the farmers, the higher output can make a difference to the economy. The portion of agricultural produce which is sold in the market by the farmers is called marketed surplus. A good proportion of the rice and wheat produced during the green revolution period (available as marketed surplus) was sold by the farmers in the market. As a result, the price of food grains declined relative to other items of consumption. The lowincome groups, who spend a large percentage of their income on food, benefited from this decline in relative prices. The green revolution enabled the government to procure sufficient amount of food grains to build a stock which could be used in times of food shortage. While the nation had immensely benefited from the green revolution, the technology involved was not free from risks. One such risk was the possibility that it would increase the disparities between small and big farmers—since only the big farmers could afford the required inputs, thereby reaping most of the benefits of the green revolution. Moreover, the HYV crops were also more prone to attack by pests and the small farmers who adopted this technology could lose everything in a pest attack. Rationalised 2023-24 26 INDIAN ECONOMIC DEVELOPMENT Fortunately, these fears did not come true because of the steps taken by the government. The government provided loans at a low interest rate to small farmers and subsidised fertilisers so that small farmers could also have access to the needed inputs. Since the small farmers could obtain the required inputs, the output on small farms equalled the output on large farms in the course of time. As a result, the green revolution benefited the small as well as rich farmers. The risk of the small farmers being ruined when pests attack their crops was considerably reduced by the services rendered by research institutes established by the government. You should note that the green revolution would have favoured the rich farmers only if the state did not play an extensive role in ensuring that the small farmer also gains from the new technology. The Debate Over Subsidies: The economic justification of subsidies in agriculture is, at

present, a hotly debated question. It is generally agreed that it was necessary to use subsidies to provide an incentive for adoption of the new HYV technology by farmers in general and small farmers in particular. Any new technology will be looked upon as being risky by farmers. Subsidies were, therefore, needed to encourage farmers to test the new technology. Some economists believe that once the technology is found profitable and is widely adopted, subsidies should be phased out since their purpose has been served. Further, subsidies are meant to benefit the farmers but a substantial amount of fertiliser subsidy also benefits the fertiliser industry; and among farmers, the subsidy largely benefits the farmers in the more prosperous regions. Therefore, it is argued that there is no case for continuing with fertiliser subsidies; it does not benefit the target group and it is a huge burden on the government's finances (see also Box 2.6). On the other hand, some believe that the government should continue with agricultural subsidies because farming in India continues to be a risky business. Most farmers are very poor and they will not be able to afford the required inputs without subsidies. Eliminating subsidies will increase the inequality between rich and poor farmers and violate the goal of equity. These experts argue that if subsidies are largely benefiting the fertiliser industry and big farmers, the correct policy is not to abolish subsidies but to take steps to ensure that only the poor farmers enjoy the benefits. Thus, by the late 1960s, Indian agricultural productivity had increased sufficiently to enable the country to be self-sufficient in food grains. This is an achievement to be proud of. On the negative side, some 65 per cent of the country's population continued to be employed in agriculture even as late as 1990. Economists have found that as Rationalised 2023-24 INDIAN ECONOMY 1950-1990 27 a nation becomes more prosperous, the proportion of GDP contributed by agriculture as well as the proportion of population working in the sector declines considerably. In India, between 1950 and 1990, the proportion of GDP contributed by agriculture declined significantly but not the population depending on it (67.5 per cent in 1950 to 64.9 per cent by 1990). Why was such a large proportion of the population engaged in agriculture although agricultural output could have grown with much less people working in the sector? The answer is that the industrial sector and the service sector did not absorb the people working in the agricultural sector. Many economists call this an important failure of our policies followed during 1950-1990. 2.4 INDUSTRY AND TRADE Economists have found that poor nations can progress only if they have a good industrial sector. Industry provides employment which is more stable than the employment in agriculture; it promotes modernisation and overall prosperity. It is for this reason that the five year plans placed a lot of emphasis on industrial development. You might have studied in the previous chapter that, at the time of independence, the variety of industries was very narrow Box 2.6: Prices as Signals You would have learnt in an earlier class about how prices of goods are determined in the market. It is important to understand that prices are signals about the availability of goods. If a good becomes scarce, its price will rise and those who use this good will have the incentive to make efficient decisions about its use based on the price. If the price of water goes up because of lower supply, people will have the incentive to use it with greater care; for example, they may stop watering the garden to conserve water. We complain whenever the price of petrol increases and blame it on the government. But the increase in petrol price reflects greater scarcity and the price rise is a signal that less petrol is available—this provides an incentive to use less petrol or look for alternate fuels. Some economists point out that subsidies do not allow prices to indicate the supply of a good. When electricity and water are provided at a subsidised rate or free, they will be used wastefully without any concern for their scarcity. Farmers will cultivate water intensive crops if water is supplied free, although the water resources in that region may be scarce and such crops will further deplete the already scarce resources. If water is priced to reflect scarcity, farmers will cultivate crops suitable to the region. Fertiliser and pesticide subsidies result in overuse of resources which can be harmful to the environment. Subsidies provide an incentive for wasteful use of resources. Think about subsidies in terms of incentives and ask yourself whether it is wise from the

economic viewpoint to provide free electricity to farmers. Rationalised 2023-24 28 INDIAN ECONOMIC DEVELOPMENT — largely confined to cotton textiles and jute. There were two wellmanaged iron and steel firms — one in Jamshedpur and the other in Kolkata — but, obviously, we needed to expand the industrial base with a variety of industries if the economy was to grow. Public and Private Sectors in Indian Industrial Development: The big question facing the policy makers was — what should be the role of the government and the private sector in industrial development? At the time of independence, Indian industrialists did not have the capital to undertake Work These Out ÿ A group of students may visit an agricultural farm, prepare a case study on the method of farming used, that is, types of seeds, fertilisers, machines, means of irrigation, cost involved, marketable surplus and income earned. It will be beneficial if the changes in cultivation methods could be collected from an elderly member of the farming family (a) Discuss the findings in your class. (b) The different groups can then prepare a chart showing variations in cost of production, productivity, use of seeds, fertilisers, means of irrigation, time taken, marketable surplus and income of the family. ÿ Collect newspaper cuttings related to the World Bank, International Monetary Fund, World Trade Organisation (and meets of G7, G8, G10 countries). Discuss the views shared by the developed and developing countries on farm subsidies. ÿ Prepare pie charts on the occupational structure of the Indian economy available in the following table. Discuss the possible reasons for the change in the shape of pies. Sector 1950–51 1990–91 Agriculture 72.1 66.8 Industry 10.7 12.7 Services 17.2 20.5 ÿStudy the arguments for and against agricultural subsidies. What is your view on this issue? ÿSome economists argue that farmers in other countries, particularly developed countries, are provided with high amount of subsidies and are encouraged to export their produce to other countries. Do you think our farmers will be able to compete with farmers from developed countries? Discuss. Rationalised 2023-24 INDIAN ECONOMY 1950-1990 29 investment in industrial ventures required for the development of Indian economy; nor was the market big enough to encourage industrialists to undertake major projects even if they had the capital to do so. It is principally for these reasons that the erstwhile governments had to play an extensive role in promoting the industrial sector. In addition, the decision to develop the Indian economy on socialist lines led to the policy of the government controlling the commanding heights of the economy, as the Second Five Year plan put it. This meant that the government would have complete control of those industries that were vital for the economy. The policies of the private sector would have to be complimentary to those of the public sector, with the public sector leading the way. Industrial Policy Resolution 1956 (IPR 1956): In accordance with the goal of the state controlling the commanding heights of the economy, the Industrial Policy Resolution of 1956 was adopted. This resolution formed the basis of the Second Five Year Plan, the plan which tried to build the basis for a socialist pattern of society. This resolution classified industries into three categories. The first category comprised industries which would be exclusively owned by the government; the second category consisted of industries in which the private sector could supplement the efforts of the public sector, with the government taking the sole responsibility for starting new units; the third category consisted of the remaining industries which were to be in the private sector. Although there was a category of industries left to the private sector, the sector was kept under state control through a system of licenses. No new industry was allowed unless a license was obtained from the government. This policy was used for promoting industry in backward regions; it was easier to obtain a license if the industrial unit was established in an economically backward area. In addition, such units were given certain concessions such as tax benefits and electricity at a lower tariff. The purpose of this policy was to promote regional equality. Even an existing industry had to obtain a license for expanding output or for diversifying production (producing a new variety of goods). This was meant to ensure that the quantity of goods produced was not more than what the economy required. License to expand production was given only if the government was convinced that the economy required a

larger quantity of goods. Small-Scale Industry: In 1955, the Village and Small-Scale Industries Committee, also called the Karve Committee, noted the possibility of using small-scale industries for promoting rural development. A ‘small-scale industry’ is defined with reference to the maximum investment allowed on the assets of a unit. This limit has changed over a period of time. In 1950 a small -scale industrial unit was one which invested Rationalised 2023-24 30 INDIAN ECONOMIC DEVELOPMENT a maximum of rupees five lakh; at present the maximum investment allowed is rupees one crore. It is believed that small-scale industries are more ‘labour intensive’ i.e., they use more labour than the large-scale industries and, therefore, generate more employment. But these industries cannot compete with the big industrial firms; it is obvious that development of small-scale industry requires them to be shielded from the large firms. For this purpose, the production of a number of products was reserved for the small-scale industry; the criterion of reservation being the ability of these units to manufacture the goods. They were also given concessions such as lower excise duty and bank loans at lower interest rates. 2.5 TRADE POLICY: IMPORT SUBSTITUTION The industrial policy that India adopted was closely related to the trade policy. In the first seven plans, trade was characterised by what is commonly called an inward looking trade strategy. Technically, this strategy is called import substitution. This policy aimed at replacing or substituting imports with domestic production. For example, instead of importing vehicles made in a foreign country, industries would be encouraged to produce them in India itself. In this policy the government protected the domestic industries from foreign competition. Protection from imports took two forms: tariffs and quotas. Tariffs are a tax on imported goods; they make imported goods more expensive and discourage their use. Quotas specify the quantity of goods which can be imported. The effect of tariffs and quotas is that they restrict imports and, therefore, protect the domestic firms from foreign competition. The policy of protection was based on the notion that industries of developing countries were not in a position to compete against the goods produced by more developed economies. It was assumed that if the domestic industries were protected they would learn to compete in the course of time. Our planners also feared the possibility of foreign exchange being spent on import of luxury goods if no restrictions were placed on imports. Nor was any serious thought given to promote exports until the mid-1980s. Effect of Policies on Industrial Development: The achievements of India’s industrial sector during the first seven plans are impressive indeed. The proportion of GDP contributed by the industrial sector increased in the period from 13 per cent in 1950-51 to 24.6 per cent in 1990-91. The rise in the industry’s share of GDP is an important indicator of development. The six per cent annual growth rate of the industrial sector during the period is commendable. No longer was Indian industry restricted largely to cotton textiles and jute; in fact, the industrial sector became well diversified by 1990, largely due to Rationalised 2023-24 INDIAN ECONOMY 1950-1990 31 the public sector. The promotion of small-scale industries gave opportunities to those people who did not have the capital to start large firms to get into business. Protection from foreign competition enabled the development of indigenous industries in the areas of electronics and automobile sectors which otherwise could not have developed. In spite of the contribution made by the public sector to the growth of the Indian economy, some economists are critical of the performance of many public sector enterprises. It was proposed at the beginning of this chapter that initially public sector was required in a big way. It is now widely held that state enterprises continued to produce certain goods and services (often monopolising them) although this was no longer required. An example is the provision of telecommunication service. This industry continued to be reserved for the Public Sector even after it was realised that private sector firms could also provide it. Due to the absence of competition, even till the late 1990s, one had to wait for a long time to get a telephone connection. Another instance could be the establishment of Modern Bread, a bread-manufacturing firm, as if the Work These Out ÿ Construct a pie chart for the following table on sectoral contribution to GDP and discuss the difference in the contribution of the sectors in

the light of effects of development during 1950-91. Sector 1950-51 1990-91 Agriculture 59.0 34.9 Industry 13.0 24.6 Services 28.0 40.5 ÿ Conduct a debate in your classroom on the usefulness of Public Sector Undertakings (PSUs) by dividing the class into two groups. One group may speak in favour of PSUs and the other group against the motion (involve as many students as possible and encourage them to give examples). Rationalised 2023-24 32 INDIAN ECONOMIC DEVELOPMENT private sector could not manufacture bread! In 2001 this firm was sold to the private sector. The point is that after four decades of Planned development of Indian Economy no distinction was made between (i) what the public sector alone can do and (ii) what the private sector can also do. For example, even now only the public sector supplies national defense. And even though the private sector can manage hotels well, yet, the government also runs hotels. This has led some scholars to argue that the state should get out of areas which the private sector can manage and the government may concentrate its resources on important services which the private sector cannot provide. Many public sector firms incurred huge losses but continued to function because it is difficult to close a government undertaking even if it is a drain on the nation's limited resources. This does not mean that private firms are always profitable (indeed, quite a few of the public sector firms were originally private firms which were on the verge of closure due to losses; they were then nationalised to protect the jobs of the workers). However, a loss-making private firm will not waste resources by being kept running despite the losses. The need to obtain a license to start an industry was misused by industrial houses; a big industrialist would get a license not for starting a new firm but to prevent competitors from starting new firms. The excessive regulation of what came to be called the permit license raj prevented certain firms from becoming more efficient. More time was spent by industrialists in trying to obtain a license or lobby with the concerned ministries rather than on thinking about how to improve their products. The protection from foreign competition was also being criticised on the ground that it continued even after it proved to do more harm than good. Due to restrictions on imports, the Indian consumers had to purchase whatever the Indian producers produced. The producers were aware that they had a captive market; so they had no incentive to improve the quality of their goods. Why should they think of improving quality when they could sell low quality items at a high price? Competition from imports forces our producers to be more efficient. A few economists also point out that the public sector is not meant for earning profits but to promote the welfare of the nation. The public sector firms, on this view, should be evaluated on the basis of the extent to which they contribute to the welfare of people and not on the profits they earn. Regarding protection, some economists hold that we should protect our producers from foreign competition as long as the rich nations continue to do so. Owing to all these conflicts, economists called for a change in our policy. This, alongwith other problems, led the government to introduce a new economic policy in 1991. Rationalised 2023-24 INDIAN ECONOMY 1950-1990 33 2.6 CONCLUSION The progress of the Indian economy during the first seven plans was impressive indeed. Our industries became far more diversified compared to the situation at independence. India became self- sufficient in food production thanks to the green revolution. Land reforms resulted in abolition of the hated zamindari system. In industrial sector, many economists became dissatisfied with the performance of many public sector enterprises. Excessive government regulation prevented growth of entrepreneurship. In the name of selfreliance, Indian producers were protected against foreign competition and this did not give them the incentive to improve the quality of goods that they produced. Indian policies were 'inward oriented' that failed to develop a strong export sector. The need for reform of economic policy was widely felt in the context of changing global economic scenario, and the new economic policy was initiated in 1991 to make Indian economy more efficient. This is the subject of the next chapter. Recap ÿ After independence, India envisaged an economic system which combines the best features of socialism and capitalism—this culminated in the mixed economy model. ÿ All the economic planning has been formulated through five year plans. ÿ

Common goals of five year plans are growth, modernisation, self-sufficiency and equity. ÿ The major policy initiatives in agriculture sector were land reforms and green revolution. These initiatives helped India to become self-sufficient in food grains production. ÿ The proportion of people depending on agriculture did not decline as expected. ÿ Import substitution policy initiatives in the industrial sector raised its contribution to GDP. ÿ One of the major drawbacks in the industrial sector was the inefficient functioning of the public sector as it started incurring losses leading to drain on the nation's limited resources. Rationalised 2023-24 34 INDIAN ECONOMIC DEVELOPMENT 1. Define a plan. 2. Why did India opt for planning? 3. Why should plans have goals? 4. What are High Yielding Variety (HYV) seeds? 5. What is marketable surplus? 6. Explain the need and type of land reforms implemented in the agriculture sector. 7. What is Green Revolution? Why was it implemented and how did it benefit the farmers? Explain in brief. 8. Explain 'growth with equity' as a planning objective. 9. Does modernisation as a planning objective create contradiction in the light of employment generation? Explain. 10. Why was it necessary for a developing country like India to follow self-reliance as a planning objective? 11. What is sectoral composition of an economy? Is it necessary that the service sector should contribute maximum to GDP of an economy? Comment. 12. Why was public sector given a leading role in industrial development during the planning period? 13. Explain the statement that green revolution enabled the government to procure sufficient food grains to build its stocks that could be used during times of shortage. 14. While subsidies encourage farmers to use new technology, they are a huge burden on government finances. Discuss the usefulness of subsidies in the light of this fact. 15. Why, despite the implementation of green revolution, 65 per cent of India's population continued to be engaged in the agriculture sector till 1990? 16. Though public sector is very essential for industries, many public sector undertakings incur huge losses and are a drain on the economy's resources. Discuss the usefulness of public sector undertakings in the light of this fact. EXERCISES Rationalised 2023-24 INDIAN ECONOMY 1950-1990 35 17. Explain how import substitution can protect domestic industry. 18. Why and how was private sector regulated under the IPR 1956? 19. Match the following: 1. Prime Minister A. Seeds that give large proportion of output 2. Gross Domestic B. Quantity of goods that can be imported Product 3. Quota C. Chairperson of the planning commission 4. Land Reforms D. The money value of all the final goods and services produced within the economy in one year 5. HYV Seeds E. Improvements in the field of agriculture to increase its productivity 6. Subsidy F. The monetary assistance given by government for production activities. BHAGWATI, J. 1993. India in Transition: Freeing the Economy. Oxford University Press, Delhi. DANDEKAR, V.M. 2004. Forty Years After Independence, in Bimal Jalan, (Ed.). The Indian Economy: Problems and Prospects. Penguin, Delhi. JOSHI, VIJAY. and I.M.D. LITTLE. 1996. India's Economic Reforms 1991-2001. Oxford University Press, Delhi. MOHAN, RAKESH. 2004. Industrial Policy and Controls, in Bimal Jalan (Ed.). The Indian Economy: Problems and Prospects. Penguin, Delhi. RAO, C.H. HANUMANTHA. 2004. Agriculture: Policy and Performance, in Bimal Jalan, (Ed.). The Indian Economy: Problems and Prospects. Penguin, Delhi. REFERENCES Rationalised 2023-24CURRENT CHALLENGES FACING THE INDIAN ECONOMY UNIT III III Rationalised 2023-24 After studying this chapter, the learners will understand • the concepts of Human Resource, Human Capital Formation and Human Development • the links between investment in human capital, economic growth and human development • the need for government spending on education and health • the state of India's educational attainment. HUMAN CAPITAL FORMATION IN INDIA 4 Rationalised 2023-24 HUMAN CAPITAL FORMATION IN INDIA 59 4.1 INTRODUCTION Think of one factor that has made a great difference in the evolution of mankind. Perhaps it is human capacity to store and transmit knowledge which they have been doing through conversation, through songs and through elaborate lectures. But humans soon found out that we need a good deal of training and skill to do things efficiently. We know that the labour skill of an educated person is more than that of an uneducated person and hence the former is able to generate more income than the latter

and his or her contribution to economic growth is, consequently, more. Education is sought not only as it confers higher earning capacity on people but also for its other highly valued benefits: it gives one a better social standing and pride; it enables one to make better choices in life; it provides knowledge to understand the changes taking place in society; it also stimulates innovations. Moreover, the availability of educated labour force facilitates adaptation of new "... the wisdom of expending public and private funds on education is not to be measured by its direct fruits alone. It will be profitable as a mere investment, to give the masses of people much greater opportunities than they can generally avail themselves of. For by this means many, who would have died unknown, are enabled to get the start needed for bringing out their latent abilities". Alfred Marshall Fig. 4.1 Adequate education and training to farmers can raise productivity in farms Rationalised 2023-24 60 INDIAN ECONOMIC DEVELOPMENT technologies. Economists have stressed the need for expanding educational opportunities in a nation as it accelerates the development process. 4.2 WHAT IS HUMAN CAPITAL? Just as a country can turn physical resources like land into physical capital like factories, similarly, it can also turn human resources like nurses, farmers, teachers, students into human capital like engineers and doctors. Societies need sufficient human capital in the first place— in the form of competent people who have themselves been educated and trained as professors and other professionals. In other words, we need good human capital to produce other human capital (say, nurses, farmers, teachers, doctors, engineers...). This means that we need investment in human capital to produce more human capital out of human resources. Let us understand a little more of what human capital means by posing the following questions : (i) What are the sources of human capital? (ii) Is there any relation between human capital and economic growth of a country? (iii) Is the formation of human capital linked to people's all-round development or, as it is now called, human development? (iv) What role can the government play in human capital formation in India? 4.3 SOURCES OF HUMAN CAPITAL Investment in education is considered as one of the main sources of human capital. There are several other sources as well. Investments in health, on- thejob training, migration and information are the other sources of human capital formation. Why do your parents spend money on education? Spending on education by individuals is similar to spending on capital goods by companies with the objective of increasing future profits over a period of time. Likewise, individuals invest in education with the objective of increasing their future income. Like education, health is also considered as an important input for the development of a nation as much as it is important for the development of an individual. Who can work better —a sick person or a person with sound health? A sick labourer without access to medical facilities is compelled to abstain from work and there is loss of productivity. Hence, expenditure on health is an important source of human capital formation. Work This Out ÿ Identify and collect the data from three families from different strata (i) very poor (ii) middle class and (iii) affluent. Study the expenditure pattern of the families on education of male and female children. Rationalised 2023-24 HUMAN CAPITAL FORMATION IN INDIA 61 The amount of money spent on preventive medicine (vaccination), curative medicine (medical intervention during illness), social medicine (spread of health literacy) and provision of clean drinking water and good sanitation are the various forms of health expenditures. Health expenditure directly increases the supply of healthy labour force and is, thus, a source of human capital formation. Firms spend on giving on-thejob-training to their workers. This may take different forms: one, the workers may be trained in the firm itself under the supervision of a skilled worker; two, the workers may be sent for off-campus training. In both these cases firms incur some expenses. Firms will, thus, insist that the workers should work for a specific period of time, after their on-the-job training, during which it can recover the benefits of the enhanced productivity owing to the training. Expenditure regarding onthe-job training is a source of human capital formation as the return of such expenditure in the form of enhanced labour productivity is more than the cost of it. People migrate in search of jobs that fetch them higher salaries than what they may get in their native places. Unemployment is

the reason for the rural-urban migration in India. Technically qualified persons, like engineers and doctors, migrate to other countries because of higher salaries that they may get in such countries. Migration in both these cases involves cost of transport, higher cost of living in the migrated places and psychic costs of living in a strange sociocultural setup. The enhanced earnings in the new place outweigh the costs of migration; hence, expenditure on migration is also a source of human capital formation. People spend to acquire information relating to the labour market and other markets like education and health. For example, people want to know the level of salaries associated with various types of jobs, whether the educational institutions provide the right type of employable skills and at what cost. This information is necessary to make decisions regarding investments in human capital as well as for efficient utilisation of the acquired human capital stock. Expenditure incurred for acquiring information relating to the labour market and other markets is also a source of human capital formation. Rationalised 2023-24 62 INDIAN ECONOMIC DEVELOPMENT Box 4.1: Physical and Human Capital Both the forms of capital formation are outcomes of conscious investment decisions. Decision regarding investment in physical capital is taken on the basis of one's knowledge in this regard. The entrepreneur possesses knowledge to calculate the expected rates of return to a range of investments and then rationally decides which one of the investments should be made. The ownership of physical capital is the outcome of the conscious decision of the owner — the physical capital formation is mainly an economic and technical process. A substantial part of the human capital formation takes place in one's life when she/he is unable to decide whether it would maximise her/his earnings. Children are given different types of school education and health care facilities by their parents and the society. The peers, educators and society influence the decisions regarding human capital investments even at the tertiary level, that is, at the college level. Moreover, the human capital formation at this stage is dependent upon the already formed human capital at the school level. Human capital formation is partly a social process and partly a conscious decision of the possessor of the human capital. You know that the owner of a physical capital, say a bus, need not be present in the place where it is used; whereas, a bus-driver, who possesses the knowledge and ability to drive the bus, should be present when the bus is used for transportation of people and materials. Physical capital is tangible and can be easily sold in the market like any other commodity. Human capital is intangible; it is endogenously built in the body and mind of its owner. Human capital is not sold in the market; only the services of the human capital are sold and, hence, there arises the necessity of the owner of the human capital to be present in the place of production. The physical capital is separable from its owner, whereas, human capital is inseparable from its owner. The two forms of capital differ in terms of mobility across space. Physical capital is completely mobile between countries except for some artificial trade restrictions. Human capital is not perfectly mobile between countries as movement is restricted by nationality and culture. Therefore, physical capital formation can be built even through imports, whereas human capital formation is to be done through conscious policy formulations in consonance with the nature of the society and economy and expenditure by the state and the individuals. Both forms of capital depreciate with time but the nature of depreciation differs between the two. Continuous use of machine leads to depreciation and change of technology makes a machine obsolete. In the case of human capital, depreciation takes place with ageing but can be reduced, to a large extent, through continuous investment in education, health, etc. This investment also facilitates the human capital to cope with change in technology which is not the case with physical capital. Nature of benefits flowing from human capital are different from that of physical capital. Human capital benefits not only the owner but also the society in general. This is called external benefit. An educated person can effectively take part in a democratic process and contribute to the socio-economic progress of a nation. A healthy person, by maintaining personal hygiene and sanitation, stops the spread of contagious diseases and epidemics. Human capital creates both private and social benefits, whereas physical capital creates only private

benefit. That is, benefits from a capital good flow to those who pay the price for the product and services produced by it. Rationalised 2023-24 HUMAN CAPITAL FORMATION IN INDIA 63 The concept of physical capital is the base for conceptualising human capital. There are some similarities between the two forms of capital; there are some striking dissimilarities as well. See Box 4.1. Human Capital and Economic Growth: Who contributes more to national income — a worker in a factory or a software professional? We know that the labour skill of an educated person is more than that of an uneducated person and that the former generates more income than the latter. Economic growth means the increase in real national income of a country; naturally, the contribution of the educated person to economic growth is more than that of an illiterate person. If a healthy person could provide uninterrupted labour supply for a longer period of time, then health is also an important factor for economic growth. Thus, both education and health, along with many other factors like on-the-job training, job market information and migration, increase an Fig. 4.2 Creating human capital: a school being run in make shift premises in Delhi Look at Fig. 4.2 and discuss. (a) What are the advantages of having proper 'classroom'? (b) Do you think the children going to this schol are receiving quality education? (c) Why these schools do not have buildings? Rationalised 2023-24 64 INDIAN ECONOMIC DEVELOPMENT individual's income generating capacity. This enhanced productivity of human beings or human capital contributes substantially not only towards increasing labour productivity but also stimulates innovations and creates ability to absorb new technologies. Education provides knowledge to understand changes in society and scientific advancements, thus, facilitate inventions and innovations. Similarly, the availability of educated labour force facilitates adaptation to new technologies. Empirical evidence to prove that increase in human capital causes economic growth is rather nebulous. This may be because of measurement problems. For example, education measured in terms of years of schooling, teacher-pupil ratio and enrolment rates may not reflect the quality of education; health services measured in monetary terms, life expectancy and mortality rates may not reflect the true health status of the people in a country. Using the indicators mentioned above, an analysis of improvement in education and health sectors and growth in real per capita income in both developing and developed countries shows that there is convergence in the measures of human capital but no sign of convergence of per capita real income. In other words, the human capital growth in developing countries has been faster but the growth of per capita real income has not been that fast. There are reasons to believe that the causality between human capital and economic growth flows in either directions. That is, higher income causes building of high level of human capital and vice versa, that is, high level of human capital causes growth of income. India recognised the importance of human capital in economic growth long ago. The Seventh Five Year Plan says, "Human resources development (read human capital) has necessarily to be assigned a key role in any development strategy, particularly in a country with a large population. Trained and educated on sound lines, a large population can itself become an asset in accelerating economic growth and in ensuring social change in desired directions." It is difficult to establish a relation of cause and effect from the growth of human capital (education and health) to economic growth but we can see in Fig. 4.3 Scientific and technical manpower: a rich ingredient of human capital Rationalised 2023-24 HUMAN CAPITAL FORMATION IN INDIA 65 Table 4.1 that these sectors have grown simultaneously. Growth in each sector probably has reinforced the growth of every other sector. The National Education Policy 2020 states that the world is undergoing rapid changes in the knowledge landscape. With various dramatic scientific and technological advances, such as the rise of big data, machine learning, and artificial intelligence, many unskilled jobs worldwide may be taken over by machines, while the need for a skilled workforce, particularly involving mathematics, computer science, and data science, in conjunction with multidisciplinary abilities across the sciences and social sciences, and humanities, will be increasingly in greater demand. With climate change, increasing pollution, and depleting natural resources, there will be a sizeable shift in how we meet

the world's energy, water, food, and sanitation needs, again resulting in the need for new skilled labour, particularly in biology, chemistry, physics, agriculture, climate science, and social science. The growing emergence of epidemics and pandemics will also call for collaborative research in infectious disease management and development of vaccines and the resultant social issues heightens the need for multidisciplinary learning. There will be a growing demand for humanities and art, as India moves towards becoming a developed country as well as TABLE 4.1 Select Indicators of Development in Education and Health Sectors Particulars 1951 1981 1991 2001 2016-17 Real Per Capita Income (in Rs) 7,651 12,174 15,748 23,095 77,659 Crude Death 25.1 12.5 9.8 8.1 6.3 Rate (Per 1,000 Population) Infant Mortality Rate 146 110 80 63 33 Life Expectancy 37.2 54.1 59.7 63.9 67 at Birth (in Years) 36.2 54.7 60.9 66.9 70 16.67 43.57 52.21 65.20 76 Female Male Literacy Rate (%) Source: Economic Survey for various years, Ministry of Finance; National Statistical Office, Ministry of Statistics and Programme Implementation, Government of India. Fig. 4.4 Job on hand: transforming India into a knowledge economy Rationalised 2023-24 66 INDIAN ECONOMIC DEVELOPMENT among the three largest economies in the world. This policy vision suggests how human capital formation in India will move its economy to a higher growth trajectory based on knowledge landscape. 4.4 HUMAN CAPITAL AND HUMAN DEVELOPMENT The two terms sound similar but there is a clear distinction between them. Human capital considers education and health as a means to increase labour productivity. Human development is based on the idea that education and health are integral to human well-being because only when people have the ability to read and write and the ability to lead a long and healthy life, they will be able to make other choices which they value. Human capital treats human beings as a means to an end; the end being the increase in productivity. In this view, any investment in education and health is unproductive if it does not enhance output of goods and services. In the human development perspective, human beings are ends in themselves. Human welfare should be increased through investments in education and health even if such investments do not result in higher labour productivity. Therefore, basic education and basic health are important in themselves, irrespective of their contribution to labour productivity. In such a view, every individual has a right to get basic education and basic health care, that is, every individual has a right to be literate and lead a healthy life. Box 4.2: India as a Knowledge Economy The Indian software industry has been showing an impressive record over the past two decades. Entrepreneurs, bureaucrats and politicians are now advancing views about how India can transform itself into a knowledge-based economy by using information technology (IT). There have been some instances of villagers using e-mail which are cited as examples of such transformation. Likewise, egovernance is being projected as the way of the future. The value of IT depends greatly on the existing level of economic development. Do you think IT - based services in rural areas will lead to human development? Discuss. Work This Out ÿ If a construction worker, maid-servant, dhobi or a peon in school has absented herself/himself for long due to ill health, find out how it has affected her/his (i) job security (ii) wage/salary What could be the possible reasons? Rationalised 2023-24 HUMAN CAPITAL FORMATION IN INDIA 67 4.5 S TATE OF HUMAN CAPITAL FORMATION IN INDIA In this section we are going to analyse human capital formation in India. We have already learnt that human capital formation is the outcome of investments in education, health, on-the-job training, migration and information. Of these education and health are very important sources of human capital formation. We know that India is a federal country with a union government, state governments and local governments (Municipal Corporations, Municipalities and Village Panchayats). The Constitution of India mentions the functions to be carried out by each level of government. Accordingly, expenditures on both education and health are to be carried out simultaneously by all the three tiers of the government. Analysis of health sector is taken up in Chapter 8; hence, we will analyse only the education sector here. Do you know who takes care of education and health in India? Before we take up the analysis of the education sector in India, we will look into the need for government intervention in education

and health sectors. We do understand that education and health care services create both private and social benefits and this is the reason for the existence of both private and public institutions in the education and health service markets. Expenditures on education and health make substantial long-term impact and they cannot be easily reversed; hence, government intervention is essential. For instance, once a child is admitted to a school or health care centre where the required services are not provided, before the decision is taken to shift the child to another institution, substantial amount of damage would have been done. Moreover, individual consumers of these services do not have complete information about the quality of services and their costs. In this situation, the providers of education and health services acquire monopoly power and are involved in exploitation. The role of government in this situation is to ensure that the private providers of these services adhere to the standards stipulated by the government and charge the correct price. In India, the ministries of education at the union and state level, departments of education and various organisations like National Council of Educational Research and Training (NCERT), University Grants Commission (UGC) and All India Council of Technical Education (AICTE) facilitate institutions which come under the education sector. Similarly, the ministries of health at the union and state level, departments of health and various organisations like National Medical Commission and Indian Council for Medical Research (ICMR) facilitate institutions which come under the health sector. In a developing country like India, with a large section of the population living below the poverty line, many people cannot afford to access basic education and health care facilities. Moreover, a substantial section of India's population cannot afford Rationalised 2023-24 68 INDIAN ECONOMIC DEVELOPMENT to reach super specialty health care and higher education. Furthermore, when basic education and health care is considered as a right of the citizens, then it is essential that the government should provide education and health services free of cost for the deserving citizens and those from the socially oppressed classes. Both, the union and state governments, have been stepping up expenditures in the education sector over the years in order to fulfil the objective of attaining cent per cent literacy and considerably increase the average educational attainment of Indians. the development of education in the country. During 1952-2014, education expenditure as percentage of total government expenditure increased from 7.92 to 15.7 and as percentage of GDP increased from 0.64 to 4.13. Throughout this period the increase in education expenditure has not been uniform and there has been irregular rise and fall. To this if we include the private expenditure incurred by individuals and by philanthropic institutions, the total education expenditure should be much higher. Elementary education takes a major share of total education expenditure and the share of the higher/tertiary education (institutions of higher learning like colleges, polytechnics and universities) is the least. Though, on an average, the government spends less on tertiary education, 'expenditure per student' in tertiary education is higher than that of elementary. This does not mean that financial resources should be transferred from tertiary education to elementary education. As we expand school education, we need more teachers who are trained in the higher educational institutions; therefore, expenditure on all levels of education should be increased. In 2014-15, the per capita public expenditure on elementary education differs considerably across states from as high as Rs 34,651 in Himachal Pradesh to as low as Rs 4088 in Bihar. This leads to differences in educational opportunities and attainments across states. 4.6 EDUCATION SECTOR IN INDIA Growth in Government Expenditure on Education: Do you know how much the government spends on education? This expenditure by the government is expressed in two ways (i) as a percentage of 'total government expenditure' (ii) as a percentage of Gross Domestic Product (GDP). The percentage of 'education expenditure of total government expenditure' indicates the importance of education in the scheme of things before the government. The percentage of 'education expenditure of GDP' expresses how much of people's income is being committed to Work This Out ÿ Identify the objectives and functions of NCERT, UGC, AICTE and ICMR. Rationalised 2023-24 HUMAN CAPITAL

FORMATION IN INDIA 69 One can understand the inadequacy of the expenditure on education if we compare it with the desired level of education expenditure as recommended by the various commissions. The Education Commission (1964–66) had recommended that at least 6 per cent of GDP be spent on education so as to make a noticeable rate of growth in educational achievements. The Tapas Majumdar Committee, appointed by the Government of India in 1999, estimated an expenditure of around Rs 1.37 lakh crore over 10 years (1998- 99 to 2006-07) to bring all Indian children in the age group of 6-14 years under the purview of school education. Compared to this desired level of education expenditure of around 6 per cent of GDP, the current level of a little over 4 per cent has been quite inadequate. In principle, a goal of 6 per cent needs to be reached—this has been accepted as a must for the coming years. In 2009, the Government of India enacted the Right of Children to Free and Compulsory Education Act to make free education a fundamental right of all children in the age group of 6-14 years. Government of India has also started levying a 2 per cent 'education cess' on all Union taxes. The revenues from education cess has been earmarked for spending on elementary education. In addition to this, the government sanctions a large outlay for the promotion of higher education and Fig. 4.5 Investment in educational infrastructure is inevitable Work These Out ÿ Prepare case studies of dropouts at different levels of schooling, say (i) Primary dropouts (ii) Class VIII dropouts (iii) Class X dropouts Find out the causes and discuss in the class. ÿ 'School dropouts are giving way to child labour'. Discuss how this is a loss to human capital. Rationalised 2023-24 70 INDIAN ECONOMIC DEVELOPMENT TABLE 4.2 Educational Attainment in India Sl.No. Particulars 1990 2000 2011 2017-18 1. Adult Literacy Rate (per cent of people aged 15+) 1.1 Male 61.9 68.4 79 82 1.2 Female 37.9 45.4 59 66 2. Primary completion rate (per cent of relevant age group) 2.1 Male 78 85 92 93 2.2 Female 61 69 94 96 3. Youth literacy rate (per cent of people aged 15+ to 24) 3.1 Male 76.6 79.7 90 93 3.2 Female 54.2 64.8 82 90 new loan schemes for students to pursue higher education. Educational Achievements in India: Generally, educational achievements in a country are indicated in terms of adult literacy level, primary education completion rate and youth literacy rate. These statistics for the last two decades are given above in Table 4.2. 4.7 FUTURE PROSPECTS Education for All — Still a Distant Dream: Though literacy rates for both — adults as well as youth — have increased, still the absolute number of illiterates in India is as much as India's population was at the time of independence. In 1950, when the Constitution of India was passed by the Constituent Assembly, it was noted in the Directive Principles of the Fig. 4.6 School dropouts give way to child labour: a loss to human capital Rationalised 2023-24 HUMAN CAPITAL FORMATION IN INDIA 71 Constitution that the government should provide free and compulsory education for all children up to the age of 14 years within 10 years from the commencement of the Constitution. Had we achieved this, we would have cent per cent literacy by now. Gender Equity — Better than Before: The differences in literacy rates between males and females are narrowing signifying a positive development in gender equity; still the need to promote education for women in India is imminent for various reasons such as improving economic independence and social status of women and also because women education makes a favourable impact on fertility rate and health care of women and children. Therefore, we cannot be complacent about the upward movement in the literacy rates and we have miles to go in achieving cent per cent adult literacy. unemployment among educated youth is the highest. As per NSSO data, in the year 2011-12, the rate of unemployment among youth males who studied graduation and above in rural areas was 19 per cent. Their urban counterparts had relatively less level of unemployment at 16 per cent. The most severely affected ones were young rural female graduates as nearly 30 per cent of them are unemployed. In contrast to this, only about 3-6 per cent of primary level educated youth in rural and urban areas were unemployed. The situation is yet to improve as indicated by the Periodic Labour Force Survey 2017-18. Therefore, the government should increase allocation for higher education and also improve the standard of higher education institutions, so that students are imparted employable skills in such institutions. When

compared to less educated, a large proportion of educated persons are unemployed. Why? 4.8 CONCLUSION The economic and social benefits of human capital formation and human development are well known. The union and state governments in India have been earmarking substantial financial outlays for development of education and health sectors. The spread of education and health services across different sectors of society should be ensured so as to simultaneously attain economic growth and equity. India has a rich stock of scientific and technical manpower in the world. The need of the hour is to better it qualitatively and provide such conditions so that they are utilised in India. Fig. 4.7 Higher Education: few takers Higher Education — a Few Takers: The Indian education pyramid is steep, indicating lesser and lesser number of people reaching the higher education level. Moreover, the level of Rationalised 2023-24 72 INDIAN ECONOMIC DEVELOPMENT 1. What are the two major sources of human capital in a country? 2. What are the indicators of educational achievement in a country? 3. Why do we observe regional differences in educational attainment in India? 4. Bring out the differences between human capital and human development. 5. How is human development a broader term as compared to human capital? 6. What factors contribute to human capital formation? Recap ÿ Investments in education convert human beings into human capital; human capital represents enhanced labour productivity, which is an acquired ability and an outcome of deliberate investment decisions with an expectation that it will increase future income sources. ÿ Investments in education, on-the-job training, health, migration and information are the sources of human capital formation. ÿ The concept of physical capital is the base for conceptualising human capital. There are some similarities as well as dissimilarities between the two forms of capital formation. ÿ Investment in human capital formation is considered as efficient and growth enhancing. ÿ Human development is based on the idea that education and health are integral to human well-being because only when people have the ability to read and write and the ability to lead a long and healthy life, will they be able to make other choices which they value. ÿ The percentage of expenditure on education of the total government expenditure indicates the importance of education in the scheme of things for the government. EXERCISES Rationalised 2023-24 HUMAN CAPITAL FORMATION IN INDIA 73 7. How government organisations facilitate the functioning of schools and hospitals in India? 8. Education is considered to be an important input for the development of a nation. How? 9. Discuss the following as a source of human capital formation (i) Health infrastructure (ii) Expenditure on migration. 10. Establish the need for acquiring information relating to health and education expenditure for the effective utilisation of human resources. 11. How does investment in human capital contribute to growth? 12. ‘There is a downward trend in inequality world-wide with a rise in the average education levels’. Comment. 13. Examine the role of education in the economic development of a nation. 14. Explain how investment in education stimulates economic growth. 15. Bring out the need for on-the-job-training for a person. 16. Trace the relationship between human capital and economic growth. 17. Discuss the need for promoting women’s education in India. 18. Argue in favour of the need for different forms of government intervention in education and health sectors. 19. What are the main problems of human capital formation in India? 20. In your view, is it essential for the government to regulate the fee structure in education and health care institutions? If so, why? 1. Identify how Human Development Index is calculated. What is the position of India in the World Human Development Index? 2. Is India going to be a knowledge based economy in the near future? Discuss in the classroom. 3. Interpret the data given in Table 4.2. 4. As an educated person, what will be your contribution to the cause of education? (Example ‘Each one — teach one’). SUGGESTED ADDITIONAL ACTIVITIES Rationalised 2023-24 74 INDIAN ECONOMIC DEVELOPMENT 5. Enlist the various sources that provide information regarding education, health and labour. 6. Read the annual reports of Union Ministries of Education and Health and Family welfare and make summaries. Read the chapter on social sector in the Economic Survey. These can be downloaded from websites of the respective Union Government

Ministries. Books BECKER, GARY S. 1964. Human Capital. 2nd Edition, Columbia University Press, New York. FREEMAN, RICHARD. 1976. The Overeducated American. Academic Press, New York. SIDDHARTHAN, N.S. AND K. NARAYANAN (Eds.). 2013. Human Capital and Development — The Indian Experience. Springer, New Delhi. Government Reports India Human Development Report 2011: Towards Social Inclusion, Planning Commission, Government of India. Educational Statistics At a glance, Ministry of Education (for various years), Government of India. Annual Reports, Ministry of Education, Government of India. National Education Policy 2020, Ministry of Education, Govt. of India, New Delhi. Websites http://epathshala.nic.in www.education.nic.in www.cbse.nic.in www.ugc.ac.in www.aicte.ernet.in www.ncert.nic.in www.finmin.nic.in www.mospi.nic.in http://nroer.gov.in REFERENCES Rationalised 2023-24RURAL DEVELOPMENT 75 After studying this chapter, the learners will • understand rural development and the major issues associated with it • appreciate how crucial the development of rural areas is for India's overall development • understand the critical role of credit and marketing systems in rural development • learn about the importance of diversification of productive activities to sustain livelihoods • understand the significance of organic farming in sustainable development. RURAL DEVELOPMENT 5 Rationalised 2023-24 76 INDIAN ECONOMIC DEVELOPMENT 5.1 INTRODUCTION Previously we have studied how poverty was a major challenge facing India. We also know that the majority of the poor live in rural areas where they do not have access to the basic necessities of life. Agriculture is the major source of livelihood in the rural sector. Mahatma Gandhi once said that the real progress of India did not mean simply the growth and expansion of industrial urban centres but mainly the development of the villages. This idea of village development being at the centre of the overall development of the nation is relevant even today. Why is this so? Why should we attach such significance to rural development when we see around us fast growing cities with large industries and modern information technology hubs? It is because more than two-third of India's population depends on agriculture that is yet to become productive enough to provide for them; one-fourth of rural India still lives in abject poverty. That is the reason why we have to see a developed rural India if our nation has to realise real progress. What, then, does rural development imply? 5.2 WHAT IS RURAL DEVELOPMENT? Rural development is a comprehensive term. It essentially focuses on action for the development of areas that are lagging behind in the overall development of the village economy. Some of the areas which are challenging and need fresh initiatives for development in rural India include • Development of human resources including – literacy, more specifically, female literacy, education and skill development – health, addressing both sanitation and public health • Land reforms • Development of the productive resources of each locality • Infrastructure development like electricity, irrigation, credit, marketing, transport facilities including construction of village roads and feeder roads to nearby highways, facilities for agriculture research and extension, and information dissemination • Special measures for alleviation of poverty and bringing about significant improvement in the living conditions of the weaker sections of the population emphasising access to productive employment opportunities All this means that people engaged in farm and non-farm activities in rural areas have to be provided with various means that help them increase the productivity. They also need to be given opportunities to diversify into various non-farm productive "Only the tillers of the soil live by the right. The rest form their train and eat only the bread of dependence". Thiruvalluvar Rationalised 2023-24 RURAL DEVELOPMENT 77 activities such as food processing. Enabling them better and more affordable access to healthcare, sanitation facilities at workplaces and homes and education for all would also need to be given top priority for rapid rural development. It was observed in an earlier chapter that although the share of agriculture sector's contribution to GDP was on a decline, the population dependent on this sector did not show any significant change. Further, after the initiation of reforms, the growth rate of agriculture sector decelerated to about 3 per cent per annum during the 1991-2012, which was lower than the earlier

years. In recent years, this sector has become volatile. During 2014-15, the GVA growth rate of agriculture and its allied sectors was less than one per cent. Scholars identify decline in public investment since 1991 as the major reason for this. They also argue that inadequate infrastructure, lack of alternate employment opportunities in the industry or service sector, increasing casualisation of employment etc., further impede rural development. The impact of this phenomenon can be seen from the growing distress witnessed among farmers across different parts of India. Against this background, we will critically look at some of the crucial aspects of rural India like credit and marketing systems, agricultural diversification and the role of organic farming in promoting sustainable development. 5.3 CREDIT AND MARKETING IN RURAL AREAS Credit: Growth of rural economy depends primarily on infusion of capital, from time to time, to realise higher productivity in agriculture and non-agriculture sectors. As the time gestation between crop sowing and realisation of income after production is quite long, farmers borrow from various sources to meet their initial investment on seeds, fertilisers, implements and other family expenses of marriage, death, religious ceremonies etc. At the time of independence, moneylenders and traders exploited small and marginal farmers and landless labourers by lending to them on high interest rates and by manipulating the accounts to keep them in a debt-trap. A major change occurred after 1969 when India adopted social banking and multiagency approach to adequately meet the needs of rural credit. Later, the Work These Out ÿ On a monthly basis, go through the newspapers of your region and identify the problems raised by them in relation to rural areas and the solutions offered. You could also visit a nearby village and identify the problems faced by people there. Discuss this in the classroom. ÿ Prepare a list of recent schemes and their objectives from the government website https:// www.rural.nic.in. Collect the details of how anyone of these schemes implemented in your region/rural neighbourhood areas. Discuss your observations in class. Rationalised 2023-24 78 INDIAN ECONOMIC DEVELOPMENT Box 5.1: The Poor Women's Bank 'Kudumbashree' is a women-oriented community-based poverty reduction programme being implemented in Kerala. In 1995, a thrift and credit society was started as a small savings bank for poor women with the objective to encourage savings. The thrift and credit society mobilised Rs 1 crore as thrift savings. These societies have been acclaimed as the largest informal banks in Asia in terms of participation and savings mobilised. Source: www.kudumbashree.org. Visit this website and explore various other initiatives undertaken by this organisation. Identify some factors which contributed to their successes and discuss in the class. National Bank for Agriculture and Rural Development (NABARD) was set up in 1982 as an apex body to coordinate the activities of all institutions involved in the rural financing system. The Green Revolution was a harbinger of major changes in the credit system as it led to the diversification of the portfolio of rural credit towards productionoriented lending. The institutional structure of rural banking today consists of a set of multi-agency institutions, namely, commercial banks, regional rural banks (RRBs), cooperatives and land development banks. They are expected to dispense adequate credit at cheaper rates. Recently, Self-Help Groups (henceforth SHGs) have emerged to fill the gap in the formal credit system because the formal credit delivery mechanism has not only proven inadequate but has also not been fully integrated into the overall rural social and community development. Since some kind of collateral is required, vast proportion of poor rural households were automatically out of the credit network. The SHGs promote thrift in small proportions by a minimum contribution from each member. From the pooled money, credit is given to the needy members to be repayable in small instalments at reasonable interest rates. By May 2019, nearly 6 crore Work These Out ÿ In your locality/neighbourhood, you might notice self-help groups providing credit. Attend few meetings of such self-help groups. Write a report on the profile of a self-help group. The profile may include — when it was started, the number of members, amount of savings and type of credit they provide and how borrowers use the loan. ÿ You might also find that those who take a loan for starting self-employment activities but use it for other purposes.

Interact with few such borrowers. Identify the reasons for not starting self employment activities and discuss in the classroom. Rationalised 2023-24 RURAL DEVELOPMENT 79 women in India have become member in 54 lakh women SHGs. About ` 10- 15,000 per SHG and another `2.5 lakhs per SHG as a Community Investment Support Fund (CISF) are provided as part of renovating fund to take up self employement for income generation. Such credit provisions are generally referred to as micro-credit programmes. SHGs have helped in the empowerment of women. It is alleged that the borrowings are mainly confined to consumption purposes. Why are borrowers not spending for productive purposes? Rural Banking — a Critical Appraisal: Rapid expansion of the banking system had a positive effect on rural farm and non-farm output, income and employment, especially after the green revolution — it helped farmers to avail services and credit facilities and a variety of loans for meeting their prodution needs. Famines became events of the past; we have now achieved food security which is reflected in the abundant buffer stocks of grains. However, all is not well with our banking system. With the possible exception of the commercial banks, other formal institutions have failed to develop a culture of deposit mobilisation — lending to worthwhile borrowers and effective loan recovery. Agriculture loan default rates have been chronically high. Why farmers failed to pay back loans? It is alleged that farmers are deliberately refusing to pay back loans. What could be the reasons? Thus, the expansion and promotion of the rural banking sector has taken a backseat after reforms. To improve the situation, In recent years, all the adults are encouraged to open bank accounts as a part of a scheme known as JanDhan Yojana. Those bank account holders can get Rs. 1-2 lakh accidental insurance coverage and overdraft facilities for Rs. 10,000 and get their wages if they get any government-related jobs and works under MNREGA; old age pension and other social security paymentsofthegovernmentare transferred Work These Out ÿ In the last few years, you might have taken note — in your neighbourhood if you are living in rural areas or read in the newspapers or seen on TV — of farmers commiting suicides. Many such farmers had borrowed money for farming and other purposes. It was found that when they were unable to pay back due to crop failure, insufficient income and employment opportunities, they took such steps. Collect information relating to such cases and discuss in the classroom. ÿ Visit banks that cater to rural areas. They may be primary agricultural cooperative banks, land development banks, regional rural banks or district cooperative banks. Collect details such as how many rural households borrowed from them, amount generally borrowed, kinds of collateral used, interest rates and dues. ÿ If farmers who borrowed from cooperative banks could not pay back due to crop failure and other reasons, their loans should be waived otherwise they may take drastic decisions like committing suicides. Do you agree? Rationalised 2023-24 80 INDIAN ECONOMIC DEVELOPMENT to bank accounts. There is no need to keep minimum bank balance. This has led to more than 40 crore people opening bank accounts; indirectly it has promoted thrift habit and efficient allocation of financial resources particularly in rural areas. Banks also could mobile funds of more than Rs. 1,40,000 crores through these accounts. 5.4 AGRICULTURAL MARKET SYSTEM Have you ever asked yourself how food grains, vegetables and fruits that we consume daily come from different parts of the country? The mechanism through which these goods reach different places depends on the market channels. Agricultural marketing is a process that involves the assembling, storage, processing, transportation, packaging, grading and distribution of different agricultural commodities across the country. Prior to independence, farmers, while selling their produce to traders, suffered from faulty weighing and manipulation of accounts. Farmers who did not have the required information on prices prevailing in markets were often forced to sell at low prices. They also did not have proper storage facilities to keep back their produce for selling later at a better price. Do you know that even today, more than 10 per cent of goods produced in farms are wasted due to lack of storage? Therefore, government intervention became necessary to regulate the activities of the private traders. Let us discuss four such measures that were initiated to improve the marketing aspect. The first step was regulation of markets to create

orderly and transparent marketing conditions. By and large, this policy benefited farmers as well as consumers. However, there is still a need to develop about 27,000 rural periodic markets as regulated market places to realise the full potential of rural markets. Second component is provision of physical infrastructure facilities like roads, railways, warehouses, godowns, cold storages and processing units. The current infrastructure facilities are quite inadequate to meet the growing demand and need to be improved. Cooperative Fig. 5.1 Regulated market yards benefit farmers as well as consumers Rationalised 2023-24 RURAL DEVELOPMENT 81 marketing, in realising fair prices for farmers' products, is the third aspect of government initiative. The success of milk cooperatives in transforming the social and economic landscape of Gujarat and some other parts of the country is testimony to the role of cooperatives. However cooperatives have received a setback during the recent past due to inadequate coverage of farmer members, lack of appropriate link between marketing and processing cooperatives and inefficient financial management. The fourth element is the policy instruments like (i) assurance of minimum support prices (MSP) for agricultural products (ii) maintenance of buffer stocks of wheat and rice by Food Corporation of India and (iii) distribution of food grains and sugar through PDS. These instruments are aimed at protecting the income of the farmers and providing foodgrains at a subsidised rate to the poor. However, despite government intervention, private trade (by moneylenders, rural political elites, big merchants and rich farmers) predominates agricultural markets. The need for government intervention is imminent particularly when a large share of agricultural products, is handled by the private sector. Agricultural marketing has come a long way with the intervention of the government in various forms. Some scholars argue that commercialisation of agriculture offers tremendous scope for farmers to earn higher incomes provided the government intervention is restricted. What do you think about this view? Emerging Alternate Marketing Channels: It has been realised that if farmers directly sell their produce to consumers, it increases their incomes. Some examples of these channels are Apni Mandi (Punjab, Haryana and Rajasthan); Hadaspar Mandi (Pune); Rythu Bazars (vegetable and fruit markets in Andhra Pradesh and Telangana) and Uzhavar Sandies (farmers markets in Tamil Nadu). Further, several national and multinational fast food chains are increasingly entering into contracts/ alliances with farmers to encourage Work These Out ÿ Visit a nearby vegetable and fruit market. Observe and identify different characteristics of the market. Identify the place of origin of at least ten different fruits and vegetables and distance travelled to reach the market. Further, look at the modes of transport and its implication on prices. ÿ Most small towns have regulated market yards. Farmers can go to these markets and sell their produce. They can also store their goods in the yard. Visit one regulated market yard; collect the details of its functioning, kind of goods coming to the yard and how prices are fixed. Prepare a detailed report and discuss in the class. Rationalised 2023-24 82 INDIAN ECONOMIC DEVELOPMENT them to cultivate farm products (vegetables, fruits, etc.) of the desired quality by providing them with not only seeds and other inputs but also assured procurement of the produce at predecided prices. It is argued that such arrangements will help in reducing the price risks of farmers and would also expand the markets for farm products. Do you think such arrangements raise incomes of small farmers. greater risk in depending exclusively on farming for livelihood. Diversification towards new areas is necessary not only to reduce the risk from agriculture sector but also to provide productive sustainable livelihood options to rural people. Much of the agricultural employment activities are concentrated in the Kharif season. But during the Rabi season, in areas where there are inadequate irrigation facilities, it becomes difficult to find gainful employment. Therefore expansion into other sectors is essential to provide supplementary gainful employment and in realising higher levels of income for rural people to overcome poverty and other tribulations. Hence, there is a need to focus on allied activities, non-farm employment and other emerging alternatives of livelihood, though there are many other options available for providing sustainable livelihoods in rural areas. In 2020, Indian Parliament passed three laws to reform

agriculture marketing system. While some section of farmers support these reforms, the rest of the farmers oppose and these Acts are still being debated. Collect the details of these laws, debate and discuss in the class. 5.5 DIVERSIFICATION INTO PRODUCTIVE ACTIVITIES Diversification includes two aspects - one relates to change in cropping pattern and the other relates to a shift of workforce from agriculture to other allied activities (livestock, poultry, fisheries etc.) and non-agriculture sector. The need for diversification arises from the fact that there is Fig. 5.2 Jaggery making is an allied activity of the farming sector Work This Out ÿVisit one such alternative marketing system which farmers in your locality, or in the neighbourhood rural areas, use. How are they different from regulated market yards? Should they be encouraged and supported by the government? Why and how? Discuss. Rationalised 2023-24 RURAL DEVELOPMENT 83 As agriculture is already overcrowded, a major proportion of the increasing labour force needs to find alternate employment opportunities in other non-farm sectors. Non-farm economy has several segments in it; some possess dynamic linkages that permit healthy growth while others are in subsistence, low productivity propositions. The dynamic sub-sectors include agro-processing industries, food processing industries, leather industry, tourism, etc. Those sectors which have the potential but seriously lack infrastructure and other support include traditional home-based industries like pottery, crafts, handlooms etc. Majority of rural women find employment in agriculture while men generally look for non-farm employment. In recent times, women have also begun looking for non-farm jobs (see Box 5.2). Animal Husbandry: In India, the farming community uses the mixed crop-livestock farming system —cattle, goats, fowl are the widely held species. Livestock production provides increased stability in income, food security, transport, fuel and nutrition for the family without disrupting other food-producing activities. Today, livestock sector alone provides alternate livelihood options to over 70 million small and marginal farmers including landless labourers. A significant number of women also find employment in the livestock sector. Chart 5.1 shows the distribution of livestock in India. Poultry accounts for the largest share with 61 per cent Box 5.2: Tamil Nadu Women in Agriculture (TANWA) Tamil Nadu Women in Agriculture (TANWA) was a project initiated in the late 1980s in Tamil Nadu to train women in latest agricultural techniques and in organic farming. It encouraged women to actively participate in raising agricultural productivity and family income. At a Farm Women's Group in Thiruchirapalli, run by Anthoniammal, trained women are successfully making and selling vermicompost and earning money from this venture. Many other Farm Women's Groups are creating savings in their group by functioning like mini banks through a micro-credit system. With the accumulated savings, they promote small-scale household activities like mushroom cultivation, soap manufacture, doll making or other income-generating activities. There could be similar initiatives in your area or your neighborhood rural areas. Talk to organisation or women entrepreneurs and discuss the details in the class. Chart 5.1: Distribution of Poultry and Livestock in India, 2019 Rationalised 2023-24 84 INDIAN ECONOMIC DEVELOPMENT followed by others. Other animals which include camels, asses, horses, ponies and mules are in the lowest rung. India had about 303 million cattle, including 110 million buffaloes in 2019. Performance of the Indian dairy sector over the last three decades has been quite impressive. Milk production in the country has increased by about ten times between 1951-2016. This can be attributed mainly to the successful implementation of 'Operation Flood'. It is a system whereby all the farmers can pool their milk produced according to different grading (based on quality), processed and marketed to urban centres through cooperatives. In this system the farmers are assured of a fair price and income from the supply of milk to urban markets. As pointed out earlier Gujarat state is held as a success story in the efficient implementation of milk cooperatives which has been emulated by many states. Gujarat, Madhya Pradesh, Uttar Pradesh, Andhra Pradesh, Maharashtra, Punjab and Rajasthan, are major milk producing states. Meat, eggs, wool and other by-products are also emerging as important productive sectors for diversification. Fisheries: The fishing community regards the water body as 'mother' or 'provider'. The water bodies consisting of sea,

oceans, rivers, lakes, natural aquatic ponds, streams etc. are, therefore, an integral and life-giving source for the fishing community. In India, after progressive increase in budgetary allocations and introduction of new technologies in fisheries and aquaculture, the development of fisheries has come a long way. Presently, fish production from inland sources contributes about 65 per cent to the total value of fish production and the balance 35 per cent comes from the marine sector (sea and oceans). Today total fish production accounts for 0.9 per cent of the total GDP. In India, West Bengal, Andhra Pradesh, Kerala, Gujarat, Maharashtra and Tamil Nadu are major fish producing states. A large share of fishworker families are poor. Rampant underemployment, low per capita earnings, absence of mobility of labour to other sectors and a high rate of illiteracy and indebtedness are some of the major problems fishing community face today. Even though women are not involved in active fishing, about 60 per cent of the workforce in export marketing and 40 per cent in internal marketing are women. There is a need to increase credit facilities through cooperatives and SHGs for fisherwomen to meet the Fig. 5.3 Sheep rearing — an important income augmenting activity in rural areas Rationalised 2023-24 RURAL DEVELOPMENT 85 working capital requirements for marketing. Horticulture: Blessed with a varying climate and soil conditions, India has adopted growing of diverse horticultural crops such as fruits, vegetables, tuber crops, flowers, medicinal and aromatic plants, spices and plantation crops. These crops play a vital role in providing food and nutrition, besides addressing employment concerns. Horticulture sector contributes nearly one-third of the value of agriculture output and six per cent of Gross Domestic Product of India. India has emerged as a world leader in producing a variety of fruits like mangoes, bananas, coconuts, cashew nuts and a number of spices and is the second largest producer of fruits and vegetables. Economic condition of many farmers engaged in horticulture has improved and it has become a means of improving livelihood for many unprivileged classes. Flower harvesting, nursery maintenance, hybrid seed production and tissue culture, propagation of fruits and flowers and food processing are highly remunerative employment options for women in rural areas. Though, in terms of numbers, our livestock population is quite impressive but its productivity is quite low as compared to other countries. It requires improved technology and promotion of good breeds of animals to enhance productivity. Improved veterinary care and credit facilities to small and marginal farmers and landless labourers would enhance sustainable livelihood options through livestock production. Production of fisheries has already increased substantially. However problems related to over- fishing and pollution need to be regulated Fig. 5.5 Women in rural households take up beekeeping as an entrepreneurial activity Fig. 5.4 Poultry has the largest share of total livestock in India Rationalised 2023-24 86 INDIAN ECONOMIC DEVELOPMENT and controlled. Welfare programmes for the fishing community have to be reoriented in a manner which can provide long-term gains and sustenance of livelihoods. Horticulture has emerged as a successful sustainable livelihood option and needs to be encouraged significantly. Enhancing its role requires investment in infrastructure like electricity, cold storage systems, marketing linkages, small-scale processing units and technology improvement and dissemination. Other Alternate Livelihood Options: The IT has revolutionised many sectors in the Indian economy. There is broad consensus that IT can play a critical role in achieving sustainable development and food security in the twenty-first century. Governments can predict areas of food insecurity and vulnerability using appropriate information and software tools so that action can be taken to prevent or reduce the likelihood of an emergency. It also has a positive impact on the agriculture sector as it can disseminate information regarding emerging technologies and its applications, prices, weather and soil conditions for growing different crops etc. Though IT is, by itself, no catalyst of change but it can act as a tool for releasing the creative potential and knowledge embedded in the society. It also has potential of employment generation in rural areas. Experiments with IT and its application to rural development are carried out in different parts of India. 5.6 SUSTAINABLE DEVELOPMENT AND ORGANIC FARMING In recent years, awareness of the harmful

effect of chemical-based fertilisers and pesticides on our health is on a rise. Conventional agriculture relies heavily on chemical fertilisers and toxic pesticides etc., which enter the food supply, penetrate the water sources, harm the livestock, deplete the soil and devastate natural eco-systems. Efforts in evolving technologies which are eco-friendly are essential for sustainable development and one such technology which is eco-friendly is organic farming. In short, organic agriculture is a whole system of Box 5.3: Adoption of Village by Parliamentarians In October, 2014, The Government of India introduced a new scheme called Saansad Adarsh Gram Yojana (SAGY). Under this scheme, Members of India's Parliament need to identify and develop one village from their constituencies. To begin with, MPs can develop one village as a model village by 2016, and two more by 2019, covering over 2,500 villages in India. According to the scheme, the village can have a population of 3,000-5,000 in the plains and 1,000-3,000 in the hills and should not be MPs' own or their spouse's village. MPs are expected to facilitate a village development plan, motivate villagers to take up activities and built infrastructure in the areas of health, nutrition and education. Source: www.pib.nic.in accessed on 24 October 2014. Rationalised 2023-24 RURAL DEVELOPMENT 87 farming that restores, maintains and enhances the ecological balance. There is an increasing demand for organically grown food to enhance food safety throughout the world (see Box 5.4). Benefits of Organic Farming: Organic agriculture offers a means to substitute costlier agricultural inputs (such as HYV seeds, chemical fertilisers, pesticides etc.) with locally produced organic inputs that are cheaper and thereby generate good returns on investment. Organic agriculture also generates income through exports as the demand for organically grown crops is on a rise. Studies across countries have shown that organically grown food has more nutritional value than chemical farming thus providing us with healthy foods. Since organic farming requires more labour input than conventional farming, India will find organic farming an attractive proposition. Finally, the produce is pesticide-free and produced in an environmentally sustainable way (see Box 5.5). Popularising organic farming requires awareness and willingness on the part of farmers to adapt to new technology. Inadequate infrastructure and the problem of marketing the products are major concerns which need to be addressed apart from an Box 5.5: Organically Produced Cotton in Maharashtra In 1995, when Kisan Mehta of Prakruti (an NGO) first suggested that cotton, the biggest user of chemical pesticides, could be grown organically, the then Director of the Central Institute for Cotton Research, Nagpur, famously remarked, “Do you want India to go naked?” At present, as many as 130 farmers have committed 1,200 hectares of land to grow cotton organically on the International Federation of Organic Agriculture Movement’s standards. The produce was later tested by the German Accredited Agency, AGRECO, and found to be of high quality. Kisan Mehta feels that about 78 per cent of Indian farmers are marginal farmers owning about less than 0.8 hectare but accounting for 20 per cent of India’s cultivable land. For such farmers, organic agriculture is more profitable in terms of money and soil conservation in the long run. Visit a farm in your locality which uses organic manure and discuss the uses associated with the farming practices. Present the report in your class. Source: Lyla Bavadam, A Green Alternative, Frontline, 29 July 2005. Box 5.4: Organic Food Organic food is growing in popularity across the world. Many countries have around 10 per cent of their food system under organic farming. There are many retail chains and supermarkets which are accorded with green status to sell organic food. Moreover, organic foods command higher price of around 10-100 per cent than conventional ones. Rationalised 2023-24 88 INDIAN ECONOMIC DEVELOPMENT appropriate agriculture policy to promote organic farming. It has been observed that the yields from organic farming are less than modern agricultural farming in the initial years. Therefore, small and marginal farmers may find it difficult to adapt to largescale production. Organic produce may also have more blemishes and a shorter shelf life than sprayed produce. Moreover choice in production of off-season crops is quite limited in organic farming. Nevertheless, organic farming helps in sustainable development of agriculture and India has a clear advantage in producing organic products for both domestic and international markets. Do you

think food and non-food items cultivated using organic farming methods will be cheaper? 5.7 CONCLUSION It is clear that until and unless some spectacular changes occur, the rural sector might continue to remain backward. There is a greater need today to make rural areas more vibrant through diversification into dairying, poultry, fisheries, vegetables and fruits and linking up the rural production centres with the urban and foreign (export) markets to realise higher returns on the investments for the products. Moreover, infrastructure elements like credit and marketing, farmerfriendly agricultural policies and a constant appraisal and dialogue between farmers' groups and state agricultural departments are essential to realise the full potential of the sector. Today we cannot look at the environment and rural development as two distinct subjects. There is need to invent or procure alternate sets of ecofriendly technologies that lead to sustainable development in different circumstances. From these, each rural Work These Out ÿ Make a list of five popular items that are organically produced in India. ÿ Visit a nearby super market, vegetable shop and/or a departmental shop. Identify a few products. Prepare a chart comparing a few goods that are produced organically and in the normal way on the basis of their prices, shelf life, quality and the kind of advertisement through which they are popularised. ÿ Visit a horticultural farm in the nearby locality. Collect the details of goods that they cultivate on the farm. They could have diversified their cropping patterns. Discuss with them the merits and demerits of the diversification. Rationalised 2023-24 RURAL DEVELOPMENT 89 community can choose whatever will suit its purpose. We need to learn from, and also try out when found relevant, practices from the available set of 'best practice' illustrations (which means success stories of rural development experiments that have already been carried out in similar conditions in different parts of India), to speed up this process of 'learning by doing'. 1. What do you mean by rural development? Bring out the key issues in rural development. 2. Discuss the importance of credit in rural development. 3. Explain the role of micro-credit in meeting credit requirements of the poor. 4. Explain the steps taken by the government in developing rural markets. 5. Why is agricultural diversification essential for sustainable livelihoods? 6. Critically evaluate the role of the rural banking system in the process of rural development in India. Recap ÿRural development is quite a comprehensive term but it essentially means a plan of action for the development of rural areas which are lagging behind in socio-economic development. ÿThere is a need for improving the quantity and quality of infrastructure in rural areas such as banking, marketing, storage, transport and communications etc. to realise its true potential. ÿ Diversification towards new areas such as livestock, fisheries and other non-agricultural activities is necessary not only to reduce the risk from agriculture sector but also to provide productive sustainable livelihood options to our rural people. ÿThe importance of organic farming as an environmentally sustainable production process is on a rise and needs to be promoted. EXERCISES Rationalised 2023-24 90 INDIAN ECONOMIC DEVELOPMENT 7. What do you mean by agricultural marketing? 8. Mention some obstacles that hinder the mechanism of agricultural marketing. 9. What are the alternative channels available for agricultural marketing? Give some examples. 10. Distinguish between 'Green Revolution' and 'Golden Revolution'. 11. Do you think various measures taken by the government to improve agricultural marketing are sufficient? Discuss. 12. Explain the role of non-farm employment in promoting rural diversification. 13. Bring out the importance of animal husbandry, fisheries and horticulture as a source of diversification. 14. 'Information technology plays a very significant role in achieving sustainable development and food security' — comment. 15. What is organic farming and how does it promote sustainable development? 16. Identify the benefits and limitations of organic farming. 17. Enlist some problems faced by farmers during the initial years of organic farming. 18. "Jan-Dhan-Yojna helps in the rural development." Do you agree with this statement? Explain. ACHARYA, S.S. 2004. Agricultural Marketing, State of the Indian Farmer, a Millennium Study. Academic Foundation, New Delhi. ALAGH, Y.K. 2004. State of the Indian Farmer, a Millennium Study — an Overview. Academic Foundation, New Delhi. CHAWLA, N.K., M.P.G. KURUP and V. P. SHARMA.

2004. Animal Husbandry, State of the Indian Farmer, a Millennium Study. Academic Foundation, New Delhi. DEHADRAI, P.V. and Y.S. YADAV. 2004. Fisheries Development, State of the Indian Farmer, a Millennium Study. Academic Foundation, New Delhi. JALAN, BIMAL. (Ed.). 1992. The Indian Economy: Problems and Perspectives. Penguin Publication, New Delhi. REFERENCES Rationalised 2023-24 RURAL DEVELOPMENT 91 NARAYANAN, S. 2005. Organic Farming in India. NABARD Occasional Paper No: 38, Department of Agriculture and Rural Development, Mumbai. SINGH, H.P., P.P. DUTTA and M. SUDHA. 2004. Horticulture Development, State of the Indian Farmer, a Millennium Study. Academic Foundation, New Delhi. SINGH, SURJIT and VIDYA SAGAR. 2004. Agricultural Credit in India: State of the Indian Farmer, a Millennium Study. Academic Foundation, New Delhi. SINHA, V.K. 1998. Challenges in Rural Development. Discovery Publishing House, New Delhi. TODARO, MICHAEL P. 1987. Economic Development in the Third World. Orient Longman Ltd, Hyderabad. TOPPO, E. 2004. Organic Vegetable Gardening: Grow Your Own Vegetables. Unit for Labour Studies, Tata Institute of Social Sciences, Mumbai. Government Reports Successful Governance Initiatives and Best Practices: Experiences from Indian States, Government of India in Coordination with Human Resource Development Centre and UNDP, Planning Commission, Delhi, 2002. Annual Reports, Ministry of Rural Development, Government of India, New Delhi. Basic Animal Husbandry and Fisheries Statistics (for various years), Ministry of Agriculture and Farmers' Welfare, Government of India. Websites www.dahd.nic.in www.saanjhi.gov.in www.ruralindiaonline.org Rationalised 2023-2492 INDIAN ECONOMIC DEVELOPMENT After studying this chapter, the learners will • understand a few basic concepts relating to employment such as economic activity, worker, workforce and unemployment • understand the nature of participation of men and women in various economic activities in various sectors • know the nature and extent of unemployment • assess the initiatives taken by the government in generating employment opportunities in various sectors and regions. EMPLOYMENT : GROWTH, INFORMALISATION AND OTHER ISSUES 6 Rationalised 2023-24 EMPLOYMENT : GROWTH, INFORMALISATION AND OTHER ISSUES 93 6.1 INTRODUCTION People do a variety of work. Some work on farms, in factories, banks, shops and many other workplaces; yet a few others work at home. Work at home includes not only traditional work like weaving, lace making or variety of handicrafts but also modern jobs like programming work in the IT industry. Earlier factory work meant working in factories located in cities whereas now technology has enabled people to produce those factory-based goods at home in villages. During Covid-19 pandemic in 2020–21, millions of workers delivered their products and services through work-from-home. Why do people work? Work plays an important role in our lives as individuals and as members of society. People work for 'earning' a living. Some people get, or have, money by inheriting it, not working for it. This does not completely satisfy anybody. Being employed in work gives us a sense of self-worth and enables us to relate ourselves meaningfully with others. Every working person is actively contributing to national income and hence, the development of the country by engaging in various economic activities — that is the real meaning of 'earning' a living. We do not work only for ourselves; we also have a sense of accomplishment when we work to meet the requirements of those who are dependent on us. Having recognised the importance of work, Mahatma Gandhi insisted upon education and training through a variety of works including craft. Studying about working people gives us insights into the quality and nature of employment in a country and helps in understanding and planning our human resources. It helps us to analyse the contribution made by different industries and sectors towards national income. It also helps us to address many social issues such as exploitation of marginalised sections of the society, child labour, etc. What I object to, is the 'craze' for machinery, not machinery as such. The craze is for what they call labour-saving machinery. Men go on 'saving labour' till thousands are without work and thrown on the open streets to die of starvation... Mahatma Gandhi Fig. 6.1 Multinational companies sell footballs made in the houses of Jalandhar, Punjab Rationalised 2023-24 94 INDIAN ECONOMIC DEVELOPMENT 6.2 WORKERS AND EMPLOYMENT What is

employment? Who is a worker? When a farmer works on fields, he or she produces food grains and raw materials for industries. Cotton becomes cloth in textile mills and in powerlooms. Lorries transport goods from one place to another. We know that the total money value of all such final goods and services produced in a country in a year is called its gross domestic product for that year. When we also consider what we pay for our imports and get from our exports we find that there is a net earning for the country which may be positive (if we have exported more in value terms than imported) or negative (if imports exceeded exports in value terms) or zero (if exports and imports were of the same value). When we add this earning (plus or minus) from foreign transactions, what we get is called the country's gross national product for that year. Those activities which contribute to the gross national product are called economic activities. All those who are engaged in economic activities, in whatever capacity — high or low, are workers. Even if some of them temporarily abstain from work due to illness, injury or other physical disability, bad weather, festivals, social or religious functions, they are also workers. Workers also include all those who help the main workers in these activities. We generally think of only those who are paid by an employer for their work as workers. This is not so. Those who are self-employed are also workers. The nature of employment in India is multifaceted. Some get employment throughout the year; some others get employed for only a few months in a year. Many workers do not get fair wages for their work. While estimating the number of workers, all those who are engaged in economic activities are included as employed. You might be interested in knowing the number of people actively engaged in various economic activities. During 2017-18, India had about a 471 million strong workforce. Since majority of our people reside in rural areas, the proportion of workforce residing there is higher. The Work This Out ÿ In your house or neighbourhood, you might come across many women who, even though they have technical degrees and diplomas and also free time to go to work, do not go to work. Ask them the reasons for not going to work. List all of them and discuss in the classroom whether they should go for work and why, and also ways by which they could be sent for work. Some social scientists argue that housewives working at home without getting paid for that work must also be regarded as contributing to the gross national product and therefore, as engaged in an economic activity. Would you agree? Rationalised 2023-24 EMPLOYMENT : GROWTH, INFORMALISATION AND OTHER ISSUES 95 rural workers constitute about twothirds of this 471 million. Men form the majority of workforce in India. About 77 per cent of the workers are men and the rest are women(men and women include child labourers in respective sexes). Women workers account for one-fourth of the rural workforce whereas in urban areas, they are just one-fifth of the workforce. Women carry out works like cooking, fetching water and fuelwood and participate in farm labour. They are not paid wages in cash or in the form of grains; at times they are not paid at all. For this reason, these women are not categorised as workers. Economists argue that these women should also be called workers. What do you think? 6.3 PARTICIPATION OF PEOPLE IN EMPLOYMENT Worker-population ratio is an indicator which is used for analysing the employment situation in the country. This ratio is useful in knowing the proportion of population that is actively contributing to the production of goods and services of a country. If the ratio is higher, it means that the engagement of people is greater; if the ratio for a country is medium, or low, it means that a very high proportion of its population is not involved directly in economic activities. You might have already studied, in lower classes, the meaning of the term 'population'. Population is defined as the total number of people who reside in a particular locality at a particular point of time. If you want to know the worker-population ratio for India, divide the total number of workers in India by the population in India and multiply it by 100, you will get the worker-population ratio for India. If you look at Table 6.1, it shows the different levels of participation of people in economic activities. For every 100 persons, about 35 (by rounding off 34.7) are workers in India. In urban areas, the proportion is about 34, whereas in rural India, the ratio is about 35. Why is there such a difference? People in rural areas have limited resources to earn a higher income and

participate more in the employment market. Many do not go to schools, colleges and other training institutions. Even if some go, they discontinue in the middle to join the workforce; whereas, in urban areas, a considerable section is able to study in various educational institutions. Urban people have a variety of employment opportunities. They look for the appropriate job to suit their qualifications and skills. In rural areas, people cannot stay at home as their economic condition may not allow them to do so. TABLE 6.1 Worker-Population Ratio in India, 2017-2018 Sex Worker-Population Ratio Total Rural Urban Men 52.1 51.7 53.0 Women 16.5 17.5 14.2 Total 34.7 35.0 33.9 Rationalised 2023-24 96 INDIAN ECONOMIC DEVELOPMENT Compared to females, more males are found to be working. The difference in participation rates is very large in urban areas: for every 100 urban females, only about 14 are engaged in some economic activities. In rural areas, for every 100 rural women about 18 participate in the employment market. Why are women, in general, and urban women, in particular, not working? It is common to find that where men are able to earn high incomes, families discourage female members from taking up jobs. Going back to what has already been mentioned above, many household activities done by women are not recognised as productive work. This narrow definition of work leads to non-recognition of women's work and, therefore, to the underestimation of the number of women workers in the country. Think of the women actively engaged in many activities within the house and at family farms who are not paid for such work. As they certainly contribute to the maintenance of the household and farms, do you think that their number should be added to the number of women workers? 6.4 SELF-EMPLOYED AND HIRED WORKERS Does the worker-population ratio say anything about workers' status in society or about the working conditions? By knowing the status with which a worker is placed in an enterprise, it may be possible to know one dimension — quality of employment in a country. It also Fig. 6.2 Brick-making: a form of casual work Work These Out ÿ Any study of employment must start with a review of the worker -population ratios — why? ÿ In some communities, you might have noticed that even if the males do not earn a high income, they do not send women to work. Why? Rationalised 2023-24 EMPLOYMENT : GROWTH, INFORMALISATION AND OTHER ISSUES 97 enables us to know the attachment a worker has with his or her job and the authority she or he has over the enterprise and over other co-workers. Let us take three workers from the construction industry — a cement shop owner, a construction worker and a civil engineer of a construction company. Since the status of each one of them is different from another, they are also called differently. Workers who own and operate an enterprise to earn their livelihood are known as self-employed. Thus the cement shop owner is self-employed. About 52 per cent workforce in India belongs to this category. The construction workers are known as casual wage labourers; they account for about 25 per cent of India's workforce. Such labourers are casually engaged in others' farms and, in return, get a remuneration for the work done. Workers like the civil engineer working in the construction company account for 23 per cent of India's workforce. When a worker is engaged by someone or an enterprise and paid his or her wages on a regular basis, they are known as regular salaried employees (see table 6.3). Look at Chart 6.1 you will notice that self-employment is a major source of livelihood for both men and women as this category accounts for more than 50 per cent of the workforce. Casual wage work is the second major source for both men and women, Chart 6.2 : Distribution of Employment by Region Urban Workers Rural Workers Casual Wage Labourers Regular Salaried Employees Self-employed 38% 15% 47% 58% 29% 13% Chart 6.1 : Distribution of Employment Male Workers Female Workers Self-employed Casual Wage Labourers Regular Salaried Employees 21% 27% 52% 24% 24% 52% Rationalised 2023-24 98 INDIAN ECONOMIC DEVELOPMENT urban areas. In the latter, both selfemployment and regular wage salaried jobs are greater. In the former, since majority of those depending on farming own plots of land and cultivate independently, the share of selfemployed is greater. The nature of work in urban areas is different. Obviously everyone cannot run factories, shops and offices of various types. Moreover enterprises in urban areas require workers on a regular

basis. a little more so for the latter (24-27 per cent). When it comes to regular salaried employment, both women and men are found to be so engaged in greater proportion. Men form 23 per cent whereas women form 21 per cent. The gap between men and women is very less. When we compare the distribution of workforce in rural and urban areas in Chart 6.2 you will notice that the selfemployed and casual wage labourers are found more in rural areas than in Work These Out ÿ We generally think that only those who are doing paid work regularly or casually such as agricultural labourers, factory workers, those who work in banks and other offices as assistants and clerks are workers. From the above discussion, you must have understood that those who are self- employed such as pavement vegetable vendors, professionals such as lawyers, doctors and engineers are also workers. Mark (a), (b) and (c) against self-employed, regular salaried employees and casual wage labourers respectively: 1. Owner of a saloon 2. Worker in a rice mill who is paid on daily basis but employed regularly 3. Cashier in State Bank of India 4. Typist working in a state government office on a daily wage basis but paid monthly 5. A handloom weaver 6. Loading worker in wholesale vegetable shop 7. Owner of a cool drinks shop which sells Pepsi, Coca Cola and Mirinda 8. Nurse in a private hospital who gets monthly salary and has been working regularly for the past 5 years. ÿ Economists point out that casual wage labourers are the most vulnerable among the three categories. Could you locate who these workers are and where they are found and why? ÿ Can we say that the self-employed earn more than the casual wage labourers or regular salaried employees? Identify a few other indicators of quality of employment. Rationalised 2023-24 EMPLOYMENT : GROWTH, INFORMALISATION AND OTHER ISSUES 99 6.5 EMPLOYMENT IN FIRMS, FACTORIES AND OFFICES In the course of economic development of a country, labour flows from agriculture and other related activities to industry and services. In this process, workers migrate from rural to urban areas. Eventually, at a much later stage, the industrial sector begins to lose its share of total employment as the service sector enters a period of rapid expansion. This shift can be understood by looking at the distribution of workers by industry. Generally, we divide all economic activities into eight different industrial divisions. They are (i) Agriculture (ii) Mining and Quarrying (iii) Manufacturing (iv) Electricity, Gas and Water Supply (v) Construction (vi) Trade (vii) Transport and Storage and (viii) Services. For simplicity, all the working persons engaged in these divisions can be clubbed into three major sectors viz., (a) primary sector which includes (i) and (ii), (b) secondary sector which includes (iii), (iv) and (v) and (c) service sector which includes divisions (vi), (vii) and (viii). Table 6.2 shows the distribution of working persons in different industries during the year 2017-18. Primary sector is the main source of employment for majority of workers TABLE 6.2 Distribution of Workforce by Industry, 2017-2018 Industrial Category Place of Residence Sex Total Rural Urban Men Female Primary Sector 59.8 6.6 40.7 57.1 44.6 Secondary Sector 20.4 34.3 26.5 17.7 24.4 Tertiary/ Service Sector 19.8 59.1 32.8 25.2 31.0 Total 100.0 100.0 100.0 100.0 100.0 Fig. 6.3 Garment workers: upcoming factory employment for women Rationalised 2023-24 100 INDIAN ECONOMIC DEVELOPMENT in India. Secondary sector provides employment to only about 24 per cent of workforce. About 31 per cent of workers are in the service sector. Table 6.2 also shows that about 60 per cent of the workforce in rural India depends on agriculture, forestry and fishing. About 20 per cent of rural workers are working in manufacturing industries, construction and other industrial activities. Service sector provides employment to about 20 per cent of rural workers. Agriculture is not a major source of employment in urban areas where people are mainly engaged in the service sector. About 60 per cent of urban workers are in the service sector. The secondary sector gives employment to about one-third of urban workforce. Though both men and women workers are concentrated in the primary sector, women workers' concentration is very high there. About 57 per cent of the female workforce is employed in the primary sector whereas less than half of males work in that sector. Men get opportunities in both secondary and service sectors. 6.6 GROWTH AND CHANGING STRUCTURE OF EMPLOYMENT In Chapters 2 and 3, you might have studied about the planning strategies in

detail. Here we will look at two developmental indicators — growth of employment and GDP. Nearly seventy years of planned development have been aimed at expansion of the economy through increase in national output and employment. During the period 1950–2010, Gross Domestic Product (GDP) of India grew positively and was higher than the employment growth. However, there was always fluctuation in the growth of GDP. During this period, employment grew at the rate of not more than 2 per cent. Chart 6.3 also points at another disheartening development in the late 1990s: employment growth started declining and reached the level of growth that India had in the early stages of planning. During these years, we also find a widening gap between the growth of GDP and employment. This means that in the Indian economy, without generating employment, we have been able to Work This Out ÿ All newspapers have one section meant for job opportunities. Some also devote an entire supplement in a day or every week like Opportunities in The Hindu or Ascent in The Times of India. Many companies advertise vacancies for various positions. Cut those sections. Develop a table which contains four columns: whether the company is private or public, name of the post, number of posts, sector — primary, secondary or tertiary — and qualification required. Analyse the table in the classroom about jobs advertised in the newspapers. Rationalised 2023-24 EMPLOYMENT : GROWTH, INFORMALISATION AND OTHER ISSUES 101 produce more goods and services. Scholars refer to this phenomenon as jobless growth. So far we have seen how employment has grown in comparison to GDP. Now it is necessary to know how the growth pattern of employment and GDP affected different sections of workforce. From this we will also be able to understand what types of employment are generated in our country. Let us look at two indicators that we have seen in the preceding sections — employment of people in various industries and their status. We know that India is an agrarian nation; a major section of population lives in rural areas and is dependent on agriculture as their main livelihood. Developmental strategies in many countries, including India, have aimed at reducing the proportion of people depending on agriculture. Distribution of workforce by industrial sectors shows substantial shift from farm work to non-farm work (see Table 6.3). In 1972-73, about 74 per cent of workforce was engaged in primary sector and in 2011-12, this proportion has declined to about 50 per cent. Secondary and service sectors are showing promising future for the Indian workforce. You may notice that the shares of these sectors have increased from 11 to 24 per cent and 15 to 27 per cent, respectively. The distribution of workforce in different status indicates that over the Chart 6.3: Growth of Employment and Gross Domestic Product, 1951–2012 (%) Note: *This is the period for which comparable and authentic data are available. Rationalised 2023-24 102 INDIAN ECONOMIC DEVELOPMENT last five decades (1972-2018), people have moved from self-employment and regular salaried employment to casual wage work. Yet self-employment continues to be the major employment provider. Look at the last column of table 6.3. How do you understand the stagnation of secondary sector and moderate rise in self-employement during 2011-18? Discuss in the class. Scholars call the process of moving from self-employment and regular salaried employment to casual wage work noticed during 1972-94 as casualisation of workforce. This makes the workers highly vulnerable. How? Look at the case study of Ahmedabad in the preceding section. In the mean time you also notice in 2017-18 a moderate rise in the share of regular salaried employees. How do you explain this phenomenon? Item 1972-73 1983 1993-94 2011-2012 2017-2018 Sector Primary 74.3 68.6 64 48.9 44.6 Secondary 10.9 11.5 16 24.3 24.4 Services 14.8 16.9 20 26.8 31.0 Total 100.0 100.0 100.0 100.0 100.0 Status Self-employed 61.4 57.3 54.6 52.0 52.2 Regular Salaried Employees 15.4 13.8 13.6 18.0 22.8 Casual Wage Labourers 23.2 28.9 31.8 30.0 25.0 Total 100.0 100.0 100.0 100.0 100.0 TABLE 6.3 Trends in Employment Pattern (Sector-wise and Status-wise), 1972-2018 (in %) Work These Out ÿDo you know that maintaining employment growth at 2 per cent for a country like India is not an easy thing? Why? ÿ What will happen if there is no additional employment generated in the economy even though we are able to produce goods and services in the economy? How could jobless growth happen? ÿ

Economists say that if casualisation increases the earning of the people, such phenomenon should be welcomed. Suppose a marginal farmer becomes a full-time agricultural labourer, do you think he will be happy even if he earns more in his daily wage work? Or will a permanent and regular worker of the pharmaceutical industry be happy if he becomes a daily wage labourer, even if his or her overall earnings increase? Discuss in the classroom. Rationalised 2023-24 EMPLOYMENT : GROWTH, INFORMALISATION AND OTHER ISSUES 103 6.7 INFORMALISATION OF INDIAN WORKFORCE In the previous section we have found that the proportion of hired work jobs - working for others has been increasing. One of the objectives of development planning in India, since India's independence, has been to provide decent livelihood to its people. It has been envisaged that the industrialisation strategy would bring surplus workers from agriculture to industry with better standard of living as in developed countries. We have seen in the preceding section, that even after 70 years of planned development, more than half of the Indian workforce depends on farming as the major source of livelihood. Economists argue that, over the years, the quality of employment has been deteriorating. Even after working for more than 10-20 years, why do some workers not get maternity benefit, provident fund, gratuity and pension? Why does a person working in the private sector get a lower salary as compared to another person doing the same work but in the public sector? You may find that a small section of Indian workforce is getting regular income. The government, through its labour laws, enable them to protect their rights in various ways. This section of the workforce forms trade unions, bargains with employers for better wages and other social security measures. Who are they? To know this we classify workforce into two categories: workers in formal and informal sectors, which are also referred to as organised and unorganised sectors. All the public sector establishments and those private sector establishments which employ 10 hired workers or more are called formal sector establishments and those who work in such establishments are formal sector workers. All other enterprises and workers working in those enterprises form the informal sector. Thus, informal sector includes millions of farmers, agricultural labourers, owners of small enterprises and people working in those enterprises as also the self-employed who do not have any hired workers. It also includes all nonfarm casual wage labourers who work for more than one employer such as construction workers and headload workers. You may note that this is one of the ways of classifying workers. There could be other ways of classification as well. Discuss the possible ways in the class. Box 6.1: Formal Sector Employment The information relating to employment in the formal sector is collected by the Union Ministry of Labour through employment exchanges located in different parts of the country. Do you know who is the major employer in the formal sector in India? In 2012, out of about 30 million formal sector workers, about 18 million workers were employed by the public sector. Here also men form the majority, as women constitute only about one-sixth of the formal sector workforce. Economists point out that the reform process initiated in the early 1990s resulted in a decline in the number of workers employed in the formal sector. What do you think? Rationalised 2023-24 104 INDIAN ECONOMIC DEVELOPMENT Those who are working in the formal sector enjoy social security benefits. They earn more than those in the informal sector. Developmental planning envisaged that as the economy grows, more and more workers would become formal sector workers and the proportion of workers engaged in the informal sector would dwindle. But what has happened in India? Look at the following chart which gives the distribution of workforce in formal and informal sectors. We learnt that in 2011-12 there were about 473 million workers in India. There were about 30 million workers in the formal sector. Can you estimate the percentage of people employed in the formal sectors in the country? About only six per cent (30/473×100)! Thus, the rest 94 per cent are in the informal sector. In 2011-12, the year for which gender wise data on formal-informal sector employment is available (Chart 6.4), about 20 per cent of formal sector and 30 per cent of informal sector workers are women. Fig. 6.4 Road side vending: an increasing variety of informal sector employment Chart 6.4: Workers in Formal and Informal Sector,

2011-12 Number of Workers (in million) 350 300 250 200 150 100 50 0 24 6 310 133 Male Female Rationalised 2023-24 EMPLOYMENT : GROWTH, INFORMALISATION AND OTHER ISSUES 105 Box 6.2: Informalisation in Ahmedabad Ahmedabad is a prosperous city with its wealth based on the produce of more than 60 textile mills with a labour force of 1,50,000 workers employed in them. These workers had, over the course of the century, acquired a certain degree of income security. They had secure jobs with a living wage; they were covered by social security schemes protecting their health and old age. They had a strong trade union which not only represented them in disputes but also ran activities for the welfare of workers and their families. In the early 1980s, textile mills all over the country began to close down. In some places, such as Mumbai, the mills closed rapidly. In Ahmedabad, the process of closure was long drawn out and spread over 10 years. Over this period, approximately over 80,000 permanent workers and over 50,000 non-permanent workers lost their jobs and were driven to the informal sector. The city experienced an economic recession and public disturbances, especially communal riots. A whole class of workers was thrown back from the middle class into the informal sector, into poverty. There was widespread alcoholism and suicides, children were withdrawn from school and sent to work. Source: Renana Jhabvala, Ratna M. Sudarshan and Jeemol Unni (Ed.) Informal Economy at Centre Stage: New Structures of Employment, Sage Publications, New Delhi, 2003, pp.265. Since the late 1970s, many developing countries, including India, started paying attention to enterprises and workers in the informal sector as employment in the formal sector is not growing. Workers and enterprises in the informal sector do not get regular income; they do not have any protection or regulation from the government. Workers are dismissed without any compensation. Technology used in the informal sector enterprises is outdated; they also do not maintain any accounts. Workers of this sector live in slums and are squatters. Of late, owing to the efforts of the International Labour Organisation (ILO), the Indian government has Change in the balance of power in a house: an unemployed mill worker peeling garlic whereas his wife has a new job of beedi rolling. Rationalised 2023-24 106 INDIAN ECONOMIC DEVELOPMENT initiated the modernisation of informal sector enterprises and provision of social security measures to informal sector workers. 6.8 UNEMPLOYMENT You might have seen people looking for jobs in newspapers. Some look for a job through friends and relatives. In many cities, you might find people standing in some select areas looking for people to employ them for that day’s work. Some go to factories and offices and give their bio-data and ask whether there is any vacancy in their factory or office. Many in the rural areas do not go out and ask for a job but stay home when there is no work. Some go to Work These Out Tick (¸) mark against those which are in the informal sector ÿ Worker in a hotel which has seven hired workers and three family workers ÿ A private school teacher in a school which has 25 teachers ÿ A police constable ÿ Nurse in a government hospital ÿ Cycle-rickshaw puller ÿ The owner of a textile shop employing nine workers ÿ Driver of a bus company which has more than 10 buses with 20 drivers, conductors and other workers ÿ Civil engineer working in a construction company which has 10 workers ÿ Computer operator in the state government office working on a temporary basis ÿ A clerk in the electricity office. Fig. 6.5 Unemployed mill workers waiting for casual jobs Rationalised 2023-24 EMPLOYMENT : GROWTH, INFORMALISATION AND OTHER ISSUES 107 employment exchanges and register themselves for vacancies notified through employment exchanges. The National Statistical Office (Previously it was known as National Sample Survey Organisation) defines unemployment as a situation in which all those who, owing to lack of work, are not working but either seek work through employment exchanges, intermediaries, friends or relatives or by making applications to prospective employers or express their willingness or availability for work under the prevailing condition of work and remunerations. There are a variety of ways by which an unemployed person is identified. Economists define unemployed person as one who is not able to get employment of even one hour in half a day. There are three sources of data on unemployment : Reports of Census of India, National Statistical Office’s Reports of Employment and

Unemployment Situation, Annual Reports of Periodic Labour Force Survey, and Directorate General of Employment and Training data of Registration with Employment Exchanges. Though they provide different estimates of unemployment, they do provide us with the attributes of the unemployed and the variety of unemployment prevailing in our country. Do we have different types of unemployment in our economy? The situation described in the first paragraph of this section is called open unemployment. Economists call unemployment prevailing in Indian farms as disguised unemployment. What is disguised unemployment? Suppose a farmer has four acres of land and he actually needs only two workers and himself to carry out various operations on his farm in a year, but if he employs five workers and his family members such as his wife and children, this situation is known as disguised unemployment. One study conducted in the late 1950s showed about one-third of agriculture workers in India as disguisedly unemployed. You may have noticed that many people migrate to an urban area, pick up a job and stay there for some time, but come back to their home villages as soon as the rainy season begins. Why do they do so? This is because work in agriculture is seasonal; there are no employment opportunities in the village for all months in the year. When there is no work to do on farms, people go to urban areas and look for jobs. Fig. 6.6 Sugar cane cutters: disguised unemployment is common in farm works Rationalised 2023-24 108 INDIAN ECONOMIC DEVELOPMENT This kind of unemployment is known as seasonal unemployment. This is also a common form of unemployment prevailing in India. Though we have witnessed slow growth of employment, have you seen people being unemployed over a very long time? Scholars say that in India, people cannot remain completely unemployed for very long because their desperate economic condition would not allow them to be so. You will rather find them being forced to accept jobs that nobody else would do, unpleasant or even dangerous jobs in unclean, or unhealthy surroundings. The Central and State governments take initiatives and generate employment to facilitate a decent living for low income families through various measures. These will be discussed in the following section. 6.9 GOVERNMENT AND EMPLOYMENT GENERATION You may recall about the Mahatma Gandhi National Rural Employment Guarantee Act 2005. It promises 100 days of guaranteed wage employment to all rural households who volunteer to do unskilled manual work. The scheme based on this Act is one of the many measures the government has implemented to generate employment for those who are in need of jobs in rural areas. Since Independence, the Union and State governments have played an important role in generating employment or creating opportunities for employment generation. Their efforts can be broadly categorised into two — direct and indirect. In the first category, as you have seen in the preceding section, the government employs people in various departments for administrative purposes. It also runs industries, hotels and transport companies, and hence, provides employment directly to workers. When the output of goods and services from government enterprises increases, then private enterprises which receive raw materials from government enterprises will also raise their output and hence increase the number of employment opportunities in the economy. For example, when a government owned Fig. 6.7 Dam construction work is a direct way of employment generation by the government Rationalised 2023-24 EMPLOYMENT : GROWTH, INFORMALISATION AND OTHER ISSUES 109 steel company increases its output, it will result in direct increase in employment in that government company. Simultaneously, private companies, which purchase steel from it, will also increase their output and thus employment. This is the indirect generation of employment opportunities by the government initiatives in the economy. Many programmes that the governments implement, aimed at alleviating poverty, are through employment generation. They are also known as employment generation programmes. All these programmes aim at providing not only employment but also services in areas such as primary health, primary education, rural drinking water, nutrition, assistance for people to buy income and employment generating assets, development of community assets by generating wage employment, construction of houses and sanitation, assistance for constructing houses, laying

of rural roads, development of wastelands/ degraded lands. 6.10 CONCLUSION There has been a change in the structure of workforce in India. Newly emerging jobs are found mostly in the service sector. The expansion of the service sector and the advent of high technology now frequently permit a highly competitive existence for efficient small scale and often individual enterprises or specialist workers side by side with the multinationals. Outsourcing of work is becoming a common practice. It means that a big firm finds it profitable to close down some of its specialist departments (for example, legal or computer programming or customer service sections) and hand over a large number of small piecemeal jobs to very small enterprises or specialist individuals, sometimes situated even in other countries. The traditional notion of the modern factory or office, as a result, has been altered in such a manner that for many the home is becoming the workplace. All of this change has not gone in favour of the individual worker. The nature of employment has become more informal with only limited availability of social security measures to the workers. In the last few decades, there has been rapid growth in the gross domestic product, but without simultaneous increase in employment opportunities. This has forced the government to take up initiatives in generating employment opportunities particularly in the rural areas. Rationalised 2023-24 110 INDIAN ECONOMIC DEVELOPMENT 1. Who is a worker? 2. Define worker-population ratio. 3. Are the following workers — a beggar, a thief, a smuggler, a gambler? Why? Recap ÿ All those persons who are engaged in various economic activities and hence contribute to gross national product are workers. ÿ About two-fifth of the total population in the country is engaged in various economic activities. ÿ Men particularly rural men, form the major section of workforce in India. ÿ Majority of workers in India are self-employed. Casual wage labourers and regular salaried employees together account for less than half the proportion of India's workforce. ÿ About three-fifth of India's workforce depends on agriculture and other allied activities as the major source of livelihood. ÿ In recent years, the growth of employment has decelerated. ÿ During post-reform period, India has been witness to employment opportunities in the service sector. These new jobs are found mostly in the informal sector and the nature of jobs is also mostly casual. ÿ Government is the major formal sector employer in the country. ÿ Disguised unemployment is a common form of unemployment in rural India. ÿ There has been a change in the structure of the workforce in India. ÿ Through various schemes and policies, the government takes initiatives to generate employment directly and indirectly. EXERCISES Rationalised 2023-24 EMPLOYMENT : GROWTH, INFORMALISATION AND OTHER ISSUES 111 4. Find the odd man out (i) owner of a saloon (ii) a cobbler (iii) a cashier in Mother Dairy or Milk Cooperative Society of your area (iv) a tuition master (v) transport operator (vi) construction worker. 5. The newly emerging jobs are found mostly in the sector (service/manufacturing). 6. An establishement with four hired workers is known as (formal/informal) sector establishment. 7. Raj is going to school. When he is not in school, you will find him working in his farm. Can you consider him as a worker? Why? 8. Compared to urban women, more rural women are found working. Why? 9. Meena is a housewife. Besides taking care of household chores, she works in the cloth shop which is owned and operated by her husband. Can she be considered as a worker? Why? 10. Find the odd man out (i) rickshaw puller who works under a rickshaw owner (ii) mason (iii) mechanic shop worker (iv) shoeshine boy. 11. The following table shows distribution of workforce in India for the year 1972-73. Analyse it and give reasons for the nature of workforce distribution. You will notice that the data is pertaining to the situation in India about 50 years ago! Place of Residence Workforce (in millions) Male Female Total Rural 125 69 195 Urban 32 7 39 12. The following table shows the population and worker population ratio for India in 1999-2000. Can you estimate the workforce (urban and total) for India? Region Estimates of Worker Estimated Population Population No. of Workers (in crores) Ratio (in crores) Rural 71.88 41.9 71.88 × 41.9 = 30.12 Urban 28.52 33.7 ? Total 100.40 39.5 ? 100 Rationalised 2023-24 112 INDIAN ECONOMIC DEVELOPMENT 13. Why are regular salaried employees more in urban areas than in rural areas? 14. Why are less women found in regular

salaried employment? 15. Analyse the recent trends in sectoral distribution of workforce in India. 16. Compared to the 1970s, there has hardly been any change in the distribution of workforce across various industries. Comment. 17. Do you think that during 1950-2010 employment generated in the country is commensurate with the growth of GDP in India? How? 18. Is it necessary to generate employment in the formal sector rather than in the informal sector? Why? 19. Victor is able to get work only for two hours in a day. Rest of the day, he is looking for work. Is he unemployed? Why? What kind of jobs could persons like Victor be doing? 20. You are residing in a village. If you are asked to advice the village panchayat, what kinds of activities would you suggest for the improvement of your village which would also generate employment. 21. Who is a casual wage labourer? 22. How will you know whether a worker is working in the informal sector? 1. Select a region, say a street or colony, and divide it into 3-4 sub-regions. Conduct a survey by which you can collect the details of activity each person living there is engaged in. Derive the worker-population ratio for all the regions. Interpret the results for differences in worker-population ratio for the different sub-regions. 2. Suppose 3-4 groups of students are given different regions of a state. One region is mainly engaged in cultivation of paddy. In another region, coconut is the main plantation. The third region is a coastal region where fishing is the main activity. The fourth region has a river nearby with a lot of livestock rearing activities. Ask all the four groups to develop a report on what kind of employment could be generated in the four regions. 3. Visit the local library and ask for Employment News, a weekly published by the Government of India. Go through each issue for the last two months. There will be seven issues. Select 25 advertisements and SUGGESTED ADDITIONAL ACTIVITIES Rationalised 2023-24 EMPLOYMENT : GROWTH, INFORMALISATION AND OTHER ISSUES 113 fill in the following table (expand the table as needed). Discuss the nature of jobs in the classroom. Items Advertisement 1 Advertisement 2 1. Name of Office 2. Department/company 3. Private/public/joint venture 4. Name of the post 5. Sector—primary/seconday/ service 6. Number of posts/vacancies 7. Qualification required 4. You might notice, in your locality, a variety of works being done by the government, for example laying of roads, desilting of tanks, construction of school buildings, hospital and other government offices, construction of check dams and houses for the poor etc. Prepare a critical assessment report on one such activity. The issues covered could be the following (i) how the work was identified (ii) amount sanctioned (iii) contribution of local people, if any (iv) number of persons involved — both men and women (v) wages paid (vi) is it really required in that area and other critical comments on the implementation of the scheme under which the work is being carried out. 5. In recent years, you may have noticed that many voluntary organisations also take initiatives to generate employment in hilly and dry land regions. If you find such initiatives in your locality, visit and prepare a report. CHADHA, G.K. and P.P. SAHU, 2002. 'Post-reform Setbacks in Rural Employment: Issues that need further scrutiny.' Economic and Political Weekly, May 25, pp.1998-2026. DESAI, S and M.B.DAS. 2004. 'Is Employment Driving India's Growth Surge', Economic and Political Weekly, July 3, pp. 3045-3051. GHOSE, AJIT K. 1999. 'Current Issues of Employment Policy in India.' Economic and Political Weekly, September 4, pp. 2592-2608. HIRWAY, INDIRA. 2002. 'Employment and Unemployment Situation in 1990s: How Good are NSS Data.' Economic and Political Weekly, May 25, pp. 2027-2036. REFERENCES Rationalised 2023-24 114 INDIAN ECONOMIC DEVELOPMENT JACOB, PAUL. 1986. 'Concept of 'work' and estimates of 'workforce' — An appraisal of the treatment of activities relating to non-marketed output,' Sarvekshana, Vol.IX, No.4, April. KULSHRESHTHA, A.C., GULAB SINGH, ALOK KAR and R.L. MISHRA. 2000. 'Workforce in the Indian National Accounts Statistics,' The Journal of Income and Wealth, Vol.22, No.2, July, pp. 3-39. PRADHAN, B.K. and M.R.SALUJA. 1996. 'Labour Statistics in India: A Review.' Margin, July- September, Vol.28, Number 4, pp. 319-347. RATH, NILAKANTHA. 2001. 'Data on Employment, Unemployment and Education: Where to go from here?' Economic and Political Weekly, June 9, pp. 2081-2087. SUNDARAM, K. 2001. 'Employment-Unemployment Situation in the Nineties: Some Results from NSS

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is not above the rate of regeneration of the resource and the wastes generated are within the assimilating capacity of the environment. When this is not so, the environment fails to perform its third and vital function of life sustenance and this results in an environmental crisis. This is the situation today all over the world. The rising population of the developing countries and the affluent consumption and production standards of the developed world have placed a huge stress on the environment in terms of its first two functions. Many resources have become extinct and the wastes generated are beyond the absorptive capacity of the environment. Absorptive capacity means the ability of the environment to absorb degradation. The result — we are today at the threshold of environmental crisis. The past development has polluted and dried up rivers and other aquifers making water an economic good. Besides, the intensive and extensive extraction of both renewable and non-renewable resources has exhausted some of these Air Pollution Water Pollution Noise Pollution Asthma Cholera Fig. 7.1 Water bodies: small, snow-fed Himalayan streams are the few fresh-water sources that remain unpolluted. Rationalised 2023-24 118 INDIAN ECONOMIC DEVELOPMENT vital resources and we are compelled to spend huge amounts on technology and research to explore new resources. Added to these are the health costs of degraded environmental quality — decline in air and water quality (seventy per cent of water in India is polluted) have resulted in increased incidence of respiratory and water-borne diseases. Hence the expenditure on health is also rising. To make matters worse, global environmental issues such as global warming and ozone depletion also contribute to increased financial commitments for the government. Box 7.1: Global Warming Global warming is a gradual increase in the average temperature of the earth's lower atmosphere as a result of the increase in greenhouse gases since the Industrial Revolution. Much of the recent observed and projected global warming is human-induced. It is caused by man-made increases in carbon dioxide and other greenhouse gases through the burning of fossil fuels and deforestation. Adding carbon dioxide, methane and such other gases (that have the potential to absorb heat) to the atmosphere with no other changes will make our planet's surface warmer. The atmospheric concentrations of carbon dioxide and CH4 have increased by 31 per cent and 149 per cent respectively above pre-industrial levels since 1750. During the past century, the atmospheric temperature has risen by 1.1°F (0.6°C) and sea level has risen several inches. Some of the longer-term results of global warming are melting of polar ice with a resulting rise in sea level and coastal flooding; disruption of drinking water supplies dependent on snow melts; extinction of species as ecological niches disappear; more frequent tropical storms; and an increased incidence of tropical diseases. Among factors that may be contributing to global warming are the burning of coal and petroleum products (sources of carbon dioxide, methane, nitrous oxide, ozone); deforestation, which increases the amount of carbon dioxide in the atmosphere; methane gas released in animal waste; and increased cattle production, which contributes to deforestation, methane production, and use of fossil fuels. A UN Conference on Climate Change, held in Kyoto, Japan, in 1997, resulted in an international agreement to fight global warming which called for reductions in emissions of greenhouse gases by industrialised nations. Source: www.wikipedia.org Thus, it is clear that the opportunity costs of negative environmental impacts are high. The biggest question that arises is: are environmental problems new to this century? If so, why? The answer to this question requires some elaboration. In the early days when civilisation just began, or before this phenomenal increase in population, and before countries took to industrialisation, the demand for environmental resources and services was much less than their supply. This meant that pollution was within the absorptive capacity of the Rationalised 2023-24 ENVIRONMENT AND SUSTAINABLE DEVELOPMENT 119 Box 7.2: Ozone Depletion Ozone depletion refers to the phenomenon of reductions in the amount of ozone in the stratosphere. The problem of ozone depletion is caused by high levels of chlorine and bromine compounds in the stratosphere. The origins of these compounds are chlorofluorocarbons (CFC), used as cooling substances in airconditioners and refrigerators, or as aerosol propellants, and

bromofluorocarbons (halons), used in fire extinguishers. As a result of depletion of the ozone layer, more ultraviolet (UV) radiation comes to Earth and causes damage to living organisms. UV radiation seems responsible for skin cancer in humans; it also lowers production of phytoplankton and thus affects other aquatic organisms. It can also influence the growth of terrestrial plants. A reduction of approximately 5 per cent in the ozone layer was detected from 1979 to 1990. Since the ozone layer prevents most harmful wavelengths of ultraviolet light from passing through the Earth's atmosphere, observed and projected decreases in ozone have generated worldwide concern. This led to the adoption of the Montreal Protocol banning the use of chlorofluorocarbon (CFC) compounds, as well as other ozone depleting chemicals such as carbon tetrachloride, trichloroethane (also known as methyl chloroform), and bromine compounds known as halons. Source: www.ceu.hu environment and the rate of resource extraction was less than the rate of regeneration of these resources. Hence environmental problems did not arise. But with population explosion and with the advent of industrial revolution to meet the growing needs of the expanding population, things changed. The result was that the demand for resources for both production and consumption went beyond the rate of regeneration of the resources; the pressure on the absorptive capacity of the environment increased tremendously — this trend continues even today. Thus what has happened is a reversal of supply-demand relationship for environmental quality — we are now faced with increased demand for environmental resources and services but their supply is limited due to overuse Fig. 7.2 Damodar Valley is one of India's most industrialised regions. Pollutants from the heavy industries along the banks of the Damodar river are converting it into an ecological disaster Rationalised 2023-24 120 INDIAN ECONOMIC DEVELOPMENT and misuse. Hence the environmental issues of waste generation and pollution have become critical today. 7.3 STATE OF INDIA'S ENVIRONMENT India has abundant natural resources in terms of rich quality of soil, hundreds of rivers and tributaries, lush green forests, plenty of mineral deposits beneath the land surface, vast stretch of the Indian Ocean, ranges of mountains, etc. The black soil of the Deccan Plateau is particularly suitable for cultivation of cotton, leading to concentration of textile industries in this region. The Indo-Gangetic plains — spread from the Arabian Sea to the Bay of Bengal — are one of the most fertile, intensively cultivated and densely populated regions in the world. India's forests, though unevenly distributed, provide green cover for a majority of its population and natural cover for its wildlife. Large deposits of iron-ore, coal and natural gas are found in the country. India accounts for nearly 8 per cent of the world's total iron-ore reserves. Bauxite, copper, chromate, diamonds, gold, lead, lignite, manganese, zinc, uranium, etc. are also available in different parts of the country. However, the developmental activities in India have resulted in pressure on its finite natural resources, besides creating impacts on human health and well-being. The threat to India's environment poses a dichotomy—threat of poverty-induced environmental degradation and, at the same time, threat of pollution from affluence and a rapidly growing industrial sector. Air pollution, water contamination, soil erosion, deforestation and wildlife extinction are some of the most pressing environmental concerns of India. The priority issues identified are (i) land degradation (ii) biodiversity loss (iii) air pollution with special reference to vehicular pollution in urban cities (iv) management of fresh water and (v) solid waste management. Land in India suffers from varying degrees and types of degradation stemming mainly from unstable use and inappropriate management practices. Fig. 7.3 Deforestation leads to land degradation, biodiversity loss and air pollution Rationalised 2023-24 ENVIRONMENT AND SUSTAINABLE DEVELOPMENT 121 Box. 7.3: Chipko or Appiko — What's in a Name? You may be aware of the Chipko Movement, which aimed at protecting forests in the Himalayas. In Karnataka, a similar movement took a different name, 'Appiko', which means to hug. On 8 September 1983, when the felling of trees was started in Salkani forest in Sirsi district, 160 men, women and children hugged the trees and forced the woodcutters to leave. They kept vigil in the forest over the next six weeks. Only after the forest officials assured the volunteers that the trees will be cut scientifically and in

accordance with the working plan of the district, did they leave the trees. When commercial felling by contractors damaged a large number of natural forests, the idea of hugging the trees gave the people hope and confidence that they can protect the forests. On that particular incident, with the felling discontinued, the people saved 12,000 trees. Within months, this movement spread to many adjoining districts. Indiscriminate felling of trees for fuelwood and for industrial use has led to many environmental problems. Twelve years after setting up of a paper mill in Uttar Kanara area, bamboo has been wiped out from that area. “Broad-leaved trees which protected the soil from the direct onslaught of rain have been removed, the soil washed away, and bare laterite soil left behind. Now nothing grows but a weed”, says a farmer. Farmers also complain that rivers and rivulets dry up quicker, and that rainfall is becoming erratic. Diseases and insects earlier unknown are now attacking the crops. Appiko volunteers want the contractors and forest officials to follow certain rules and restrictions. For instance, local people should be consulted when trees are marked for felling and trees within 100 metres of a water source and on a slope of 30 degrees or above should not be felled. Do you know that the government allocates forestlands to industries to use forest materials as industrial raw material? Even if a paper mill employs 10,000 workers and a plywood factory employs 800 people but if they deprive the daily needs of a million people, is it acceptable? What do you think? Source: Excerpts from ‘State of India’s Environment 2: The Second Citizens’ Report 1984-85’, Centre for Science and Environment, 1996, New Delhi. Rationalised 2023-24 122 INDIAN ECONOMIC DEVELOPMENT Work These Out ÿ In order to enable the students to appreciate the contribution of environment to economic development, the following game can be introduced. One student may name a product used by any enterprise and the other student may trace out its roots to nature and earth. trucks steel and rubber steel iron mineral earth rubber trees forests earth books paper trees forest earth cloth cotton plant nature petrol earth machinery iron mineral earth ÿ A truck driver had to pay Rs 10,000 as challan as his truck was emitting black soot. Why do you think he was penalised? Was it justified? Discuss. Some of the factors responsible for land degradation are (i) loss of vegetation occuring due to deforestation (ii) unsustainable fuel wood and fodder extraction (iii) shifting cultivation (iv) encroachment into forest lands (v) forest fires and over grazing (vi) non-adoption of adequate soil conservation measures (vii) improper crop rotation (viii) indiscriminate use of agro-chemicals such as fertilisers and pesticides (ix) improper planning and management of irrigation systems (x) extraction of ground water in the competing uses of land for forestry, agriculture, pastures, human settlements and industries exert an enormous pressure on the country’s finite land resources. The per capita forest land in the country is only 0.06 hectare against the requirement of 0.47 hectare to meet basic needs, resulting in an excess felling of about 15 million cubic metre forests over the permissible limit. Estimates of soil erosion show that soil is being eroded at a rate of 5.3 billion tonnes a year for the entire excess of the recharge capacity (xi) open access resource and (xii) poverty of the agriculture-dependent people. India supports approximately 17 per cent of the world’s human and 20 per cent of livestock population on a mere 2.5 per cent of the world’s geographical area. The high density of population and livestock and country as a result of which the country loses 0.8 million tonnes of nitrogen, 1.8 million tonnes of phosphorus and 26.3 million tonnes of potassium every year. According to the Government of India, the quantity of nutrients lost due to erosion each year ranges from 5.8 to 8.4 million tonnes. Rationalised 2023-24 ENVIRONMENT AND SUSTAINABLE DEVELOPMENT 123 Box 7.4 : Pollution Control Boards In order to address two major environmental concerns in India, viz. water and air pollution, the government set up the Central Pollution Control Board (CPCB) in 1974. This was followed by states establishing their own state level boards to address all the environmental concerns. They investigate, collect and disseminate information relating to water, air and land pollution, lay down standards for sewage/trade effluent and emissions. These boards provide technical assistance to governments in promoting cleanliness of streams and wells by prevention, control and abatement of water pollution,

and improve the quality of air and to prevent, control or abate air pollution in the country. These boards also carry out and sponsor investigation and research relating to problems of water and air pollution and for their prevention, control or abatement. They organise, through mass media, a comprehensive mass awareness programme for the same. The PCBs prepare manuals, codes and guidelines relating to treatment and disposal of sewage and trade effluents. They assess the air quality through regulation of industries. In fact, state boards, through their district level officials, periodically inspect every industry under their jurisdiction to assess the adequacy of treatment measures provided to treat the effluent and gaseous emissions. It also provides background air quality data needed for industrial siting and town planning. The pollution control boards collect, collate and disseminate technical and statistical data relating to water pollution. They monitor the quality of water in 125 rivers (including the tributaries), wells, lakes, creeks, ponds, tanks, drains and canals. ÿ Visit a nearby factory/irrigation department and collect the details of measures that they adopt to control water and air pollution. ÿ You might be seeing advertisements in newspapers, radio and television or billboards in your locality on awareness programmes relating to water and air pollution. Collect a few news-clippings, pamphlets and other information and discuss them in the classroom. In India, air pollution is widespread in urban areas where vehicles are the major contributors and in a few other areas which have a high concentration of industries and thermal power plants. Vehicular emissions are of particular concern since these are ground level sources and, thus, have the maximum impact on the general population. The number of motor vehicles has increased from about 3 lakh in 1951 to 30 crores in 2019. In 2016, personal transport vehicles (two-wheeled vehicles and cars only) constituted about 85 per cent of the total number of registered vehicles thus contributing significantly to total air pollution load. India is one of the ten most industrialised nations of the world. But this status has brought with it unwanted and unanticipated consequences such as unplanned urbanisation, pollution and the risk of accidents. The CPCB (Central Pollution Rationalised 2023-24 124 INDIAN ECONOMIC DEVELOPMENT Control Board) has identified seventeen categories of industries (large and medium scale) as significantly polluting (See Box 7.4). allow all future generations to have a potential average quality of life that is at least as high as that which is being enjoyed by the current generation. The concept of sustainable development was emphasised by the United Nations Conference on Environment and Development (UNCED), which defined it as: ‘Development that meets the need of the present generation without compromising the ability of the future generation to meet their own needs’. Read the definition again. You will notice that the term ‘need’ and the phrase ‘future generations’ in the definition are the catch phrases. The use of the concept ‘needs’ in the definition is linked to distribution of resources. The seminal report —Our Common Future—that gave the above definition explained sustainable development as ‘meeting the basic needs of all and extending to all the opportunity to satisfy their aspirations for a better life’. Meeting the needs of all requires redistributing resources and is hence a moral issue. Edward Barbier defined sustainable development as one which is directly concerned with increasing the material standard of living of the poor at the grass root level — this can be quantitatively measured in terms of increased income, real income, educational services, health care, sanitation, water supply etc. In more specific terms, sustainable development aims at decreasing the absolute poverty of the poor by providing lasting and secure livelihoods that minimise resource depletion, environmental The above points highlight the challenges to India’s environment. The various measures adopted by the Ministry of Environment and the central and state pollution control boards may not yield reward unless we consciously adopt a path of sustainable development. The concern for future generations alone can make development last forever. Development to enhance our current living styles, without concern for posterity, will deplete resources and degrade environment at a pace that is bound to result in both environmental and economic crisis. 7.4 SUSTAINABLE DEVELOPMENT Environment and economy are interdependent and need each other.

Hence, development that ignores its repercussions on the environment will destroy the environment that sustains life forms. What is needed is sustainable development: development that will Work This Out ÿ You can see a column on the measure of air pollution in any national daily. Cut out the news item a week before Diwali, on the day of Diwali and two days after Diwali. Do you observe a significant difference in the value? Discuss in your class. Rationalised 2023-24 ENVIRONMENT AND SUSTAINABLE DEVELOPMENT 125 degradation, cultural disruption and social instability. Sustainable development is, in this sense, a development that meets the basic needs of all, particularly the poor majority, for employment, food, energy, water, housing, and ensures growth of agriculture, manufacturing, power and services to meet these needs. The Brundtland Commission emphasises on protecting the future generation. This is in line with the argument of the environmentalists who emphasise that we have a moral obligation to hand over the planet earth in good order to the future generation; that is, the present generation should bequeath a better environment to the future generation. At least we should leave to the next generation a stock of 'quality of life' assets no less than what we have inherited. The present generation can promote development that enhances the natural and built environment in ways that are compatible with (i) conservation of natural assets (ii) preservation of the regenerative capacity of the world's natural ecological system (iii) avoiding the imposition of added costs or risks on future generations. According to Herman Daly, a leading environmental economist, to achieve sustainable development, the following needs to be done (i) limiting the human population to a level within the carrying capacity of the environment. The carrying capacity of the environment is like a'plimsoll line' of the ship which is its load limit mark. In the absence of the plimsoll line for the economy, human scale grows beyond the carrying capacity of the earth and deviates from sustainable development (ii) technological progress should be input efficient and not input consuming (iii) renewable resources should be extracted on a sustainable basis, that is, rate of extraction should not exceed rate of regeneration (iv) for non-renewable resources rate of depletion should not exceed the rate of creation of renewable substitutes and (v) inefficiencies arising from pollution should be corrected. In 2015, the UN formulated 17 Sustainable Development Goals (SDGs) intended to be achieved by the year 2030. Collect the details of those goals and discuss them in the context of India. 7.5 STRATEGIES FOR SUSTAINABLE DEVELOPMENT Use of Non-conventional Sources of Energy: India, as you know, is hugely dependent on thermal and hydro power plants to meet its power needs. Both of these have adverse environmental impacts. Thermal power plants emit large quantities of carbon dioxide which is a green house gas. It also produces fly ash which, if not used properly, can cause pollution of water bodies, land and other components of the environment. Hydroelectric projects inundate forests and interfere with the natural flow of water in catchment areas and the river basins. Wind power and solar rays are good examples of conventional. In recent years, some efforts are being taken to tap these energy resources. Collect the details of one such unit set up in your area if any, and discuss in the class. Rationalised 2023-24 126 INDIAN ECONOMIC DEVELOPMENT LPG, Gobar Gas in Rural Areas: Households in rural areas generally use wood, dung cake or other biomass as fuel. This practice has several adverse implications like deforestation, reduction in green cover, wastage of cattle dung and air pollution. To rectify the situation, subsidised LPG is being provided. In addition, gobar gas plants are being provided through easy loans and subsidy. As far as liquefied petroleum gas (LPG) is concerned, it is a clean fuel — it reduces household pollution to a large extent. Also, energy wastage is minimised. For the gobar gas plant to function, cattle dung is fed to the plant and gas is produced which is used as fuel while the slurry which is left over is a very good organic fertiliser and soil conditioner. CNG in Urban Areas: In Delhi, the use of Compressed Natural Gas (CNG) as fuel in public transport system has significantly lowered air pollution and the air has become cleaner. In the last few years many other Indian cities also began to use CNG. Wind Power: In areas where speed of wind is usually high, wind mills can provide electricity without any adverse impact on the

environment. Wind turbines move with the wind and electricity is generated. No doubt, the initial cost is high. But the benefits are such that the high cost gets easily absorbed. Work This Out ÿ In Delhi, buses and other public transport vehicles uses CNG as fuel instead of petrol or diesel; some vehicles use convertible engines; solar energy is being used to light up the streets. What do you think about these changes? Delhi also adopted odd/even scheme to restrict the use of vehicles with registration ending with odd/even numbers on alternative days, for specific period in a year. Organise a debate in class on the need for sustainable development practices in India. Fig.7.4 Gobar Gas Plant uses cattle dung to produce energy Rationalised 2023-24 ENVIRONMENT AND SUSTAINABLE DEVELOPMENT 127 Solar Power through Photovoltaic Cells: India is naturally endowed with a large quantity of solar energy in the form of sunlight. We use it in different ways. For example, we dry our clothes, grains, other agricultural products as well as various items made for daily use. We also use sunlight to warm ourselves in winter. Plants use solar energy to perform photosynthesis. Now, with the help of photovoltaic cells, solar energy can be converted into electricity. These cells use special kind of materials to capture solar energy and then convert the energy into electricity. This technology is extremely useful for remote areas and for places where supply of power through grid or power lines is either not possible or proves very costly. This technique is also totally free from pollution. In recent years India is taking efforts to increase the power generation through solar. India is also leading an International body called International Solar Alliance (ISA). Mini-hydel Plants: In mountainous regions, streams can be found almost everywhere. A large percentage of such streams are perennial. Mini-hydel plants use the energy of such streams to move small turbines. The turbines generate electricity which can be used locally. Such power plants are more or less environment-friendly as they do not change the land use pattern in areas where they are located; they generate enough power to meet local demands. This means that they can also do away with the need for large scale transmission towers and cables and avoid transmission loss. Traditional Knowledge and Practices: Traditionally, Indian people have been close to their environment. They have been more a component of the environment and not its controller. If we look back at our agriculture system, healthcare system, housing, transport etc., we find that all practices have been environment friendly. Only recently have we drifted away from the traditional systems and caused large scale damage to the environment and also our rural heritage. Now, it is time to go back. One apt example is in healthcare. India is very much privileged to have about 15,000 species of plants which have medicinal properties. About 8,000 of these are in regular use in various systems of treatment including the folk tradition. With the sudden onslaught of the western system of treatment, we ignored our traditional systems such as Ayurveda, Unani, Tibetan and folk systems. These healthcare systems are in great demand again for treating chronic health problems. Now a days every cosmetic produce — hair oil, toothpaste, body lotion, face cream and what not — is herbal in composition. Not only are these products environment friendly, they are relatively free from side effects and do not involve large-scale industrial and chemical processing. Biocomposting: In our quest to increase agricultural production during the last five decades or so, we almost totally neglected the use of compost and completely switched over to chemical fertilisers. The result is that large tracts of productive land have Rationalised 2023-24 128 INDIAN ECONOMIC DEVELOPMENT been adversely affected, water bodies including ground water system have suffered due to chemical contamination and demand for irrigation has been going up year after year. Farmers, in large numbers all over the country, have again started using compost made from organic wastes of different types. In certain parts of the country, cattle are maintained only because they produce dung which is an important fertiliser and soil conditioner. Earthworms can convert organic matter into compost faster than the normal composting process. This process is now being widely used. Indirectly, the civic authorities are benefited too as they have to dispose reduced quantity of waste. Biopest Control: With the advent of green revolution, the entire country entered into a frenzy to use more and more chemical

pesticides for higher yield. Soon, the adverse impacts began to show; food products were contaminated, soil, water bodies and even ground water were polluted with pesticides. Even milk, meat and fishes were found to be contaminated. To meet this challenge, efforts are on to bring in better methods of pest control. One such step is the use of pesticides based on plant products. Neem trees are proving to be quite useful. Several types of pest controlling chemicals have been isolated from neem and these are being used. Mixed cropping and growing different crops in consecutive years on the same land have also helped farmers. In addition, awareness is spreading about various animals and birds which help in controlling pests. For example, snakes are one of the prime group of animals which prey upon rats, mice and various other pests. Similarly, large varieties of birds, for example, owls and peacocks, prey upon vermin and pests. If these are allowed to dwell around the agricultural areas, they can clear large varieties of pests including insects. Lizards are also important in this regard. We need to know their value and save them. Sustainable development has become a catch phrase today. It is 'indeed' a paradigm shift in development thinking. Though it has been interpreted in a number of ways, adherence to this path ensures lasting development and non-declining welfare for all. 7.6 CONCLUSION Economic development, which aimed at increasing the production of goods and services to meet the needs of a rising population, puts greater pressure on the environment. In the initial stages of development, the demand for environmental resources was less than that of supply. Now the world is faced with increased demand for environmental resources but their supply is limited due to overuse and misuse. Sustainable development aims at promoting the kind of development that minimises environmental problems and meets the needs of the present generation without compromising the ability of the future generation to meet their own needs. Rationalised 2023-24 ENVIRONMENT AND SUSTAINABLE DEVELOPMENT 129 1. What is meant by environment? 2. What happens when the rate of resource extraction exceeds that of their regeneration? 3. Classify the following into renewable and non-renewable resources (i) trees (ii) fish (iii) petroleum (iv) coal (v) iron-ore (vi) water. 4. Two major environmental issues facing the world today are _____ and _____. 5. How do the following factors contribute to the environmental crisis in India? What problem do they pose for the government? (i) Rising population (ii) Air pollution EXERCISES Recap ÿ Environment performs four functions: supplies resources, assimilates wastes, sustains life by providing genetic and bio diversity and provides aesthetic services. ÿ Population explosion, affluent consumption and production have placed a huge stress on the environment. ÿ Developmental activities in India have put immense pressure on its finite natural resources, besides creating impact on human health and well-being. ÿ The threat to India's environment is of two dimensions —threat of poverty induced environmental degradation and the threat of pollution from affluence and a rapidly growing industrial sector. ÿ Though the government, through various measures, attempts to safeguard the environment, it is also necessary to adopt a path of sustainable development. ÿ Sustainable development is development that meets the need of the present generation without compromising the ability of the future generation to meet their own needs. ÿ Promotion of natural resources, conservation, preserving regenerative capacity of ecological system and avoiding the imposition of environmental risks on future generations would lead to sustainable development. Rationalised 2023-24 130 INDIAN ECONOMIC DEVELOPMENT (iii) Water contamination (iv) Affluent consumption standards (v) Illiteracy (vi) Industrialisation (vii) Urbanisation (viii) Reduction of forest coverage (ix) Poaching, and (x) Global warming. 6. What are the functions of the environment? 7. Identify six factors contributing to land degradation in India. 8. Explain how the opportunity costs of negative environmental impact are high. 9. Outline the steps involved in attaining sustainable development in India. 10. India has abundant natural resources — substantiate the statement. 11. Is environmental crisis a recent phenomenon? If so, why? 12. Give two instances of (a) Overuse of environmental resources (b) Misuse of environmental resources. 13. State any four pressing environmental concerns of India. 14. Correction for environmental damages

involves opportunity costs — explain. 15. Explain how the supply-demand reversal of environmental resources account for the current environmental crisis. 16. Highlight any two serious adverse environmental consequences of development in India. India's environmental problems pose a dichotomy — they are poverty induced and, at the same time, due to affluence in living standards — is this true? 17. What is sustainable development? 18. Keeping in view your locality, describe any four strategies of sustainable development. 19. Explain the relevance of intergenerational equity in the definition of sustainable development. 1. Suppose 70 lakh cars are added every year to the roads of metropolitans. Which type of resources do you think are undergoing depletion? Discuss. 2. Make a list of items that can be recycled. SUGGESTED ADDITIONAL ACTIVITIES Rationalised 2023-24 ENVIRONMENT AND SUSTAINABLE DEVELOPMENT 131 3. Prepare a chart on the causes and remedies of soil erosion in India. 4. How does population explosion contribute to the environmental crisis? Debate in the classroom. 5. The nation has to pay heavily for correcting environmental damages— discuss. 6. A paper factory is to be set up in your village. Arrange a role play consisting of an activist, an industrialist and a group of villagers. BOOKS AGARWAL, ANIL and SUNITA NARAIN. 1996. Global Warming in an Unequal World. Centre for Science and Environment, Reprint Edition, New Delhi. BHARUCHA, E. 2005. Textbook of Environmental Studies for Undergraduate Courses, Universities Press (India) Pvt Ltd. CENTRE FOR SCIENCE AND ENVIRONMENT. 1996. State of India's Environment 1: The First Citizens' Report 1982. Reprint Edition, New Delhi. CENTRE FOR SCIENCE AND ENVIRONMENT. 1996. State of India's Environment 2: The Second Citizens' Report 1985, Reprint Edition, New Delhi. KARPAGAM, M. 2001.Environmental Economics: A Textbook. Sterling Publishers, New Delhi. RAJAGOPALAN, R. 2005. Environmental Studies: From Crisis to Cure. Oxford University Press, New Delhi. SCHUMACHER, E.F. Small is Beautiful. Abacus Publishers, New York. Reports State of India's Environment (for various years), Centre for Science and Environment, New Delhi. Journals Scientific American, India, Special Issue, September 2005 Down to Earth, Centre for Science and Environment, New Delhi. Websites http://envfor.nic.in http://cpcb.nic.in http://www.cseindia.org REFERENCES Rationalised 2023-24DEVELOPMENT EXPERIENCES OF INDIA: A COMPARISON WITH NEIGHBOURS UNIT III IV Rationalised 2023-24 In today's globalised world, where geographical boundaries are slowly becoming meaningless, it is important for neighbouring countries in the developing world to understand the development strategies being pursued by their neighbours. This is more so because they share the relatively limited economic space in world markets. In this unit, we will compare India's developmental experiences with two of its important and strategic neighbours — Pakistan and China. Rationalised 2023-24 134 INDIAN ECONOMIC DEVELOPMENT After studying this chapter, the learners will • figure out comparative trends in various economic and human development indicators of India and its neighbours, China and Pakistan • assess the strategies that these countries have adopted to reach their present state of development. COMPARATIVE DEVELOPMENT EXPERIENCES OF INDIA AND ITS NEIGHBOURS 8 Rationalised 2023-24 COMPARATIVE DEVELOPMENT EXPERIENCES OF INDIA AND ITS NEIGHBOURS 135 8.1 INTRODUCTION In the preceding units we studied the developmental experience of India in detail. We also studied the kind of policies India adopted, which had varying impacts in different sectors. Over the last two decades or so, the economic transformation that is taking place in different countries across the world, partly because of the process of globalisation, has both short as well as long-term implications for each country, including India. Nations have been primarily trying to adopt various means which will strengthen their own domestic economies. To this effect, they are forming regional and global economic groupings such as the SAARC, European Union, ASEAN, G-8, G-20, BRICS etc. In addition, there is also an increasing eagerness on the parts of various nations to try and understand the developmental processes pursued by their neighbouring nations as it allows them to better comprehend their own strengths and weaknesses vis-à-vis their neighbours. In the unfolding process of globalisation, this is particularly considered essential by developing countries as they face

competition not only from developed nations but also amongst themselves in the relatively limited economic space enjoyed by the developing world. Besides, an understanding of the other economies in our neighbourhood is also required as all major common economic activities in the region impinge on overall human development in a shared environment. In this chapter we will compare the developmental strategies pursued by India and the largest two of its neighbouring economies—Pakistan and China. It has to be remembered that despite being endowed with vast natural resources, there is little similarity between the political power setup of India - the largest democracy of the world which is wedded to a secular and deeply liberal Constitution for more than half a century, and the militarist political power structure of Pakistan or the command economy of China that has only recently started moving towards a democratic system and more liberal economic restructuring respectively. 8.2 DEVELOPMENTAL PATH—A SNAPSHOT VIEW Do you know that India, Pakistan and China have many similarities in their developmental strategies? All the three nations have started towards their developmental path at the same time. While India and Pakistan became independent nations in 1947, People's Republic of China was established in 1949. In a speech at that time, Geography has made us neighbours. History has made us friends. Economics has made us partners, and necessity has made us allies. Those whom God has so joined together, let no man put asunder. John F. Kennedy Rationalised 2023-24 136 INDIAN ECONOMIC DEVELOPMENT Jawaharlal Nehru had said, "These new and revolutionary changes in China and India, even though they differ in content, symbolise the new spirit of Asia and new vitality which is finding expression in the countries in Asia." All three countries had started planning their development strategies in similar ways. While India announced its first Five Year Plan for 1951–56, Pakistan announced its first five year plan, now called the Medium Term Development Plan, in 1956. China announced its First Five Year Plan in 1953. Since 2018, Pakistan is working on the basis of 12th Five Year Development Plan (2018–23), whereas, China is working on 14th Five Year Plan (2021–25). Until March 2017, India has been following Five Year Plan- based development model. India and Pakistan adopted similar strategies, such as creating a large public sector and raising public expenditure on social development. Till the 1980s, all the three countries had similar growth rates and per capita incomes. Where do they stand today in comparison to one another? Before we answer this question, let us trace the historical path of developmental policies in China and Pakistan. After studying the last three units, we already know what policies India has been adopting since its Independence. China: After the establishment of People's Republic of China under oneparty rule, all critical sectors of the economy, enterprises and lands owned and operated by individuals were brought under government control. The Great Leap Forward (GLF) campaign initiated in 1958 aimed at industrialising the country on a massive scale. People were encouraged to set up industries in their backyards. In rural areas, communes were started. Under the Commune system, people collectively cultivated lands. In 1958, there were 26,000 communes covering almost all the farm population. GLF campaign met with many problems. A severe drought caused havoc in China killing about 30 million people. When Russia had conflicts with China, it withdrew its professionals who had earlier been sent to China to help in the industrialisation process. In 1965, Mao introduced the Great Proletarian Cultural Revolution (1966–76) under which students and professionals were sent to work and learn from the countryside. The present day fast industrial growth in China can be traced back to the reforms introduced in 1978. China introduced reforms in phases. In the initial phase, reforms were initiated in agriculture, foreign trade and investment sectors. In agriculture, for instance, commune lands were divided into small plots, which were allocated (for use not ownership) to individual households. They were allowed to keep all income from the land after paying stipulated taxes. In the later phase, reforms were initiated in the industrial sector. Private sector firms, in general, and township and village enterprises, i.e., those enterprises which were owned and operated by local collectives, in particular, were allowed to produce Rationalised 2023-24 COMPARATIVE DEVELOPMENT EXPERIENCES OF INDIA AND ITS

NEIGHBOURS 137 goods. At this stage, enterprises owned by government (known as State Owned Enterprises—SOEs), which we, in India, call public sector enterprises, were made to face competition. The reform process also involved dual pricing. This means fixing the prices in two ways; farmers and industrial units were required to buy and sell fixed quantities of inputs and outputs on the basis of prices fixed by the government and the rest were purchased and sold at market prices. Over the years, as production increased, the proportion of goods or inputs transacted in the market also increased. In order to attract foreign investors, special economic zones were set up. Pakistan: While looking at various economic policies that Pakistan adopted, you will notice many similarities with India. Pakistan also follows the mixed economy model with co-existence of public and private sectors. In the late 1950s and 1960s, Pakistan introduced a variety of regulated policy framework (for import substitution-based industrialisation). The policy combined tariff protection for manufacturing of consumer goods together with direct import controls on competing imports. The introduction of Green Revolution led to mechanisation and increase in public investment in infrastructure in select areas, which finally led to a rise in the production of foodgrains. This changed the agrarian structure dramatically. In the 1970s, nationalisation of capital goods industries took place. Pakistan then shifted its policy orientation in the late 1970s and 1980s when the major thrust areas were denationalisation and encouragement of private sector. During this period, Pakistan also received financial support from western nations and remittances from Fig. 8.1 Wagah Border is not only a tourist place but also used for trade between India and Pakistan Rationalised 2023-24 138 INDIAN ECONOMIC DEVELOPMENT continuously increasing outflow of emigrants to the Middle-east. This helped the country in stimulating economic growth. The then government also offered incentives to the private sector. All this created a conducive climate for new investments. In 1988, reforms were initiated in the country. Having studied a brief outline of the developmental strategies of China and Pakistan, let us now compare some of the developmental indicators of India, China and Pakistan. 8.3 DEMOGRAPHIC INDICATORS If we look at the global population, out of every six persons living in this world, one is an Indian and another a Chinese. We shall compare some demographic indicators of India, China and Pakistan. The population of Pakistan is very small and accounts for roughly about one-tenth of China or India. Though China is the largest nation and geographically occupies the largest area among the three nations, its density is the lowest. Table 8.1 shows the population growth as being the highest in Pakistan, followed by India and China. Scholars point out the onechild norm introduced in China in the late 1970s as the major reason for low population growth. They also state that this measure led to a decline in the sex ratio, the proportion of females per 1000 males. However, from the table, you will notice that the sex ratio is low and biased against females in all three countries. Scholars cite son preference prevailing in all these countries as the reason. In recent times, all three countries are adopting various measures to improve the situation. Onechild norm and the resultant arrest in the growth of population also have other implications. For instance, after a few decades, in China, there will be more elderly people in proportion to young people. This led China to allow couples to have two children. The fertility rate is also low in China and very high in Pakistan. Urbanisation is high in China with India having 34 per cent of its people living in urban areas. TABLE 8.1 Select Demographic Indicators, 2017-18 Country Estimated Annual Density Sex Fertility Urbanisation Population Growth of (per sq. km) Ratio Rate (in million) Population India 1352 1.03 455 924 2.2 34 China 1393 0.46 148 949 1.7 59 Pakistan 212 2.05 275 943 3.6 37 Source: World Development Indicators 2019, www.worldbank.org Rationalised 2023-24 COMPARATIVE DEVELOPMENT EXPERIENCES OF INDIA AND ITS NEIGHBOURS 139 8.4 GROSS DOMESTIC PRODUCT AND SECTORS One of the much-talked issues around the world about China is its growth of Gross Domestic Product. China has the second largest GDP (PPP) of $22.5 trillion in the world, whereas, India's GDP (PPP) is $9.03 trillion and Pakistan's GDP is $ 0.94 trillion, roughly about 11 per cent of India's GDP. India's GDP is about 41 per cent of China's GDP. When many developed countries were

finding it difficult to maintain a growth rate of even 5 per cent, China was able to maintain near double-digit growth during 1980s as can be seen from Table 8.2. Also, notice that in the 1980s, Pakistan was ahead of India; China was having double-digit growth and India was at the bottom. In 2015–17, there has been a decline in Pakistan Work These Out ÿ Does India follow any population stabilisation measures? If so, collect the details and discuss in the classroom. You may refer to the latest Economic Survey, annual reports or website of the Ministry of Health and Family Welfare (http://mohfw.nic.in). ÿ Scholars find son preference as a common phenomenon in many developing countries, including India, China and Pakistan. Do you find this phenomenon in your family or neighbourhood? Why do people practise discrimination between male and female children? What do you think about it? Discuss it in the classroom. Fig. 8.2 Land use and agriculture in India, China and Pakistan (Not to scale) Source: Key Indicators for Asia and Pacific 2016, Asian Development Bank, Philippines; World Development Indicators 2018 TABLE 8.2 Annual Growth of Gross Domestic Product (%), 1980–2017 Country 1980–90 2015–2017 India 5.7 7.3 China 10.3 6.8 Pakistan 6.3 5.3 Rationalised 2023-24 140 INDIAN ECONOMIC DEVELOPMENT and China's growth rates, whereas, India met with moderate increase in growth rates. Some scholars hold the reform processes introduced in Pakistan and political instability over a long period as reasons behind the declining growth rate in Pakistan. We will study in a later section which sector contributed to different growth rates in these countries. First, look at how people engaged in different sectors contribute to the Gross Domestic Product now called as Gross Value Added. It was pointed out in the previous section that China and Pakistan have more proportion of urban population than India. In China, due to topographic and climatic conditions, the area suitable for cultivation is relatively small — only about 10 per cent of its total land area. The total cultivable area in China accounts for 40 per cent of the cultivable area in India. Until the 1980s, more than 80 per cent of the people in China were dependent on farming as their sole source of livelihood. Since then, the government encouraged people to leave their fields and pursue other activities such as handicrafts, commerce and transport. In 2018– 19, with 26 per cent of its workforce engaged in agriculture, its contribution to the GVA in China is 7 per cent (see Table 8.3). In both India and Pakistan, the contribution of agriculture to GVA were 16 and 24 per cent, respectively, but the proportion of workforce that works in this sector is more in India. In Pakistan, about 41 per cent of people work in agriculture, whereas, in India, it is 43 per cent. Twenty four per cent of Pakistan workforce is engaged in industry but it produces 19 per cent of GVA. In India, industry workforce Fig. 8.3 Industry in India, China and Pakistan (Not to scale) Rationalised 2023-24 COMPARATIVE DEVELOPMENT EXPERIENCES OF INDIA AND ITS NEIGHBOURS 141 account for 25 per cent but produces goods worth 30 per cent of GVA. In China, industries contribute to GVA at 41, and employ 28 per cent of workforce. In all the three countries, service sector contributes highest share of GVA. In the normal course of development, countries first shift their employment and output from agriculture to Industry and then to services. This is what is happening in China as can be seen from Table 8.3. The proportion of workforce engaged in industry in India and Pakistan were low at 25 per cent and 24 per cent respectively. The contribution of industries to GVA is at 30 per cent in India and 19 per cent in Pakistan. In these countries, the shift is taking place directly to the service sector. Thus, in all the three countries the service sector is emerging as a major player of development. It contributes more to GVA and, at the same time, emerges as a prospective employer. If we look at the proportion of workforce in the1980s, Pakistan was faster in shifting its workforce to service sector than India and China. In the 1980s, India, China and Pakistan employed 17, 12 and 27 per cent of its workforce in the service sector respectively. In 2019, it has reached the level of 32, 46 and 35 per cent, respectively. In the last five decades, the growth of agriculture sector, which employs the largest proportion of workforce in all the three countries, has declined. In the industrial sector, China has maintained a near double-digit growth rate in 1980s but began showing decline in recent years, TABLE 8.3 Sectoral Share of Employment and

GVA (%) in 2018–2019 Sector Contribution to GVA Distribution of Workforce India China Pakistan India China Pakistan Agriculture 16 7 24 43 26 41 Industry 30 41 19 25 28 24 Services 54 52 57 32 46 35 Total 100 100 100 100 100 100 Source: Human Development Report 2019 ; Key Indicators of Asia and Pacific 2019. Work These Out ÿ Do you think it is necessary for India and Pakistan to concentrate on the manufacturing sector as China does? Why? ÿ Scholars argue that the service sector should not be considered as an engine of growth whereas India and Pakistan have raised their share of output mainly in this sector only. What do you think? Rationalised 2023-24 142 INDIAN ECONOMIC DEVELOPMENT whereas, for India and Pakistan growth rate has declined. In case of service sector, China was able to maintain its rate of growth during 1980–1990,while there was a positive and increasing growth of India's service sector output. Thus, China's growth is contributed by the manufacturing and service sectors and India's growth by the service sector. During this period, Pakistan has shown deceleration in all three sectors. 8.5 INDICATORS OF HUMAN DEVELOPMENT You might have studied about the importance of human development indicators in the lower classes and the position of many developed and developing countries. Let us look how India, China and Pakistan have performed in some of the select indicators of human development. Look at Table 8.5. TABLE 8.4 Trends in Output Growth in Different Sectors, 1980–2015 Country 1980–90 2014–18 Agriculture Industry Service Agriculture Industry Service India 3.1 7.4 6.9 3.1 6.9 7.6 China 5.9 10.8 13.5 3.1 5.3 7.1 Pakistan 4 7.7 6.8 1.7 4.8 5.0 TABLE 8.5 Some Selected Indicators of Human Development, 2017-2019 Item India China Pakistan Human Development Index (Value) 0.645 0.761 0.557 Rank (based on HDI) 130 87 154 Life Expectancy at Birth (years) 69.7 76.9 67.3 Mean years of Schooling (% aged 15 and above) 6.5 8.1 5.2 Gross National Income per capita (PPP US$) 6,681 16,057 5,005 Percentage of People living Below Poverty Line (National) 21.9* 1.7** 24.3* Infant Mortality Rate (per 1000 live births) 29.9 7.4 57.2 Maternal Mortality Rate (per 1 lakh births) 133 29 140 Population using at least basic Sanitation (%) 60 75 60 Population using at least basic drinking 93 96 91 Water Source (%) Percentage of Undernourished Children 37.9 8.1 37.6 Note: * for the year 2011; for the years 2015. Sources: Human Development Report 2019 and 2020 and World Development Indicators (www.worldbank.org); Key indicators for Asia and the Pacific 2019, Asian Development Bank (ADB). Rationalised 2023-24 COMPARATIVE DEVELOPMENT EXPERIENCES OF INDIA AND ITS NEIGHBOURS 143 Table 8.5 shows that China is moving ahead of India and Pakistan. This is true for many indicators — income indicator such as GDP per capita, or proportion of population below poverty line or health indicators such as mortality rates, access to sanitation, literacy, life expectancy or malnourishment. China and Pakistan are ahead of India in reducing proportion of people below the poverty line and also their performance in sanitation. But India and Pakistan have not been able to save women from maternal mortality. In China, for one lakh births, only 29 women die whereas in India and Pakistan, about 133 and 140 women die respectively. Surprisingly all the three countries report providing improved drinking water sources for most of its population. China has the smallest share of poor among the three countries. Find out for yourself how these differences occur. In dealing with or making judgements on such questions, however, we should also note a problem while using the human development indicators given above with conviction. This occurs because these are all extremely important indicators; but these are not sufficient. Along with these, we also need what may be called 'liberty indicators'. One such indicator has actually been added as a measure of 'the extent of democratic participation in social and political decision-making' but it has not been given any extra weight. Some obvious 'liberty indicators' like measures of 'the extent of Constitutional protection given to rights of citizens' or 'the extent of constitutional protection of the Independence of the Judiciary and the Rule of Law' have not even been introduced so far. Without including these (and perhaps some more) and giving them overriding importance in the list, the construction of a human development index may be said to be incomplete and its usefulness limited. 8.6 DEVELOPMENT STRATEGIES — AN APPRAISAL It is common to find developmental strategies of a

country as a model to others for lessons and guidance for their own development. It is particularly evident after the introduction of the reform process in different parts of the world. In order to learn from economic performance of our neighbouring countries, it is necessary to have an understanding of the roots of their successes and failures. It is also necessary to distinguish between, and contrast, the different phases of their strategies. Though countries go through their development phases differently, let us take the initiation of reforms as a point of reference. We know that reforms were initiated in China in 1978, Pakistan in 1988 and India in 1991. Let us briefly assess their achievements and failures in pre- and post-reform periods. Why did China introduce structural reforms in 1978? China did not have any compulsion to introduce Rationalised 2023-24 144 INDIAN ECONOMIC DEVELOPMENT reforms as dictated by the World Bank and International Monetary Fund to India and Pakistan. The new leadership at that time in China was not happy with the slow pace of growth and lack of modernisation in the Chinese economy under the Maoist rule. They felt that Maoist vision of economic development based on decentralisation, self sufficiency and shunning of foreign technology, goods and capital had failed. Despite extensive land reforms, collectivisation, the Great Leap Forward and other initiatives, the per capita grain output in 1978 was the same as it was in the mid-1950s. It was found that establishment of infrastructure in the areas of education and health, land reforms, long existence of decentralised planning and existence of small enterprises had helped positively in improving the social and income indicators in the post reform period. Before the introduction of reforms, there had already been massive extension of basic health services in rural areas. Through the commune system, there was more equitable distribution of food grains. Experts also point out that each reform measure was first implemented at a smaller level and then extended on a massive scale. The experimentation under decentralised government enabled to assess the economic, social and political costs of success or failure. For instance, when reforms were made in agriculture, as pointed out earlier by handing over plots of land to individuals for cultivation, it brought prosperity to a vast number of poor people. It created conditions for the subsequent phenomenal growth in rural industries and built up a strong support base for more reforms. Scholars quote many such examples on how reform measures led to rapid growth in China. Scholars argue that in Pakistan the reform process led to worsening of all the economic indicators. We have seen in an earlier section that compared to 1980s, the growth rate of GDP and its sectoral constituents have not yet improved. Though the data on international poverty line for Pakistan is quite healthy, scholars using the official data of Pakistan indicate rising poverty there. The proportion of poor in 1960s was more than 40 per cent which declined to 25 per cent in 1980s and started rising again in the recent decades. The reasons for the slowdown of growth and re-emergence of poverty in Pakistan’s economy, as scholars put it, are agricultural growth and food supply situation were based not on an institutionalised process of technical change but on good harvest. When there was a good harvest, the economy was in good condition, when it was not, the economic indicators showed stagnation or negative trends. You will recall that India had to borrow from the IMF and World Bank to set right its balance of payments crisis; foreign exchange is an essential component for any country and it is Rationalised 2023-24 COMPARATIVE DEVELOPMENT EXPERIENCES OF INDIA AND ITS NEIGHBOURS 145 Work These Out ÿ While India has performed relatively well vis-à-vis other developing countries (including its Asian neighbours) in terms of economic growth, India is yet to show the world that there is considerable progress in terms of human development indicators. Where India went wrong ? Why did we not take care of our human resources? Discuss in the classroom. ÿ There is a general perception going around in India that there is sudden increase in dumping of Chinese goods into India which have implications for manufacturing sector in India and also that we do not engage ourselves in trading with our neighbouring nations. Look at the following table, which shows exports from India to, and imports from, Pakistan and China. From newspapers and websites and listening to news, collect the details of goods and services transacted in trading

with our neighbours. In order to get detailed information relating to international trade, you can log on to the website: http:/dgft.gov.in. ÿ Calculate exports as a % of imports for both the years and discuss the probable reasons for the trend in the class. Country Exports from India (Rs in crore) Imports to India (Rs in crore) 2004-2005 2018-2019 Annual 2004-2005 2018-2019 Annual Rate of Rate of Growth (%) Growth (%) Pakistan 2,341 14,426 3.7 427 3476 5.1 China 25,232 1,17,289 2.6 31,892 4,92,079 10.3 Rationalised 2023-24 146 INDIAN ECONOMIC DEVELOPMENT important to know how it can be earned. If a country is able to build up its foreign exchange earnings by sustainable export of manufactured goods, it need not worry. In Pakistan most foreign exchange earnings came from remittances from Pakistani workers in the Middle-east and the exports of highly volatile agricultural products; there was also growing dependence on foreign loans on the one hand and increasing difficulty in paying back the loans on the other. However, during the last few years, Pakistan has recovered its economic growth and has been sustaining. In 2017-18, the Annual Plan 2019-20 reports that, the GDP registered a growth of 5.5 per cent, highest when compared to the previous decade. While agriculture recorded growth rate far from satisfactory level, industrial and service sectors grew at 4.9 and 6.2 per cent respectively. Many macroeconomic indicators also began to show stable and positive trends. 8.7 CONCLUSION What are we learning from the developmental experiences of our neighbours? India, China and Pakistan have travelled seven decades of developmental path with varied results. Till the late 1970s, all of them were maintaining the same level of low development. The last three decades have taken these countries to different levels. India, with democratic institutions, performed moderately, but a majority of its people still depend on agriculture. India has taken many initiatives to develop the infrastructure and improve the standard of living. Scholars are of the opinion that political instability, over-dependence on remittances and foreign aid along with volatile performance of agriculture sector are the reasons for the slowdown of the Pakistan economy. Yet, last five years, many macroeconomic indicators began showing positive and moderate growth rates reflecting the economic recovery. In China, the lack of political freedom and its implications for human rights are major concerns; yet, in the last four decades, it used the 'market system without losing political commitment' and succeeded in raising the level of growth alongwith alleviation of poverty. You will also notice that unlike India and Pakistan, which are attempting to privatise their public sector enterprises, China has used the market mechanism to 'create additional social and economic opportunities'. By retaining collective ownership of land and allowing individuals to cultivate lands, China has ensured social security in rural areas. Public intervention in providing social infrastructure even prior to reforms has brought about positive results in human development indicators in China. Rationalised 2023-24 COMPARATIVE DEVELOPMENT EXPERIENCES OF INDIA AND ITS NEIGHBOURS 147 Recap ÿ With the unfolding of the globalisation process, developing countries are keen to understand the developmental processes pursued by their neighbours as they face competition from developed nations as also amongst themselves. ÿ India, Pakistan and China have similar physical endowments but totally different political systems. ÿ All the three countries follow the similar planned pattern of development. However, the structures established to implement developmental policies are quite different. ÿ Till the early 1980s, the developmental indicators of all the three countries, such as growth rates and sectoral contribution towards national income, were similar. ÿ Reforms were introduced in 1978 in China, in 1988 in Pakistan and in 1991 in India. ÿ China introduced structural reforms on its own initiative while they were forced upon India and Pakistan by international agencies. ÿ The impact of policy measures were different in these countries — for instance, one-child norm has arrested the population growth in China whereas in India and Pakistan, a major change is yet to take place. ÿ Even after seventy years of planned development, majority of the workforce in all the countries depends on agriculture. The dependency is greater in India. ÿ Though China has followed the classical development pattern of gradual shift from agriculture to manufacturing and then to services, India

and Pakistan's shift has been directly from agriculture to service sector. ÿ China's industrial sector has maintained a high growth rate while it is not so in both India and Pakistan. This led to rapid increase of the GDP per capita in China than in India and Pakistan. ÿ China is ahead of India and Pakistan on many human development indicators. However these improvements were attributed not to the reform process but the strategies that China adopted in the pre-reform period. ÿ While assessing the developmental indicators, one also has to consider the liberty indicators. Rationalised 2023-24 148 INDIAN ECONOMIC DEVELOPMENT 1. Why are regional and economic groupings formed? 2. What are the various means by which countries are trying to strengthen their own domestic economies? 3. What similar developmental strategies have India and Pakistan followed for their respective developmental paths? 4. Explain the Great Leap Forward campaign of China as initiated in 1958. 5. China's rapid industrial growth can be traced back to its reforms in 1978. Do you agree? Elucidate. 6. Describe the path of developmental initiatives taken by Pakistan for its economic development. 7. What is the important implication of the 'one child norm' in China? 8. Mention the salient demographic indicators of China, Pakistan and India. 9. Compare and contrast India and China's sectoral contribution towards GVA/GDP. What does it indicate? 10. Mention the various indicators of human development. 11. Define the liberty indicator. Give some examples of liberty indicators. 12. Evaluate the various factors that led to the rapid growth in economic development in China. 13. Group the following features pertaining to the economies of India, China and Pakistan under three heads • One-child norm • Low fertility rate • High degree of urbanisation • Mixed economy • Very high fertility rate • Large population • High density of population • Growth due to manufacturing sector • Growth due to service sector. EXERCISES Rationalised 2023-24 COMPARATIVE DEVELOPMENT EXPERIENCES OF INDIA AND ITS NEIGHBOURS 149 14. Give reasons for the slow growth and re-emergence of poverty in Pakistan. 15. Compare and contrast the development of India, China and Pakistan with respect to some salient human development indicators. 16. Comment on the growth rate trends witnessed in China and India in the last two decades. 17. Fill in the blanks (a) First Five Year Plan of _____ commenced in the year 1956. (Pakistan/China) (b) Maternal mortality rate is high in _____. (China/ Pakistan) (c) Proportion of people below poverty line is more in _____. (India/Pakistan) (d) Reforms in _____ were introduced in 1978. (China/ Pakistan) 1. Organise a class debate on the issue of free trade between India and China and India and Pakistan. 2. You are aware that cheap Chinese goods are available in the market, for example, toys, electronic goods, clothes, batteries etc. Do you think that these products are comparable in quality and price with their Indian counterparts? Do they create a threat to our domestic producers? Discuss. 3. Do you think India can introduce the one-child norm like China to reduce population growth? Organise a debate on the policies that India can follow to reduce population growth. 4. China's growth is mainly contributed by the manufacturing sector and India's growth by the service sector —prepare a chart showing the relevance of this statement with respect to the structural changes in the last decade in the respective countries. 5. How is China able to lead in all the Human Development Indicators? Discuss in the classroom. Use Human Development Report of the latest year. SUGGESTED ADDITIONAL ACTIVITIES Rationalised 2023-24 150 INDIAN ECONOMIC DEVELOPMENT Books DREZE, JEAN AND AMARTYA SEN. 1996. India: Economic Development and Social Opportunity. Oxford University Press, New Delhi. Articles RAY, ALOK. 2002. 'The Chinese Economic Miracle: Lessons to be Learnt.' Economic and Political Weekly, September 14, pp. 3835-3848. ZAIDI, S. AKBAR. 1999. 'Is Poverty now a Permanent Phenomenon in Pakistan?' Economic and Political Weekly, October 9, pp. 2943-2951. Government Reports Annual Plan 2016-17, Ministry of Planning, Development & Reform, Government of Pakistan accessed from http://pc.gov.pk on 02 January 2017. Economic Survey, Ministry of Finance, Government of India (for various years). Human Development Report 2005, United Nations Development Programme, Oxford University Press, Oxford. Labour Market Indicators, 3rd Edition, International Labour Organisation, Geneva. Pakistan:

National Human Development Report 2003, United Nations Development Programme, Second Impression 2004. World Development Report 2005, The World Bank, Oxford University Press, New York. World Development Indicators for various years, World Bank Washington. Human Development Report for various years, United Nations Development Programme Geneva. Key Indicators of Asia and Pacific 2016, Asian Development Bank, Philippines. Websites www.stats.gov.cn www.statpak.gov.pk www.un.org www.ilo.org www.planningcommission.nic.in www.dgft.delhi.nic.in REFERENCES Rationalised 2023-24STATISTICS FOR ECONOMICS Textbook for Class XI 2022-23 (ii) First Edition February 2006 Phalguna 1927 Reprinted December 2006 Pausa 1928 December 2007 Pausa 1929 January 2009 Magha 1930 January 2010 Magha 1931 January 2011 Magha 1932 January 2012 Magha 1933 December 2012 Agrahayana 1934 February 2015 Magha 1936 April 2016 Chaitra 1938 December 2016 Pausa 1938 January 2018 Magha 1939 December 2018 Agrahayana 1940 September 2019 Bhadrapada 1941 January 2021 Pausa 1942 November 2021 Agrahayana 1943 PD 15T RSP ` 65.00 Printed on 80 GSM paper with NCERT watermark Published at the Publication Division OFFICES OF THE PUBLICATION DIVISION, NCERT NCERT Campus Sri Aurobindo Marg New Delhi 110 016 Phone : 011-26562708 108, 100 Feet Road Hosdakere Halli Extension Banashankari III Stage Bengaluru 560 085 Phone : 080-26725740 Navjivan Trust Building P.O.Navjivan Ahmedabad 380 014 Phone : 079-27541446 CWC Campus Opp. Dhankal Bus Stop Panihati Kolkata 700 114 Phone : 033-25530454 CWC Complex Maligaon Guwahati 781 021 Phone : 0361-2674869 Publication Team Head, Publication : Anup Kumar Rajput Division Chief Editor : Shveta Uppal Chief Production : Arun Chitkara Officer Chief Business : Vipin Dewan Manager Editor : M.G. Bhagat Production Assistant : Om Prakash Cover Shweta Rao Illustrations and Layout Sarita Verma Mathur by the Secretary, National Council of Educational Research and Training, Sri Aurobindo Marg, New Delhi 110 016 and printed at Gopsons Paper Limited, Plot No. 123&124, Vallur Village, Ambattur, Virudhur Nagar, Sivakasi, Tamil Nadu - 626 005 11098 – STATISTICS FOR ECONOMICS Textbook for Class XI ISBN 81-7450-497-4 2022-23 FOREWORD The National Curriculum Framework (NCF), 2005, recommends that children's life at school must be linked to their life outside the school. This principle marks a departure from the legacy of bookish learning which continues to shape our system and causes a gap between the school, home and community. The syllabi and textbooks developed on the basis of NCF signify an attempt to implement this basic idea. They also attempt to discourage rote learning and the maintenance of sharp boundaries between different subject areas. We hope these measures will take us significantly further in the direction of a child-centred system of education outlined in the National Policy on Education (1986). The success of this effort depends on the steps that school principals and teachers will take to encourage children to reflect on their own learning and to pursue imaginative activities and questions. We must recognise that, given space, time and freedom, children generate new knowledge by engaging with the information passed on to them by adults. Treating the prescribed textbook as the sole basis of examination is one of the key reasons why other resources and sites of learning are ignored. Inculcating creativity and initiative is possible if we perceive and treat children as participants in learning, not as receivers of a fixed body of knowledge. These aims imply considerable change in school routines and mode of functioning. Flexibility in the daily time-table is as necessary as rigour in implementing the annual calendar so that the required number of teaching days are actually devoted to teaching. The methods used for

teaching and evaluation will also determine how effective this textbook proves for making children's life at school a happy experience, rather than a source of stress or boredom. Syllabus designers have tried to address the problem of curricular burden by restructuring and reorienting knowledge at different stages with greater consideration for child psychology and the time available for teaching. The textbook attempts to enhance this endeavour by giving higher priority and space to opportunities for contemplation and wondering, discussion in small groups, and activities requiring hands-on experience. The National Council of Educational Research and Training (NCERT) appreciates the hard work done by the textbook development team 2022-23 (iv) responsible for this book. We wish to thank the Chairperson of the advisory group for Social Sciences textbooks at Higher Secondary Level, Professor Hari Vasudevan and the Chief Advisor for this book, Professor Tapas Majumdar for guiding the work of this committee. Several teachers contributed to the development of this textbook; we are grateful to them and their principals for making this possible. We are indebted to the institutions and organisations which have generously permitted us to draw upon their resources, material and personnel. We are especially grateful to the members of the National Monitoring Committee, appointed by the Department of Secondary and Higher Education, Ministry of Human Resource Development under the Chairmanship of Professor Mrinal Miri and Professor G.P. Deshpande, for their valuable time and contribution. As an organisation committed to systemic reform and continuous improvement in the quality of its products, NCERT welcomes comments and suggestions which will enable us to undertake further revision and refinement. Director New Delhi National Council of Educational 20 December 2005 Research and Training 2022-23 (v) TEXTBOOK DEVELOPMENT COMMITTEE CHAIRPERSON, ADVISORY COMMITTEE FOR SOCIAL SCIENCE TEXTBOOKS AT HIGHER SECONDARY LEVEL Hari Vasudevan, Professor, Department of History, University of Calcutta, Kolkata CHIEF ADVISOR Tapas Majumdar, Emeritus Professor, Jawaharlal Nehru University, New Delhi MEMBERS Bhawna Rajput, Sr. Lecturer, Aditi Mahavidyalaya, Delhi University, Delhi E. Bijoykumar Singh, Professor, Department of Economics, Manipur University, Imphal M.M. Goel, Reader, Department of Commerce, PGDAV College (M), Delhi University, Delhi Meera Malhotra, Head, Economics, Modern School, Barakhamba Road, New Delhi Sudhir Kumar, Reader, A. N. Sinha Institute of Social Studies, Patna T. P. Sinha, Reader, Department of Economics, S.S.N. College, Delhi University, Delhi MEMBER-COORDINATOR Neeraja Rashmi, Reader, Economics, DESS, NCERT, New Delhi 2022-23 ACKNOWLEDGEMENTS Acknowledgements are due to Savita Sinha, Professor and Head, Department of Education in Social Sciences and Humanities, for her support in developing this textbook. The Council is also thankful to J. Khuntia, Senior Lecturer, School of Correspondence Courses, Delhi University; T.M. Thomas, Associate Professor, Deshbandhu College, Delhi University; M. V. Srinivasan and Jaya Singh, Lecturer, DESSH, NCERT, for helping in finalising the textbook. Special thanks are due to Vandana R. Singh, Consultant Editor, for going through the manuscript and suggesting relevant changes. The Council also gratefully acknowledges the contributions of Amjad Husain and Girish Goyal, DTP Operators; Dillip Kumar Agasti, Proofreader; Dinesh Kumar, In-charge, Computer Station, in shaping this book. The contribution of the Publication Department, NCERT, in bringing out this book is also duly acknowledged. 2022-23 CONTENTS Foreword iii Chapter 1 : Introduction 1 Chapter 2 : Collection of Data 9 Chapter 3 : Organisation of Data 22 Chapter 4 : Presentation of Data 40 Chapter 5 : Measures of Central Tendency 58 Chapter 6 : Measures of Dispersion 74 Chapter 7 : Correlation 91 Chapter 8 : Index Numbers 107 Chapter 9 : Use of Statistical Tools 122 APPENDIX A : GLOSSARY OF STATISTICAL TERMS 131 APPENDIX B : TABLE OF TWO-DIGIT RANDOM NUMBERS 134 2022-23 2022-23told this subject is mainly around what Alfred Marshall (one of the founders of modern economics) called "the study of man in the ordinary business of life". Let us understand what that means. When you buy goods (you may want to satisfy your own personal needs or those of your family or those of any other person to whom you want to make a gift) you are called a consumer. When you sell goods to make a profit for yourself (you may be a

shopkeeper), you are called a seller. When you produce goods (you may be a farmer or a manufacturing company),or provide services (you may Introduction 1. WHY ECONOMICS? You have, perhaps, already had Economics as a subject for your earlier classes at school. You might have been Studying this chapter should enable you to: • know what the subject of economics is about; • understand how economics is linked with the study of economic activities in consumption, production and distribution; • understand why knowledge of statistics can help in describing consumption, production and distribution; • learn about some uses of statistics in the understanding of economic activities. CHAPTER 1 2022-23 2 STATISTICS FOR ECONOMICS In real life we cannot be as lucky as Aladdin. Though, like him we have unlimited wants, we do not have a magic lamp. Take, for example, the pocket money that you get to spend. If you had more of it then you could have purchased almost all the things you wanted. But since your pocket money is limited, you have to choose only those things that you want the most. This is a basic teaching of Economics. Activities • Can you think for yourself of some other examples where a person with a given income has to choose which things and in what quantities he or she can buy at the prices that are being charged (called the current prices)? • What will happen if the current prices go up? Scarcity is the root of all economic problems. Had there been no scarcity, there would have been no economic problem. And you would not have studied Economics either. In our daily life, we face various forms of scarcity. The long queues at railway booking counters, crowded buses and trains, shortage of essential commodities, the rush to get a ticket to watch a new film, etc., are all manifestations of scarcity. We face scarcity because the things that satisfy our wants are limited in availability. Can you think of some more instances of scarcity? The resources which the producers have are limited and also have alternative uses. Take the case of food be a doctor, porter, taxi driver or transporter of goods) you are called a producer. When you are in a job, working for some other person, and you get paid for it (you may be employed by somebody who pays you wages or a salary), you are called an employee. When you employ somebody, giving them a wage, you are an employer. In all these cases you will be called gainfully employed in an economic activity. Economic activities are ones that are undertaken for a monetary gain. This is what economists mean by ordinary business of life. Activities • List different activities of the members of your family. Would you call them economic activities? Give reasons. • Do you consider yourself a consumer? Why? We cannot get something for nothing If you ever heard the story of Aladdin and his Magic Lamp, you would agree that Aladdin was a lucky guy. Whenever and whatever he wanted, he just had to rub his magic lamp and a genie appeared to fulfill his wish. When he wanted a palace to live in, the genie instantly made one for him. When he wanted expensive gifts to bring to the king when asking for his daughter’s hand, he got them at the bat of an eyelid. 2022-23 INTRODUCTION 3 that you eat every day. It satisfies your want of nourishment. Farmers employed in agriculture raise crops that produce your food. At any point of time, the resources in agriculture like land, labour, water, fertiliser, etc., are given. All these resources have alternative uses. The same resources can be used in the production of nonfood crops such as rubber, cotton, jute etc. Thus, alternative uses of resources give rise to the problem of choice between different commodities that can be produced by those resources. Activities • Identify your wants. How many of them can you fulfill? How many of them are unfulfilled? Why you are unable to fulfill them? • What are the different kinds of scarcity that you face in your daily life? Identify their causes. Consumption, Production and Distribution If you thought about it, you might have realised that Economics involves the study of man engaged in economic activities of various kinds. For this, you need to know reliable facts about all the diverse economic activities like production, consumption and distribution. Economics is often discussed in three parts: consumption, production and distribution. We want to know how the consumer decides, given his income and many alternative goods to choose from, what to buy when he knows the prices. This is the study of Consumption. We also want to know how the producer, similarly, chooses what and how to produce for the market.

This is the study of Production. Finally, we want to know how the national income or the total income arising from what has been produced in the country (called the Gross Domestic Product or GDP) is distributed through wages (and salaries), profits and interest (We will leave aside here income from international trade and investment). This is the study of Distribution. Besides these three conventional divisions of the study of Economics about which we want to know all the facts, modern economics has to include some of the basic problems facing the country for special studies. For example, you might want to know why or to what extent some households in our society have the capacity to earn much more than others. You may want to know how many people in the country are really poor, how many are middle-class, how many are relatively rich and so on. You 2022-23 4 STATISTICS FOR ECONOMICS may want to know how many are illiterate, who will not get jobs, requiring education, how many are highly educated and will have the best job opportunities and so on. In other words, you may want to know more facts in terms of numbers that would answer questions about poverty and disparity in society. If you do not like the continuance of poverty and gross disparity and want to do something about the ills of society you will need to know the facts about all these things before you can ask for appropriate actions by the government. If you know the facts it may also be possible to plan your own life better. Similarly, you hear of — some of you may even have experienced disasters like Tsunami, earthquakes, the bird flu — dangers threatening our country and so on that affect man's 'ordinary business of life' enormously. Economists can look at these things provided they know how to collect and put together the facts about what these disasters cost systematically and correctly. You may perhaps think about it and ask yourselves whether it is right that modern economics now includes learning the basic skills involved in making useful studies for measuring poverty, how incomes are distributed, how earning opportunities are related to your education, how environmental disasters affect our lives and so on? Obviously, if you think along these lines, you will also appreciate why we needed Statistics (which is the study of numbers relating to selected facts in a systematic form) to be added to all modern courses of modern economics. Would you now agree with the following definition of economics that many economists use? "Economics is the study of how people and society choose to employ scarce resources that could have alternative uses in order to produce various commodities that satisfy their wants and to distribute them for consumption among various persons and groups in society." 2. STATISTICS IN ECONOMICS In the previous section you were told about certain special studies that concern the basic problems facing a country. These studies required that we know more about economic facts. Such economic facts are also known as economic data. The purpose of collecting data about these economic problems is to understand and explain these problems in terms of the various causes behind them. In other words, we try to analyse them. For example, when we analyse the hardships of poverty, we try to explain it in terms of the various factors such as unemployment, low productivity of people, backward technology, etc. But, what purpose does the analysis of poverty serve unless we are able to find ways to mitigate it. We may, therefore, also try to find those measures that help solve an economic problem. In Economics, such measures are known as policies. So, do you realise, then, that no analysis of an economic problem would 2022-23 INTRODUCTION 5 be possible without data on various factors underlying an economic problem? And, that, in such a situation, no policies can be formulated to solve it. If yes, then you have, to a large extent, understood the basic relationship between Economics and Statistics. 3. WHAT IS STATISTICS? At this stage you are probably ready to know more about Statistics. You might very well want to know what the subject 'Statistics' is all about. Statistics deals with the collection, analysis, interpretation and presentation of numerical data. It is a branch of mathematics and also used in the disciplines such as accounting, economics, management, physics, finance, psychology and sociology. Here we are concerned with data from the field of Economics. Most Economics data are quantitative. For example, a statement in Economics like "the production of rice in India has increased from 39.58

million tonnes in 1974–75 to 106.5 million tonnes in 2013–14, is a quantitative data. In addition to quantitative data, Economics also uses qualitative data. The chief characteristic of such information is that they describe attributes of a single person or a group of persons that is important to record as accurately as possible even though they cannot be measured in quantitative terms. Take, for example, 'gender' that distinguishes a person as man/woman or boy/girl. It is often possible (and useful) to state the information about an attribute of a person in terms of degrees (like better/ worse; sick/ healthy/ more healthy; unskilled/ skilled/ highly skilled, etc.). Such qualitative information or statistics is often used in Economics and other social sciences and collected and stored systematically like quantitative information (on prices, incomes, taxes paid, etc.), whether for a single person or a group of persons. You will study in the subsequent chapters that statistics involves collection of data. The next step is to present the data in tabular, diagrammatic and graphic forms. The data, then, are summarised by calculating various numerical indices, such as mean, variance, standard deviation, etc., that represent the broad characteristics of the collected set of information. Finally, the data are analysed and interpreted. Activities • Think of two examples of qualitative and quantitative data. • Which of the following would give you qualitative data; beauty, intelligence, income earned, marks in a subject, ability to sing, learning skills? 4. WHAT STATISTICS DOES? Statistics is an indispensable tool for an economist that helps him to understand an economic problem. Using its various methods, effort is made to find the causes behind it with the help of qualitative and quantitative facts of an economic problem. Once the causes of the problem are identified, it 2022-23 6 STATISTICS FOR ECONOMICS is easier to formulate certain policies to tackle it. But there is more to Statistics. It enables an economist to present economic facts in a precise and definite form that helps in proper comprehension of what is stated. When economic facts are expressed in statistical terms, they become exact. Exact facts are more convincing than vague statements. For instance, saying that with precise figures, 310 people died in the recent earthquake in Kashmir, is more factual and, thus, a statistical data. Whereas, saying hundreds of people died, is not. Statistics also helps in condensing mass data into a few numerical measures (such as mean, variance etc., about which you will learn later). These numerical measures help to summarise data. For example, it would be impossible for you to remember the incomes of all the people in a data if the number of people is very large. Yet, one can remember easily a summary figure like the average income that is obtained statistically. In this way, Statistics summarises and presents a meaningful overall information about a mass of data. Quite often, Statistics is used in finding relationships between different economic factors. An economist may be interested in finding out what happens to the demand for a commodity when its price increases or decreases? Or, would the supply of a commodity be affected by the changes in its own price? Or, would the consumption expenditure increase when the average income increases? Or, what happens to the general price level when the government expenditure increases? Such questions can only be answered if any relationship exists between the various economic factors that have been stated above. Whether such relationships exist or not can be easily verified by applying statistical methods to their data. In some cases the economist might assume certain relationships between them and like to test whether the assumption she/he made about the relationship is valid or not. The economist can do this only by using statistical techniques. In another instance, the economist might be interested in predicting the changes in one economic factor due to the changes in another factor. For example, she/he might be interested in knowing the impact of today's investment on the national income in future. Such an exercise cannot be undertaken without the knowledge of Statistics. Sometimes, formulation of plans and policies requires the knowledge of future trends. For example, an economic planner has to decide in 2017 how much the economy should produce in 2020. In other words, one must know what could be the expected level of consumption in 2020 in order to decide the production plan of the economy for 2020. In this situation, one might make subjective judgement based on the guess

about consumption in 2020. Alternatively, one might use statistical tools to predict consumption 2022-23 INTRODUCTION 7 in 2020. That could be based on the data of consumption of past years or of recent years obtained by surveys. Thus, statistical methods help formulate appropriate economic policies that solve economic problems. 5. CONCLUSION Today, we increasingly use Statistics to analyse serious economic problems such as rising prices, growing population, unemployment, poverty etc., to find measures that can solve such problems. Further, it also helps to evaluate the impact of such policies in solving the economic problems. For example, it can be ascertained easily using statistical techniques whether the policy of family planning is effective in checking the problem of ever-growing population. In economic policies, Statistics plays a vital role in decision making. For example, in the present time of rising global oil prices, it might be necessary to decide how much oil India should import in 2025. The decision to import would depend on the expected domestic production of oil and the likely demand for oil in 2025. Without the use of Statistics, it cannot be determined what the expected domestic production of oil and the likely demand for it would be. Thus, the decision to import oil cannot be made unless we know the actual requirement of oil. This vital information that helps to make the decision to import oil can only be obtained statistically. Statistical methods are no substitute for common sense! There is an interesting story which is told to make fun of statistics. It is said that a family of four persons (husband, wife and two children) once set out to cross a river. The father knew the average depth of the river. So, he calculated the average height of his family members. Since the average height of his family members was greater than the average depth of the river, he thought they could cross safely. Consequently, some members of the family (children) drowned while crossing the river. Does the fault lie with the statistical method of calculating averages or with the misuse of the averages? 2022-23 8 STATISTICS FOR ECONOMICS Recap • Our wants are unlimited but the resources used in the production of goods that satisfy our wants are limited and scarce. Scarcity is the root of all economic problems. • Resources have alternative uses. • Purchase of goods by consumers to satisfy their various needs is Consumption. • Manufacture of goods by producers for the market is Production. • Division of the national income into wages, profits, rents and interests is Distribution. • Statistics finds economic relationships using data and verifies them. • Statistical tools are used in prediction of future trends. • Statistical methods help analyse economic problems and formulate policies to solve them. EXERCISES 1. Mark the following statements as true or false. (i) Statistics can only deal with quantitative data. (ii) Statistics solves economic problems. (iii) Statistics is of no use to Economics without data. 2. Make a list of activities in a bus stand or a market place. How many of them are economic activities? 3. ‘The Government and policy makers use statistical data to formulate suitable policies of economic development’. Illustrate with two examples. 4. “You have unlimited wants and limited resources to satisfy them.” Explain this statement by giving two examples. 5. How will you choose the wants to be satisfied? 6. What are your reasons for studying Economics? 7. Statistical methods are no substitute for common sense. Comment with examples from your daily life. 2022-23Collection of Data 1. INTRODUCTION In the previous chapter, you have read about what is economics. You also studied about the role and importance of statistics in economics. In this Studying this chapter should enable you to: • understand the meaning and purpose of data collection; • distinguish between primary and secondary sources; • know the mode of collection of data; • distinguish between Census and Sample Surveys; • be familiar with the techniques of sampling; • know about some important sources of secondary data. chapter, you will study the sources of data and the mode of data collection. The purpose of collection of data is to show evidence for reaching a sound and clear solution to a problem. In economics, you often come across a statement like this, “After many fluctuations the output of food grains rose to 132 million tonnes in 1978-79 from 108 million tonnes in 1970-71, but fell to 108 million tonnes in 1979-80. Production of food grains then rose continuously to 252 million tonnes in 2015-16 and touched 272 million tonnes in 2016–17.” In this statement, you can observe

that the food grains production in different years does not remain the same. It varies from year to year and C HAPT ER 2 2022-23 10 STATISTICS FOR ECONOMICS from crop to crop. As these values vary, they are called variable. The variables are generally represented by the letters X, Y or Z. Each value of a variable is an observation. For example, the food grain production in India varies between 108 million tonnes in 1970– 71 to 272 million tonnes in 2016-17 as shown in the following table. The years are represented by variable X and the production of food grain in India (in million tonnes) is represented by variable Y. TABLE 2.1 Production of Food Grain in India (Million Tonnes) X Y 1970–71 108 1978–79 132 1990–91 176 1997–98 194 2001–02 212 2015-16 252 2016-17 272 Here, the values of these variables X and Y are the 'data', from which we can obtain information about the production of food grains in India. To know the fluctuations in food grains production, we need the 'data' on the production of food grains in India for various years. 'Data' is a tool, which helps in understanding problems by providing information. You must be wondering where do 'data' come from and how do we collect these? In the following sections we will discuss the types of data, method and instruments of data collection and sources of obtaining data. 2. WHAT ARE THE SOURCES OF DATA? Statistical data can be obtained from two sources. The researcher may collect the data by conducting an enquiry. Such data are called Primary Data, as they are based on first hand information. Suppose, you want to know about the popularity of a filmstar among school students. For this, you will have to enquire from a large number of school students, by asking questions from them to collect the desired information. The data you get, is an example of primary data. If the data have been collected and processed (scrutinised and tabulated) by some other agency, they are called Secondary Data. They can be obtained either from published sources such as government reports, documents, newspapers, books written by economists or from any other source, for example, a website. Thus, the data are primary to the source that collects and processes them for the first time and secondary for all sources that later use such data. Use of secondary data saves time and cost. For example, after collecting the data on the popularity of the filmstar among students, you publish a report. If somebody uses the data collected by you for a similar study, it becomes secondary data. 3. HOW DO WE COLLECT THE DATA? Do you know how a manufacturer decides about a product or how a political party decides about a candidate? They conduct a survey by 2022-23 COLLECTION OF DATA 11 asking questions about a particular product or candidate from a large group of people. The purpose of surveys is to describe some characteristics like price, quality, usefulness (in case of the product) and popularity, honesty, loyalty (in case of the candidate). The purpose of the survey is to collect data. Survey is a method of gathering information from individuals. Preparation of Instrument The most common type of instrument used in surveys is questionnaire/ interview schedule. The questionnaire is either self administered by the respondent or administered by the researcher (enumerator) or trained investigator. While preparing the questionnaire/interview schedule, you should keep in mind the following points; • The questionnaire should not be too long. The number of questions should be as minimum as possible. • The questionnaire should be easy to understand and avoid ambiguous or difficult words. • The questions should be arranged in an order such that the person answering should feel comfortable. • The series of questions should move from general to specific. The questionnaire should start from general questions and proceed to more specific ones. For example: Poor Q (i) Is increase in electricity charges justified? (ii) Is the electricity supply in your locality regular? Good Q (i) Is the electricity supply in your locality regular? (ii) Is increase in electricity charges justified? • The questions should be precise and clear. For example, Poor Q What percentage of your income do you spend on clothing in order to look presentable? Good Q What percentage of your income do you spend on clothing? • The questions should not be ambiguous. They should enable the respondents to answer quickly, correctly and clearly. For example: Poor Q Do you spend a lot of money on books in a month? Good Q (Tick mark the appropriate option) How much do you spend on books in a month? (i) Less than Rs 200 (ii) Rs 200–300 (iii) Rs 300–400 (iv) More than Rs

400 • The question should not use double negatives. The questions starting with “Wouldn’t you” or “Don’t you” should be avoided, as they may lead to biased responses. For example: 2022-23 12 STATISTICS FOR ECONOMICS Poor Q Don’t you think smoking should be prohibited? Good Q Do you think smoking should be prohibited? • The question should not be a leading question, which gives a clue about how the respondent should answer. For example: Poor Q How do you like the flavour of this highquality tea? Good Q How do you like the flavour of this tea? • The question should not indicate alternatives to the answer. For example: Poor Q Would you like to do a job after college or be a housewife? Good Q What would you like to do after college ? The questionnaire may consist of closed-ended (or structured) questions or open-ended (or unstructured) questions. The above question about what a student wants do after college is an open-ended question. Closed-ended or structured questions can either be a two-way question or a multiple choice question. When there are only two possible answers, ‘yes’ or ‘no’, it is called a twoway question. When there is a possibility of more than two options of answers, multiple choice questions are more appropriate. Example, Q. Why did you sell your land? (i) To pay off the debts. (ii) To finance children’s education. (iii) To invest in another property. (iv) Any other (please specify). Closed-ended questions are easy to use, score and to codify for analysis, because all respondents can choose from the given options. But they are difficult to write as the alternatives should be clearly written to represent both sides of the issue. There is also a possibility that an individual’s true response is not present among the options given. For this, the choice of ‘Any Other’ is provided, where the respondent can write a response, which was not anticipated by the researcher. Moreover, another limitation of multiple-choice questions is that they tend to restrict the answers by providing alternatives, without which the respondents may have answered differently. Open-ended questions allow for more individualised responses, but they are difficult to interpret and hard to score, since there are a lot of variations in the responses. Example, Q. What is your view about globalisation? Mode of Data Collection Have you ever come across a television show in which reporters ask questions from children, housewives or general public regarding their examination performance or a brand of soap or a 2022-23 COLLECTION OF DATA 13 political party? The purpose of asking questions is to do a survey for collection of data. There are three basic ways of collecting data: (i) Personal Interviews, (ii) Mailing (questionnaire) Surveys, and (iii) Telephone Interviews. Personal Interviews This method is used when the researcher has access to all the members. The researcher (or investigator) conducts faceto-face interviews with the respondents. Personal interviews are preferred due to various reasons. Personal contact is made between the respondent and the interviewer. The interviewer has the opportunity of explaining the study and answering the queries of respondents. The interviewer can request the respondent to expand on answers that are particularly important. Misinterpretation and misunderstanding can be avoided. Watching the reactions of respondents can provide supplementary information. Personal interview has some demerits too. It is expensive, as it requires trained interviewers. It takes longer time to complete the survey. Presence of the researcher may inhibit respondents from saying what they really think. Mailing Questionnaire When the data in a survey are collected by mail, the questionnaire is sent to each individual by mail with a request to complete and return it by a given date. The advantages of this method are that, it is less expensive. It allows the researcher to have access to people in remote areas too, who might be difficult to reach in person or by telephone. It does not allow influencing of the respondents by the interviewer. It also permits the respondents to take sufficient time to give thoughtful answers to the questions. These days online surveys or surveys through short messaging service, i.e., SMS are popular. Do you know how an online survey is conducted? The disadvantages of mail survey are that there is less opportunity to provide assistance in clarifying instructions, so there is a possibility of misunderstanding the questions. Mailing is also likely to produce low response rates due to certain factors, such as returning the questionnaire without completing it, not returning the questionnaire at all, loss of questionnaire in the mail itself,

etc. Telephone Interviews In a telephone interview, the investigator asks questions over the 2022-23 14 STATISTICS FOR ECONOMICS telephone. The advantages of telephone interviews are that they are cheaper than personal interviews and can be conducted in a shorter time. They allow the researcher to assist the respondent by clarifying the questions. Telephonic interview is better in cases where the respondents are reluctant to answer certain questions in personal interviews. The disadvantage of this method is access to people, as many people may not own telephones. Pilot Survey Once the questionnaire is ready, it is advisable to conduct a try-out with a small group which is known as Pilot Survey or Pre-testing of the questionnaire. The pilot survey helps in providing a preliminary idea about the survey. It helps in pre-testing of the questionnaire, so as to know the shortcomings and drawbacks of the questions. Pilot survey also helps in assessing the suitability of questions, clarity of instructions, performance of enumerators and the cost and time involved in the actual survey. Activities • You have to collect information from a person, who lives in a remote village of India. Which mode of data collection will be appropriate and why? Discuss. • You have to interview the parents about the quality of teaching in a school. If the principal of the school is present there, what types of problems can arise? Disadvantages • Most expensive • Possibility of influencing respondents • More time-taking. • Cannot be used by illiterates • Long response time • Does not allow explanation of unambiguous questions • Reactions cannot be watched. Advantages • Highest Response Rate • Allows use of all types of questions • Better for using open-ended questions • Allows clarification of ambiguous questions. • Least expensive • Only method to reach remote areas • No influence on respondents • Maintains anonymity of respondents • Best for sensitive questions. Personal Interview • Relatively low cost • Relatively less influence on respondents • Relatively high response rate. • Limited use • Reactions cannot be watched • Possibility of influencing respondents. Telephonic Interviews Mailed Interview 2022-23 COLLECTION OF DATA 15 4. CENSUS AND SAMPLE SURVEYS Census or Complete Enumeration A survey, which includes every element of the population, is known as Census or the Method of Complete Enumeration. If certain agencies are interested in studying the total population in India, they have to obtain information from all the households in rural and urban India. It is carried out every ten years. A house-to-house enquiry is carried out, covering all households in India. Demographic data on birth and death rates, literacy, employment, life expectancy, size and composition of population, etc., are collected and published by the Registrar General of India. The last Census of India was held in 2011. According to the Census 2011, population of India was 121.09 crore, which was 102.87 crore in 2001. Census 1901 indicated that the population of the country was 23.83 crore. Since then, in a period of 110 years, the population of the country has increased by more than 97 crore. The average annual growth rate of population which was 2.2 per cent per year in the decade 1971-81 came down to 1.97 per cent in 1991-2001 and 1.64 per cent during 2001-2011. Population and Sample Population or the Universe in statistics means totality of the items under study. Thus, the Population or the Universe is a group to which the results of the study are intended to apply. A population is always all the individuals/items who possess certain characteristics (or a set of characteristics), according to the purpose of the survey. The first task in selecting a sample is to identify the population. Once the population is identified, the researcher selects a method of studying it. If the researcher finds that survey of the whole population is not possible, then he/ she may decide to select a Representative Sample. A sample refers to a group or section of the population from which information is to be obtained. A good sample (representative sample) is generally smaller than the population and is capable of providing reasonably accurate information about the population at a much lower cost and shorter time. 2022-23 16 STATISTICS FOR ECONOMICS Now the question is how do you do the sampling? There are two main types of sampling, random and non-random. Activities • In which years will the next Census be held in India and China? • If you have to study the opinion of students about the new economics textbook of class XI, what will be your population and sample? • If a

researcher wants to estimate the average yield of wheat in Punjab, what will be her/his population and sample? The following description will make their distinction clear. Random Sampling As the name suggests, random sampling is one where the individual units from the population (samples) are selected at random. The government wants to determine the impact of the rise in petrol price on the household budget of a particular locality. For this, a representative (random) sample of 30 households has to be taken and studied. The names of all 300 households of that area are written on paper and mixed, then 30 names to be interviewed are selected one by one. In random sampling, every individual has an equal chance of being selected. In the above example, all 300 sampling units (also called sampling frame) of the population got an equal chance of being included in Suppose you want to study the average income of people in a certain region. According to the Census method, you would be required to find out the income of every individual in the region, add them up and divide by number of individuals to get the average income of people in the region. This method would require huge expenditure, as a large number of enumerators have to be employed. Alternatively, you select a representative sample, of a few individuals, from the region and find out their income. The average income of the selected group of individuals is used as an estimate of average income of the individuals of the entire region. Example • Research problem: To study the economic condition of agricultural labourers in Churachandpur district of Manipur. • Population: All agricultural labourers in Churachandpur district. • Sample: Ten per cent of the agricultural labourers in Churachandpur district. Most of the surveys are sample surveys. These are preferred in statistics because of a number of reasons. A sample can provide reasonably reliable and accurate information at a lower cost and shorter time. As samples are smaller than population, more detailed information can be collected by conducting intensive enquiries. As we need a smaller team of enumerators, it is easier to train them and supervise their work more effectively. 2022-23 COLLECTION OF DATA 17 the sample of 30 units and hence the sample, such drawn, is a random sample. This is also called lottery method. Nowadays computer programmes are used to select random samples. Exit Polls You must have seen that when an election takes place, the television networks provide election coverage. They also try to predict the results. This is done through exit polls, wherein a random sample of voters who exit the polling booths are asked whom they voted for. From the data of the sample of voters, the prediction is made. You might have noticed that exit polls do not always predict correctly. Why? Using the Random Number Tables, how will you select your sample years? Non-Random Sampling There may be a situation that you have to select 10 out of 100 households in a locality. You have to decide which household to select and which to reject. You may select the households conveniently situated or the households known to you or your friend. In this case, you are using your judgement (bias) in selecting 10 households. This way of selecting 10 out of 100 households is not a random selection. In a non-random sampling method all the units of the population do not have an equal chance of being selected and convenience or judgement of the investigator plays an important role in selection of the sample. They are mainly selected on the basis of judgment, purpose, convenience or quota and are nonrandom samples. 5. SAMPLING AND NON-SAMPLING ERRORS Sampling Errors A population consisting of numerical values has two important characteristics which are of relevance here. First, Central Tendency which may be measured by the mean, the median or the mode. Second, Dispersion, which can be measured by caculating the “standard deviation”, ‘‘ mean deviation”, “ range”, etc. A non-representative Sample A Representative Sample A Population of 20 Kuchha and 20 Pucca Houses Activity • You have to analyse the trend of foodgrains production in India for the last fifty years. As it is difficult to collect data for all the years, you are asked to select a sample of production of ten years. 2022-23 18 STATISTICS FOR ECONOMICS The purpose of the sample is to get one or more estimate of the population parameters. Sampling error refers to the difference between the sample estimate and the corresponding population parameter (actual value of the characteristic of the population for example, average income, etc). Thus, the difference between the actual value

of a parameter of the population and its estimate (from the sample) is the sampling error. It is possible to reduce the magnitude of sampling error by taking a larger sample. Example Consider a case of incomes of 5 farmers of Manipur. The variable x (income of farmers) has measure-ments 500, 550, 600, 650, 700. We note that the population average of (500+550+600+650+700) ÷ 5 = 3000 ÷ 5 = 600. Now, suppose we select a sample of two individuals where x has measurements of 500 and 600. The sample average is (500 + 600) ÷ 2 = 1100 ÷ 2 = 550. Here, the sampling error of the estimate = 600 (true value) – 550 (estimate) = 50. Non-Sampling Errors Non-sampling errors are more serious than sampling errors because a sampling error can be minimised by taking a larger sample. It is difficult to minimise non-sampling error, even by taking a large sample. Even a Census can contain non-sampling errors. Some of the non-sampling errors are: Sampling Bias Sampling bias occurs when the sampling plan is such that some members of the target population could not possibly be included in the sample. Non-Response Errors Non-response occurs if an interviewer is unable to contact a person listed in the sample or a person from the sample refuses to respond. In this case, the sample observation may not be representative. Errors in Data Acquisition This type of error arises from recording of incorrect responses. Suppose, the teacher asks the students to measure the length of the teacher's table in the classroom. The measurement by the students may differ. The differences may occur due to differences in measuring tape, carelessness of the students, etc. Similarly, suppose, we want to collect data on prices of oranges. We know that prices vary from shop to shop and from market to market. Prices also vary according to the quality. Therefore, we can only consider the average prices. Recording mistakes can also take place as the enumerators or the respondents may commit errors in recording or transscripting the data, for example, he/ she may record 13 instead of 31. 6. CENSUS OF INDIA AND NSSO There are some agencies both at the national and state level to collect, 2022-23 COLLECTION OF DATA 19 process and tabulate the statistical data. Some of the agencies at the national level are Census of India, National Sample Survey (NSS), Central Statistics Office (CSO), Registrar General of India (RGI), Directorate General of Commercial Intelligence and Statistics (DGCIS), Labour Bureau, etc. The Census of India provides the most complete and continuous demographic record of population. The Census is being regularly conducted every ten years since 1881. The first Census after Independence was conducted in 1951. The Census officials collect information on various aspects of population such as the size, density, sex ratio, literacy, migration, rural-urban distribution, etc. Census data is interpreted and analysed to understand many economic and social issues in India. The NSS was established by the Government of India to conduct nationwide surveys on socio-economic issues. The NSS does continuous surveys in successive rounds. The data collected by NSS are released through reports and its quarterly journal Sarvekshana. NSS provides periodic estimates of literacy, school enrolment, utilisation of educational services, employment, unemployment, manufacturing and service sector enterprises, morbidity, maternity, child care, utilisation of the public distribution system etc. The NSS 60th round survey (January–June 2004) was on morbidity and healthcare. The NSS 68th round survey (2011-12) was on consumer expenditure. The NSS also collects details of industrial activities and retail prices for various goods. They are used by Government of India for planning puposes. 7. CONCLUSION Economic facts, expressed in terms of numbers, are called data. The purpose of data collection is to understand, explain and analyse a problem and causes behind it. Primary data is obtained by conducting a survey. Survey includes various steps, which need to be planned carefully. There are various agencies which collect, process, tabulate and publish statistical data. These are used as secondary data. However, the choice of source of data and mode of data collection depends on the objective of the study. 2022-23 20 STATISTICS FOR ECONOMICS Recap • Data is a tool which helps in reaching a sound conclusion on any problem. • Primary data is based on first hand information. • Survey can be done by personal interviews, mailing questionnaires and telephone interviews. • Census covers every individual/unit belonging to the population. • Sample is a smaller group selected from the population from which

the relevant information would be sought. • In a random sampling, every individual is given an equal chance of being selected for providing information. • Sampling error is due to the difference between the value of the sample estimate and the value of the corresponding population parameter. • Non-sampling errors can arise in data acquisition, by non-response or by bias in selection. • Census of India and National Sample Survey are two important agencies at the national level, which collect, process and tabulate data on many important economic and social issues. EXERCISES 1. Frame at least four appropriate multiple-choice options for following questions: (i) Which of the following is the most important when you buy a new dress? (ii) How often do you use computers? (iii) Which of the newspapers do you read regularly? (iv) Rise in the price of petrol is justified. (v) What is the monthly income of your family? 2. Frame five two-way questions (with 'Yes' or 'No'). 3. State whether the following statements are True or False. (i) There are many sources of data. (ii) Telephone survey is the most suitable method of collecting data, when the population is literate and spread over a large area. (iii) Data collected by investigator is called the secondary data. (iv) There is a certain bias involved in the non-random selection of samples. (v) Non-sampling errors can be minimised by taking large samples. 4. What do you think about the following questions? Do you find any 2022-23 COLLECTION OF DATA 21 problem with these questions? Describe. (i) How far do you live from the closest market? (ii) If plastic bags are only 5 per cent of our garbage, should it be banned? (iii) Wouldn't you be opposed to increase in price of petrol? (iv) Do you agree with the use of chemical fertilisers? (v) Do you use fertilisers in your fields? (vi) What is the yield per hectare in your field? 5. You want to do a research on the popularity of Vegetable Atta Noodles among children. Design a suitable questionnaire for collecting this information. 6. In a village of 200 farms, a study was conducted to find the cropping pattern. Out of the 50 farms surveyed, 50% grew only wheat. What is the population and the sample size? 7. Give two examples each of sample, population and variable. 8. Which of the following methods give better results and why? (a) Census (b) Sample 9. Which of the following errors is more serious and why? (a) Sampling error (b) Non-Sampling error 10. Suppose there are 10 students in your class. You want to select three out of them. How many samples are possible? 11. Discuss how you would use the lottery method to select 3 students out of 10 in your class. 12. Does the lottery method always give you a random sample? Explain. 13. Explain the procedure for selecting a random sample of 3 students out of 10 in your class by using random number tables. 14. Do samples provide better results than surveys? Give reasons for your answer. 2022-23census and sampling. In this chapter, you will know how the data, that you collected, are to be classified. The purpose of classifying raw data is to bring order in them so that they can be subjected to further statistical analysis easily. Have you ever observed your local junk dealer or kabadiwallah to whom you sell old newspapers, broken household items, empty glass bottles, plastics, etc? He purchases these things from you and sells them to those who recycle them. But with so much junk in his shop it would be very difficult for him to manage his trade, if he had not organised them properly. To ease his situation he suitably groups or "classifies" various junk. He puts old newspapers together and Organisation of Data 1. INTRODUCTION In the previous chapter you have learnt about how data is collected. You also came to know the difference between Studying this chapter should enable you to: • classify the data for further statistical analysis; • distinguish between quantitative and qualitative classification; • prepare a frequency distribution table; • know the technique of forming classes; • be familiar with the method of tally marking; • differentiate between univariate and bivariate frequency distributions. CHAPTER 2022-23 ORGANISATION OF DATA 23 ties them with a rope. Then collects all empty glass bottles in a sack. He heaps the articles of metals in one corner of his shop and sorts them into groups like "iron", "copper", "aluminium", "brass" etc., and so on. In this way he groups his junk into different classes — "newspapers, "plastics", "glass", "metals" etc. — and brings order in them. Once his junk is arranged and classified, it becomes easier for him to find a particular item that a buyer may demand. Likewise when you arrange your

schoolbooks in a certain order, it becomes easier for you to handle them. You may classify them according to subjects where each subject becomes a group or a class. So, when you need a particular book on history, for instance, all you need to do is to search that book in the group “History”. Otherwise, you would have to search through your entire collection to find the particular book you are looking for. While classification of objects or things saves our valuable time and effort, it is not done in an arbitrary manner. The kabadiwallah groups his junk according to the markets for reused goods. For example, under the group “Glass” he would put empty bottles, broken mirrors and windowpanes, etc. Similarly when you classify your history books under the group “History” you would not put a book of a different subject in that group. Otherwise the entire purpose of grouping would be lost. Classification, therefore, is arranging or organising things into groups or classes based on some criteria. Activity • Visit your local post-office to find out how letters are sorted. Do you know what the pin-code in a letter indicates? Ask your postman. 2. RAW DATA Like the kabadiwallah’s junk, the unclassified data or raw data are highly disorganised. They are often very large and cumbersome to handle. To draw meaningful conclusions from them is a tedious task because they do not yield to statistical methods easily. Therefore proper organisation and presentation of such data is needed before any systematic statistical analysis is undertaken. Hence after collecting data the next step is to organise and present them in a classified form. Suppose you want to know the performance of students in mathematics and you have collected data on marks in mathematics of 100 students of your school. If you present 2022-23 24 STATISTICS FOR ECONOMICS them as a table, they may appear something like Table 3.1. TABLE 3.1 Marks in Mathematics Obtained by 100 Students in an Examination 47 45 10 60 51 56 66 100 49 40 60 59 56 55 62 48 59 55 51 41 42 69 64 66 50 59 57 65 62 50 64 30 37 75 17 56 20 14 55 90 62 51 55 14 25 34 90 49 56 54 70 47 49 82 40 82 60 85 65 66 49 44 64 69 70 48 12 28 55 65 49 40 25 41 71 80 0 56 14 22 66 53 46 70 43 61 59 12 30 35 45 44 57 76 82 39 32 14 90 25 Or you could have collected data on the monthly expenditure on food of 50 households in your neighbourhood to know their average expenditure on food. The data collected, in that case, had you presented as a table, would have resembled Table 3.2. Both Tables 3.1 and 3.2 are raw or unclassified data. In both the tables you find that Table 3.2 Monthly Household Expenditure (in Rupees) on Food of 50 Households 1904 1559 3473 1735 2760 2041 1612 1753 1855 4439 5090 1085 1823 2346 1523 1211 1360 1110 2152 1183 1218 1315 1105 2628 2712 4248 1812 1264 1183 1171 1007 1180 1953 1137 2048 2025 1583 1324 2621 3676 1397 1832 1962 2177 2575 1293 1365 1146 3222 1396 then you have to first arrange the marks of 100 students either in ascending or in descending order. That is a tedious task. It becomes more tedious, if instead of 100 you have the marks of 1,000 students to handle. Similarly, in Table 3.2, you would note that it is difficult for you to ascertain the average monthly expenditure of 50 households. And this difficulty will go up manifold if the number was larger — say, 5,000 households. Like our kabadiwallah, who would be distressed to find a particular item when his junk becomes large and disarranged, you would face a similar situation when you try to get any information from raw data that are large. In one word, therefore, it is a tedious task to pull information from large unclassified data. The raw data are summarised, and made comprehensible by classification. When facts of similar characteristics are placed in the same class, it enables one to locate them easily, make comparison, and draw inferences without any difficulty. You have numbers are not arranged in any order. Now if you are asked for the highest marks in mathematics from Table 3.1 2022-23 ORGANISATION OF DATA 25 studied in Chapter 2 that the Government of India conducts Census of population every ten years. About 20 crore persons were contacted in Census 2001. The raw data of census are so large and fragmented that it appears an almost impossible task to draw any meaningful conclusion from them. But when the same data is classified according to gender, education, marital status, occupation, etc., the structure and nature of population of India is, then, easily understood. The raw data consist of observations on variables. The raw data as given in Tables 3.1 and 3.2 consist of observations on a specific or group of variables.

Look at Table 3.1 for instance which contains marks in mathematics scored by 100 students. How can we make sense of these marks? The mathematics teacher looking at these marks would be thinking– How have my students done? How many have not passed? How we classify the data depends upon the purpose we have in mind. In this case, the teacher wishes to understand in some depth– how these students have done. She would probably choose to construct the frequency distribution. This is discussed in the next section. Activity • Collect data of total weekly expenditure of your family for a year and arrange it in a table. See how many observations you have. Arrange the data monthly and find the number of observations. 3. CLASSIFICATION OF DATA The groups or classes of a classification is done in various ways. Instead of classifying your books according to subjects — "History", "Geography", "Mathematics", "Science", etc. — you could have classified them author-wise in an alphabetical order. Or, you could have also classified them according to the year of publication. The way you want to classify them would depend on your requirement. Likewise the raw data is classified in various ways depending on the purpose. They can be grouped according to time. Such a classification is known as a Chronological Classification. In such a classification, data are classified either in ascending or in descending order with reference to time such as years, quarters, months, weeks, etc. The following example shows the population of India classified in terms of years. The variable 'population' is a Time Series as it depicts a series of values for different years. Example 1 Population of India (in crores) Year Population (Crores) 1951 35.7 1961 43.8 1971 54.6 1981 68.4 1991 81.8 2001 102.7 2011 121.0 In Spatial Classification the data are classified with reference to geographical locations such as countries, states, cities, districts, etc. 2022-23 26 STATISTICS FOR ECONOMICS Example 2 shows the yeild of wheat in different countries. Example 2 Yield of Wheat for Different Countries (2013) Country Yield of wheat (kg/hectare) Canada 3594 China 5055 France 7254 Germany 7998 India 3154 Pakistan 2787 Source: Indian Agricultural Statistics at a Glance, 2015 Activities • In Example 1, find out the years in which India's population was minimum and maximum, • In Example 2, find the country whose yield of wheat is slightly more than that of India's. How much would that be in terms of percentage? • Arrange the countries of Example 2 in the ascending order of yield. Do the same exercise for the descending order of yield. Sometimes you come across characteristics that cannot be expressed quantitatively. Such characteristics are called Qualities or Attributes. For example, nationality, literacy, religion, gender, marital status, etc. They cannot be measured. Yet these attributes can be classified on the basis of either the presence or the absence of a qualitative characteristic. Such a classification of data on attributes is called a Qualitative Classification. In the following example, we find population of a country is grouped on the basis of the qualitative variable "gender". An observation could either be a male or a female. These two characteristics could be further classified on the basis of marital status as given below: Example 3 Population Male Female Married Unmarried Married Unmarried The classification at the first stage is based on the presence and absence of an attribute, i.e., male or not male (female). At the second stage, each class — male and female, is further subdivided on the basis of the presence or absence of another attribute, i.e., whether married or unmarried. Characteristics, like height, weight, age, income, marks of students, etc., are quantitative in nature. When the collected data of such characteristics are grouped into classes, it becomes a Quantitative Classification. Activity • The objects around can be grouped as either living or non-living. Is it a quantitative classification? 2022-23 ORGANISATION OF DATA 27 Example 4 Frequency Distribution of Marks in Mathematics of 100 Students Marks Frequency 0–10 1 10–20 8 20–30 6 30–40 7 40–50 21 50–60 23 60–70 19 70–80 6 80–90 5 90–100 4 Total 100 Example 4 shows the quantitative classification of marks in mathematics of 100 students given in Table 3.1. Activity • Express the values of frequency of Example 4 as proportion or percentage of total frequency. Note that frequency expressed in this way is known as relative frequency. • In Example 4, which class has the maximum concentration of data? Express it as percentage of total observations. Which class has the minimum concentration of data? 4. VARIABLES:

CONTINUOUS AND DISCRETE A simple definition of variable, which you have read in the last chapter, does not tell you how it varies. Variables differ on the basis of specific criterion. They are broadly classified into two types: (i) Continuous and (ii) Discrete. A continuous variable can take any numerical value. It may take integral values (1, 2, 3, 4, ...), fractional values (1/2, 2/3, 3/4, ...), and values that are not exact fractions (2 =1.414, 3 =1.732, … , 7 =2.645). For example, the height of a student, as he/she grows say from 90 cm to 150 cm, would take all the values in between them. It can take values that are whole numbers like 90cm, 100cm, 108cm, 150cm. It can also take fractional values like 90.85 cm, 102.34 cm, 149.99cm etc. that are not whole numbers. Thus the variable "height" is capable of manifesting in every conceivable value and its values can also be broken down into infinite gradations. Other examples of a continuous variable are weight, time, distance, etc. Unlike a continuous variable, a discrete variable can take only certain values. Its value changes only by finite "jumps". It "jumps" from one value to another but does not take any intermediate value between them. For example, a variable like the "number of students in a class", for different classes, would assume values that are only whole numbers. It cannot take any fractional value like 0.5 because "half of a student" is absurd. Therefore it 2022-23 28 STATISTICS FOR ECONOMICS cannot take a value like 25.5 between 25 and 26. Instead its value could have been either 25 or 26. What we observe is that as its value changes from 25 to 26, the values in between them — the fractions are not taken by it. But we should not have the impression that a discrete variable cannot take any fractional value. Suppose X is a variable that takes values like 1/8, 1/ 16, 1/32, 1/64, ... Is it a discrete variable? Yes, because though X takes fractional values it cannot take any value between two adjacent fractional values. It changes or "jumps" from 1/ 8 to 1/16 and from 1/16 to 1/32. But it cannot take a value in between 1/8 and 1/16 or between 1/16 and 1/32. Activity • Distinguish the following variables as continuous and discrete: Area, volume, temperature, number appearing on a dice, crop yield, population, rainfall, number of cars on road and age. Example 4 shows how the marks of 100 students are grouped into classes. You will be wondering as to how we got it from the raw data of Table 3.1. But, before we address this question, you must know what a frequency distribution is. 5. WHAT IS A FREQUENCY DISTRIBUTION? A frequency distribution is a comprehensive way to classify raw data of a quantitative variable. It shows how different values of a variable (here, the marks in mathematics scored by a student) are distributed in different classes along with their corresponding class frequencies. In this case we have ten classes of marks: 0–10, 10–20, … , 90–100. The term Class Frequency means the number of values in a particular class. For example, in the class 30– 40 we find 7 values of marks from raw data in Table 3.1. They are 30, 37, 34, 30, 35, 39, 32. The frequency of the class: 30–40 is thus 7. But you might be wondering why 40–which is occurring twice in the raw data – is not included in the class 30– 40. Had it been included the class frequency of 30–40 would have been 9 instead of 7. The puzzle would be clear to you if you are patient enough to read this chapter carefully. So carry on. You will find the answer yourself. Each class in a frequency distribution table is bounded by Class Limits. Class limits are the two ends of a class. The lowest value is called the Lower Class Limit and the highest value the Upper Class Limit. For example, the class limits for the class: 60–70 are 60 and 70. Its lower class limit is 60 and its upper class limit is 70. Class Interval or Class Width is the difference between the upper class limit and the lower class limit. For the class 60–70, the class interval is 10 (upper class limit minus lower class limit). 2022-23 ORGANISATION OF DATA 29 The Class Mid-Point or Class Mark is the middle value of a class. It lies halfway between the lower class limit and the upper class limit of a class and can be ascertained in the following manner: Class Mid-Point or Class Mark = (Upper Class Limit + Lower Class Limit)/2 The class mark or mid-value of each class is used to represent the class. Once raw data are grouped into classes, individual observations are not used in further calculations. Instead, the class mark is used. TABLE 3.3 The Lower Class Limits, the Upper Class Limits and the Class Mark Class Frequency Lower Upper Class Class Class Mark Limit Limit 0–10 1 0 10 5 10–20 8 10 20 15 20–30 6 20 30 25 30–40 7 30

40 35 40–50 21 40 50 45 50–60 23 50 60 55 60–70 19 60 70 65 70–80 6 70 80 75 80–90 5 80 90 85 90–100 4 90 100 95 Frequency Curve is a graphic representation of a frequency distribution. Fig. 3.1 shows the diagrammatic presentation of the frequency distribution of the data in our example above. To obtain the frequency curve we plot the class marks on the X-axis and frequency on the Yaxis. Fig.3.1: Diagrammatic Presentation of Frequency Distribution of Data. How to prepare a Frequency Distribution? While preparing a frequency distribution, the following five questions need to be addressed: 1. Should we have equal or unequal sized class intervals? 2. How many classes should we have? 3. What should be the size of each class? 4. How should we determine the class limits? 5. How should we get the frequency for each class? Should we have equal or unequal sized class intervals? There are two situations in which unequal sized intervals are used. First, when we have data on income and other similar variables where the range is very high. For example, income per day may range from nearly Zero to many hundred crores of rupees. In such a situation, equal class intervals are not suitable because (i) if the class 2022-23 30 STATISTICS FOR ECONOMICS intervals are of moderate size and equal, there would be a large number of classes. (ii) If class intervals are large, we would tend to suppress information on either very small levels or very high levels of income. Second, if a large number of values are concentrated in a small part of the range, equal class intervals would lead to lack of information on many values. In all other cases, equal sized class intervals are used in frequency distributions. How many classes should we have? The number of classes is usually between six and fifteen. In case, we are using equal sized class intervals then number of classes can be the calculated by dividing the range (the difference between the largest and the smallest values of variable) by the size of the class intervals. Activities Find the range of the following: • population of India in Example 1, • yield of wheat in Example 2. What should be the size of each class? The answer to this question depends on the answer to the previous question. Given the range of the variable, we can determine the number of classes once we decide the class interval. Thus, we find that these two decisions are interlinked. We cannot decide on one without deciding on the other. In Example 4, we have the number of classes as 10. Given the value of range as 100, the class intervals are automatically 10. Note that in the present context we have chosen class intervals that are equal in magnitude. However, we could have chosen class intervals that are not of equal magnitude. In that case, the classes would have been of unequal width. How should we determine the class limits? Class limits should be definite and clearly stated. Generally, open-ended classes such as “70 and over” or “less than 10” are not desirable. The lower and upper class limits should be determined in such a manner that frequencies of each class tend to concentrate in the middle of the class intervals. Class intervals are of two types: (i) Inclusive class intervals: In this case, values equal to the lower and upper limits of a class are included in the frequency of that same class. (ii) Exclusive class intervals: In this case, an item equal to either the upper or the lower class limit is excluded from the frequency of that class. In the case of discrete variables, both exclusive and inclusive class intervals can be used. 2022-23 ORGANISATION OF DATA 31 In the case of continuous variables, inclusive class intervals are used very often. Examples Suppose we have data on marks obtained by students in a test and all the marks are in full numbers (fractional marks are not allowed). Suppose the marks obtained by the students vary from 0 to 100. This is a case of a discrete variables since fractional marks are not allowed. In this case, if we are using equal sized class intervals and decide to have 10 class intervals then the class intervals can take either of the following forms: Inclusive form of class intervals: 0-10 11-20 21-30 - - 91-100 Exclusive form of class intervals: 0-10 10-20 20-30 - - 90-100 In the case of exclusive class intervals, we have to decide in advance what is to be done if we get a value equal to the value of a class limit. For example we could decide that values such as 10, 30 etc., should be put into the class intervals “0 to 10” and “20 to 30” respectively. This can be called the case of lower limit excluded. Or else we could put the values 10, 30 etc., into the class intervals “10 to 20” and “30 to 40” respectively. This can be called the case of upper limit excluded. Example of

Continuous Variable Suppose we have data on a variable such as height (centimeters) or weight (kilograms). This data is of the continuous type. In such cases the class intervals may be defined in the following manner: 30 Kg - 39.999... Kg 40 Kg - 49.999... Kg 50 Kg - 59.999... Kg etc. These class intervals are understood in the following manner: 30 Kg and above and under 40 Kg 40 Kg and above and under 50 Kg 50 Kg and above and under 60 Kg, etc. TABLE 3.4 Frequency Distribution of Incomes of 550 Employees of a Company Income (Rs) Number of Employees 800–899 50 900–999 100 1000–1099 200 1100–1199 150 1200–1299 40 1300–1399 10 Total 550 2022-23 32 STATISTICS FOR ECONOMICS Adjustment in Class Interval A close observation of the Inclusive Method in Table 3.4 would show that though the variable "income" is a continuous variable, no such continuity is maintained when the classes are made. We find "gap" or discontinuity between the upper limit of a class and the lower limit of the next class. For example, between the upper limit of the first class: 899 and the lower limit of the second class: 900, we find a "gap" of 1. Then how do we ensure the continuity of the variable while classifying data? This is achieved by making an adjustment in the class interval. The adjustment is done in the following way: 1. Find the difference between the lower limit of the second class and the upper limit of the first class. For example, in Table 3.4 the lower limit of the second class is 900 and the upper limit of the first class is 899. The difference between them is 1, i.e. (900 – 899 = 1) 2. Divide the difference obtained in (1) by two i.e. (1/2 = 0.5) 3. Subtract the value obtained in (2) from lower limits of all classes (lower class limit – 0.5) 4. Add the value obtained in (2) to upper limits of all classes (upper class limit + 0.5). After the adjustment that restores continuity of data in the frequency distribution, the Table 3.4 is modified into Table 3.5 After the adjustments in class limits, the equality (1) that determines the value of class-mark would be modified as the following: Adjusted Class Mark = (Adjusted Upper Class Limit + Adjusted Lower Class Limit)/2. TABLE 3.5 Frequency Distribution of Incomes of 550 Employees of a Company Income (Rs) Number of Employees 799.5–899.5 50 899.5–999.5 100 999.5–1099.5 200 1099.5–1199.5 150 1199.5–1299.5 40 1299.5–1399.5 10 Total 550 How should we get the frequency for each class? In simple terms, frequency of an observation means how many times that observation occurs in the raw data. In our Table 3.1, we observe that the value 40 occurs thrice; 0 and 10 occur only once; 49 occurs five times and so on. Thus the frequency of 40 is 3, 0 is 1, 10 is 1, 49 is 5 and so on. But when the data are grouped into classes as in example 3, the Class Frequency refers to the number of values in a particular class. The counting of class frequency is done by tally marks against the particular class. Finding class frequency by tally marking A tally (/) is put against a class for each student whose marks are included in that class. For example, if the marks 2022-23 ORGANISATION OF DATA 33 obtained by a student are 57, we put a tally (/) against class 50 –60. If the marks are 71, a tally is put against the class 70–80. If someone obtains 40 marks, a tally is put against the class 40–50. Table 3.6 shows the tally marking of marks of 100 students in mathematics from Table 3.1. The counting of tally is made easier when four of them are put as //// and the fifth tally is placed across them as . Tallies are then counted as groups of five. So if there are 16 tallies in a class, we put them as / for the sake of convenience. Thus frequency in a class is equal to the number of tallies against that class. Loss of Information The classification of data as a frequency distribution has an inherent shortcoming. While it summarises the raw data making it concise and comprehensible, it does not show the details that are found in raw data. There is a loss of information in classifying raw data though much is gained by summarising it as a classified data. Once the data are grouped into classes, an individual observation has no significance in further statistical calculations. In Example 4, the class 20–30 contains 6 observations: 25, 25, 20, 22, 25 and 28. So when these data are grouped as a class 20–30 in the frequency distribution, the latter provides only the number of records in that class (i.e. frequency = 6) but not their actual values. All values in this class are assumed to be equal to the middle value of the class interval or class mark (i.e. 25). Further statistical calculations are based only on the TABLE 3.6 Tally Marking of Marks of 100 Students in Mathematics Class Observations Tally

Frequency Class Mark Mark 0–10 0 / 1 5 10–20 10, 14, 17, 12, 14, 12, 14, 14 //// /// 8 15 20–30 25, 25, 20, 22, 25, 28 //// / 6 25 30–40 30, 37, 34, 39, 32, 30, 35, //// // 7 35 40–50 47, 42, 49, 49, 45, 45, 47, 44, 40, 44, //// //// //// 49, 46, 41, 40, 43, 48, 48, 49, 49, 40, //// / 41 21 45 50–60 59, 51, 53, 56, 55, 57, 55, 51, 50, 56, //// //// //// 59, 56, 59, 57, 59, 55, 56, 51, 55, 56, //// /// 55, 50, 54 23 55 60–70 60, 64, 62, 66, 69, 64, 64, 60, 66, 69, //// //// //// 62, 61, 66, 60, 65, 62, 65, 66, 65 //// 19 65 70–80 70, 75, 70, 76, 70, 71 ///// 6 75 80–90 82, 82, 82, 80, 85 //// 5 85 90–100 90, 100, 90, 90 //// 4 95 Total 100 2022-23 34 STATISTICS FOR ECONOMICS TABLE 3.7 Frequency Distribution of Unequal Classes Class Observations Frequency Class Mark 0–10 0 1 5 10–20 10, 14, 17, 12, 14, 12, 14, 14 8 15 20–30 25, 25, 20, 22, 25, 28 6 25 30–40 30, 37, 34, 39, 32, 30, 35, 7 35 40–45 42, 44, 40, 44, 41, 40, 43, 40, 41 9 42.5 45–50 47, 49, 49, 45, 45, 47, 49, 46, 48, 48, 49, 49 12 47.5 50–55 51, 53, 51, 50, 51, 50, 54 7 52.5 55–60 59, 56, 55, 57, 55, 56, 59, 56, 59, 57, 59, 55, 56, 55, 56, 55 16 57.5 60–65 60, 64, 62, 64, 64, 60, 62, 61, 60, 62, 10 62.5 65–70 66, 69, 66, 69, 66, 65, 65, 66, 65 9 67.5 70–80 70, 75, 70, 76, 70, 71 6 75 80–90 82, 82, 82, 80, 85 5 85 90–100 90, 100, 90, 90 4 95 Total 100 values of class mark and not on the values of the observations in that class. This is true for other classes as well. Thus the use of class mark instead of the actual values of the observations in statistical methods involves considerable loss of information. However, being able to make more sense of the raw data as shown more than makes this up. Frequency distribution with unequal classes By now you are familiar with frequency distributions of equal class intervals. You know how they are constructed out of raw data. But in some cases frequency distributions with unequal class intervals are more appropriate. If you observe the frequency distribution of Example 4, as in Table 3.6, you will notice that most of the observations are concentrated in classes 40–50, 50–60 and 60–70. Their respective frequencies are 21, 23 and 19. It means that out of 100 students, 63 (21+23+19) students are concentrated in these classes. Thus, 63 per cent are in the middle range of 40-70. The remaining 37 per cent of data are in classes 0–10, 10–20, 20–30, 30–40, 70–80, 80–90 and 90–100. These classes are sparsely populated with observations. Further you will also notice that observations in these classes deviate more from their respective class marks than in comparison to those in other classes. But if classes are to be formed in such a way that class marks coincide, as far as possible, to a value around which the observations in a 2022-23 ORGANISATION OF DATA 35 class tend to concentrate, then unequal class interval is more appropriate. Table 3.7 shows the same frequency distribution of Table 3.6 in terms of unequal classes. Each of the classes 40– 50, 50–60 and 60–70 are split into two class 40–50 is divided into 40–45 and 45– 50. The class 50–60 is divided into 50– 55 and 55–60. And class 60–70 is divided into 60–65 and 65–70. The new classes 40–45, 45–50, 50–55, 55–60, 60–65 and 65–70 have class interval of 5. The other classes: 0–10, 10–20, 20–30, 30–40, 70– 80, 80–90 and 90–100 retain their old class interval of 10. The last column of this table shows the new values of class marks for these classes. Compare them with the old values of class marks in Table 3.6. Notice that the observations in these classes deviated more from their old class mark values than their new class mark values. Thus the new class mark values are more representative of the data in these classes than the old values. Figure 3.2 shows the frequency curve of the distribution in Table 3.7. The class marks of the table are plotted on X-axis and the frequencies are plotted on Y-axis. Activity • If you compare Figure 3.2 with Figure 3.1, what do you observe? Do you find any difference between them? Can you explain the difference? Frequency array So far we have discussed the classification of data for a continuous variable using the example of percentage marks of 100 students in mathematics. For a discrete variable, the classification of its data is known as a Frequency Array. Since a discrete variable takes values and not intermediate fractional values between two integral values, we have frequencies that correspond to each of its integral values. The example in Table 3.8 illustrates a Frequency Array. Table 3.8 Frequency Array of the Size of Households Size of the Number of Household Households 1 5 2 15 3 25 4 35 5 10 6 5 7 3 8 2 Fig. 3.2: Frequency Curve Total 100 2022-23 36 STATISTICS FOR ECONOMICS TABLE 3.9 Bivariate Frequency Distribution of Sales (in Lakh

Rs) and Advertisement Expenditure (in Thousand Rs) of 20 Firms 115–125 125–135 135–145 145–155 155–165 165–175 Total 62–64 2 1 3 64–66 1 3 4 66–68 1 1 2 1 5 68–70 2 2 4 70–72 1 1 1 1 4 Total 4 5 6 3 1 1 20 The variable “size of the household” is a discrete variable that only takes integral values as shown in the table. 6. BIVARIATE FREQUENCY DISTRIBUTION Very often when we take a sample from a population we collect more than one type of information from each element of the sample. For example, suppose we have taken sample of 20 companies from the list of companies based in a city. Suppose that we collect information on sales and expenditure on advertisements from each company. In this case, we have bivariate sample data. Such bivariate data can be summarised using a Bivariate Frequency Distribution. A Bivariate Frequency Distribution can be defined as the frequency distribution of two variables. Table 3.9 shows the frequency distribution of two variables, sales and advertisement expenditure (in Rs. lakhs) of 20 companies. The values of sales are classed in different columns and the values of advertisement expenditure are classed in different rows. Each cell shows the frequency of the corresponding row and column values. For example, there are 3 firms whose sales are between Rs 135 and Rs145 lakh and their advertisement expenditures are between Rs 64 and Rs 66 thousand. The use of a bivariate distribution would be taken up in Chapter 8 on correlation. 7. CONCLUSION The data collected from primary and secondary sources are raw or unclassified. Once the data are collected, the next step is to classify them for further statistical analysis. Classification brings order in the data. The chapter enables you to know how data can be classified through frequency distribution in a comprehensive manner. Once you know the techniques of classification, it will be easy for you to construct a frequency distribution, both for continuous and discrete variables. 2022-23 ORGANISATION OF DATA 37 Recap • Classification brings order to raw data. • A Frequency Distribution shows how the different values of a variable are distributed in different classes along with their corresponding class frequencies. • Either the upper class limit or the lower class limit is excluded in the Exclusive Method. • Both the upper and the lower class limits are included in the Inclusive Method. • In a Frequency Distribution, further statistical calculations are based only on the class mark values, instead of values of the observations. • The classes should be formed in such a way that the class mark of each class comes as close as possible, to a value around which the observations in a class tend to concentrate. EXERCISES 1. Which of the following alternatives is true? (i) The class midpoint is equal to: (a) The average of the upper class limit and the lower class limit. (b) The product of upper class limit and the lower class limit. (c) The ratio of the upper class limit and the lower class limit. (d) None of the above. (ii) The frequency distribution of two variables is known as (a) Univariate Distribution (b) Bivariate Distribution (c) Multivariate Distribution (d) None of the above (iii) Statistical calculations in classified data are based on (a) the actual values of observations (b) the upper class limits (c) the lower class limits (d) the class midpoints (iv) Range is the (a) difference between the largest and the smallest observations (b) difference between the smallest and the largest observations (c) average of the largest and the smallest observations (d) ratio of the largest to the smallest observation 2022-23 38 STATISTICS FOR ECONOMICS 2. Can there be any advantage in classifying things? Explain with an example from your daily life. 3. What is a variable? Distinguish between a discrete and a continuous variable. 4. Explain the ‘exclusive’ and ‘inclusive’ methods used in classification of data. 5. Use the data in Table 3.2 that relate to monthly household expenditure (in Rs) on food of 50 households and (i) Obtain the range of monthly household expenditure on food. (ii) Divide the range into appropriate number of class intervals and obtain the frequency distribution of expenditure. (iii) Find the number of households whose monthly expenditure on food is (a) less than Rs 2000 (b) more than Rs 3000 (c) between Rs 1500 and Rs 2500 6. In a city 45 families were surveyed for the number of Cell phones they used. Prepare a frequency array based on their replies as recorded below. 1 3 2 222121223333 332322616215153 242742434203143 7. What is ‘loss of information’ in classified data? 8. Do you agree that classified data is better than raw data? Why? 9. Distinguish between univariate and

bivariate frequency distribution. 10. Prepare a frequency distribution by inclusive method taking class interval of 7 from the following data. 28 17 15 22 29 21 23 27 18 12 7294 183 10 5 20 16 12 8 4 33 27 21 15 3 36 27 18 9246 32 31 29 18 14 13 15 11 9715 37 32 28 26 24 20 19 25 19 20 6 9 11. “The quick brown fox jumps over the lazy dog” Examine the above sentence carefully and note the numbers of letters in each word. Treating the number of letters as a variable, prepare a frequency array for this data. 2022-23 ORGANISATION OF DATA 39 Suggested Activity • From your old mark-sheets find the marks that you obtained in mathematics in the previous class half yearly or annual examinations. Arrange them year-wise. Check whether the marks you have secured in the subject is a variable or not. Also see, if over the years, you have improved in mathematics. 2022-23Presentation of Data 1. INTRODUCTION You have already learnt in previous chapters how data are collected and organised. As data are generally voluminous, they need to be put in a compact and presentable form. This chapter deals with presentation of data precisely so that the voluminous data collected could be made usable readily and are easily comprehended. There are generally three forms of presentation of data: • Textual or Descriptive presentation • Tabular presentation • Diagrammatic presentation. 2. TEXTUAL PRESENTATION OF DATA In textual presentation, data are described within the text. When the quantity of data is not too large this form of presentation is more suitable. Look at the following cases: Case 1 In a bandh call given on 08 September 2005 protesting the hike in prices of petrol and diesel, 5 petrol pumps were found open and 17 were closed whereas 2 schools were closed and remaining 9 schools were found open in a town of Bihar. Studying this chapter should enable you to: • present data using tables; • represent data using appropriate diagrams. CHAPTER 2022-23 PRESENTATION OF DATA 41 Case 2 Census of India 2001 reported that Indian population had risen to 102 crore of which only 49 crore were females against 53 crore males. Seventy-four crore people resided in rural India and only 28 crore lived in towns or cities. While there were 62 crore non-worker population against 40 crore workers in the entire country. Urban population had an even higher share of non-workers (19 crore) against workers (9 crore) as compared to the rural population where there were 31 crore workers out of a 74 crore population... In both the cases data have been presented only in the text. A serious drawback of this method of presentation is that one has to go through the complete text of presentation for comprehension. But, it is also true that this matter often enables one to emphasise certain points of the presentation. and columns (read vertically). For example see Table 4.1 tabulating information about literacy rates. It has three rows (for male, female and total) and three columns (for urban, rural and total). It is called a 3 × 3 Table giving 9 items of information in 9 boxes called the "cells" of the Table. Each cell gives information that relates an attribute of gender ("male", "female" or total) with a number (literacy percentages of rural people, urban people and total). The most important advantage of tabulation is that it organises data for further statistical treatment and decisionmaking. Classification used in tabulation is of four kinds: • Qualitative • Quantitative • Temporal and • Spatial Qualitative classification When classification is done according to attributes, such as social status, physical status, nationality, etc., it is called qualitative classification. For example, in Table 4.1 the attributes for classification are sex and location which are qualitative in nature. TABLE 4.1 Literacy in India by sex and location (per cent) Location Total Sex Rural Urban Male 79 90 82 Female 59 80 65 Total 68 84 74 Source: Census of India 2011. (Literacy rates relate to population aged 7 years and above) 3. TABULAR PRESENTATION OF DATA In a tabular presentation, data are presented in rows (read horizontally) 2022-23 42 STATISTICS FOR ECONOMICS Quantitative classification In quantitative classification, the data are classified on the basis of characteristics which are quantitative in nature. In other words these characteristics can be measured quantitatively. For example, age, height, production, income, etc are quantitative characteristics. Classes are formed by assigning limits called class limits for the values of the characteristic under consideration. An example of quantitative classification is given in Table 4.2. Calculate the missing figures in the Table. TABLE 4.2 Distribution of 542 respondents by their age in

an election study in Bihar Age group No. of (yrs) respondents Per cent 20–30 3 0.55 30–40 61 11.25 40–50 132 24.35 50–60 153 28.24 60–70 ? ? 70–80 51 9.41 80–90 2 0.37 All ? 100.00 Source: Assembly election Patna central constituency 2005, A.N. Sinha Institute of Social Studies, Patna. Here classifying characteristic is age in years and is quantifiable. Activities • Discuss how the total values are arrived at in Table 4.1 • Construct a table presenting data on preferential liking of the students of your class for Star News, Zee News, BBC World, CNN, Aaj Tak and DD News. • Prepare a table of (i) heights (in cm) and (ii) weights (in kg) of students of your class. Temporal classification In this classification time becomes the classifying variable and data are categorised according to time. Time may be in hours, days, weeks, months, years, etc. For example, see Table 4.3. TABLE 4.3 Yearly sales of a tea shop from 1995 to 2000 Years Sale (Rs in lakhs) 1995 79.2 1996 81.3 1997 82.4 1998 80.5 1999 100.2 2000 91.2 Data Source: Unpublished data. In this table the classifying characteristic is sales in a year and takes values in the scale of time. Activity • Go to your school office and collect data on the number of students studied in the school in each class for the last ten years and present the data in a table. Spatial classification When classification is done on the basis of place, it is called spatial classification. The place may be a village/town, block, district, state, country, etc. Table 4.4 is an example of spatial classification. 2022-23 PRESENTATION OF DATA 43 TABLE 4.4 Export from India to rest of the world in 2013-14 as share of total export (per cent) Destination Export share USA 12.5 Germany 2.4 Other EU 10.9 UK 3.1 Japan 2.2 Russia 0.7 China 4.7 West Asia -Gulf Coop. Council 15.3 Other Asia 29.4 Others 18.8 All 100.0 (Total Exports: US $ 314.40 billion) Activity • Construct a table presenting data collected from students of your class according to their native states/residential locality. 4. TABULATION OF DATA AND PARTS OF A TABLE To construct a table it is important to learn first what are the parts of a good statistical table. When put together systematically these parts form a table. The most simple way of conceptualising a table is to present the data in rows and columns alongwith some explanatory notes. Tabulation can be done using one-way, two-way or threeway classification depending upon the number of characteristics involved. A good table should essentially have the following: (i) Table Number Table number is assigned to a table for identification purpose. If more than one table is presented, it is the table number that distinguishes one table from another. It is given at the top or at the beginning of the title of the table. Generally, table numbers are whole numbers in ascending order if there are many tables in a book. Subscripted numbers, like 1.2, 3.1, etc., are also used for identifying the table according to its location. For example, Table 4.5 should be read as the fifth table of the fourth chapter, and so on (See Table 4.5). (ii) Title The title of a table narrates about the contents of the table. It has to be clear, brief and carefully worded so that the interpretations made from the table are clear and free from ambiguity. It finds place at the head of the table succeeding the table number or just below it (See Table 4.5). (iii) Captions or Column Headings At the top of each column in a table a column designation is given to explain figures of the column. This is called caption or column heading (See Table 4.5). (iv) Stubs or Row Headings Like a caption or column heading, each row of the table has to be given a heading. The designations of the rows are also called stubs or stub items, and the complete left column is known as 2022-23 44 STATISTICS FOR ECONOMICS stub column. A brief description of the row headings may also be given at the left hand top in the table. (See Table 4.5). (v) Body of the Table Body of a table is the main part and it contains the actual data. Location of any one figure/data in the table is fixed and determined by the row and column of the table. For example, data in the second row and fourth column indicate that 25 crore females in rural India were non-workers in 2001 (See Table 4.5). (vi) Unit of Measurement The unit of measurement of the figures in the table (actual data) should always be stated alongwith the title. If different units are there for rows or columns of the table, these units must be stated alongwith ‘stubs’ or ‘captions’. If figures are large, they should be rounded up and the method (Note : Table 4.5 presents the same data in tabular form already presented through case 2 in textual presentation of data) Table 4.5 Population of India according to workers and non-workers by

gender and location, 2001 Location Gender Workers Non-worker Total Main Marginal Total Male 17 3 20 18 38 Female 6 5 11 25 36 Total 23 8 31 43 74 Male 7 18 7 15 Female 1 01 12 13 Total 8 19 19 28 Male 24 4 28 25 53 Female 7 5 12 37 49 Total 31 9 40 62 102 Source : Census of India 2001 Note : Figures are rounded to nearest crore All Urban Rural Body of the table ← Note ↑ Source ↑ Row Headings/stubs → ↑ Units (Crore) ↓ Column Headings/Captions ↓ Title ↓ Table Number 2022-23 PRESENTATION OF DATA 45 of rounding should be indicated (See Table 4.5). (vii) Source It is a brief statement or phrase indicating the source of data presented in the table. If more than one source is there, all the sources are to be written in the source. Source is generally written at the bottom of the table. (See Table 4.5). (viii)Note Note is the last part of the table. It explains the specific feature of the data content of the table which is not self explanatory and has not been explained earlier. Activities • How many rows and columns are essentially required to form a table? • Can the column/row headings of a table be quantitative? • Can you present tables 4.2 and 4.3 after rounding off figures appropriately. • Present the first two sentences of case 2 on p.41 as a table. Some details for this would be found elsewhere in this chapter. 5. DIAGRAMMATIC PRESENTATION OF DATA This is the third method of presenting data. This method provides the quickest understanding of the actual situation to be explained by data in comparison to tabular or textual presentations. Diagrammatic presentation of data translates quite effectively the highly abstract ideas contained in numbers into more concrete and easily comprehensible form. Diagrams may be less accurate but are much more effective than tables in presenting the data. There are various kinds of diagrams in common use. Amongst them the important ones are the following: (i) Geometric diagram (ii) Frequency diagram (iii) Arithmetic line graph Geometric Diagram Bar diagram and pie diagram come in the category of geometric diagram. The bar diagrams are of three types — simple, multiple and component bar diagrams. Bar Diagram Simple Bar Diagram Bar diagram comprises a group of equispaced and equiwidth rectangular bars for each class or category of data. Height or length of the bar reads the magnitude of data. The lower end of the bar touches the base line such that the height of a bar starts from the zero unit. Bars of a bar diagram can be visually compared by their relative height and accordingly data are comprehended quickly. Data for this can be of frequency or non-frequency type. In non-frequency type data a particular characteristic, say production, yield, population, etc. at various points of time or of different states are noted and corresponding bars are made of the respective heights according to the values of the characteristic to construct the diagram. The values of the characteristics (measured or counted) 2022-23 46 STATISTICS FOR ECONOMICS retain the identity of each value. Figure 4.1 is an example of a bar diagram. Activity • Collect the number of students in each class studying in the current year in your school. Draw a bar diagram for the same table. Different types of data may require different modes of diagrammatical representation. Bar diagrams are suitable both for frequency type and non-frequency type variables and attributes. Discrete variables like family size, spots on a dice, grades in an examination, etc. and attributes such as gender, religion, caste, country, etc. can be represented by bar diagrams. Bar diagrams are more convenient for non-frequency data such as incomeexpenditure profile, export/imports over the years, etc. A category that has a longer bar (literacy of Kerala) than another category (literacy of West Bengal), has more of the measured (or enumerated) characteristics than the other. Bars (also called columns) are usually used in time series data (food grain produced between 1980 and 2000, decadal variation in work participation TABLE 4.6 Literacy Rates of Major States of India 2001 2011 Major Indian States Male Female Male Female Andhra Pradesh (AP) 70.3 50.4 75.6 59.7 Assam (AS) 71.3 54.6 78.8 67.3 Bihar (BR) 59.7 33.1 73.4 53.3 Jharkhand (JH) 67.3 38.9 78.4 56.2 Gujarat (GJ) 79.7 57.8 87.2 70.7 Haryana (HR) 78.5 55.7 85.3 66.8 Karnataka (KA) 76.1 56.9 82.9 68.1 Kerala (KE) 94.2 87.7 96.0 92.0 Madhya Pradesh (MP) 76.1 50.3 80.5 60.0 Chhattisgarh (CH) 77.4 51.9 81.5 60.6 Maharashtra (MR) 86.0 67.0 89.8 75.5 Odisha (OD) 75.3 50.5 82.4 64.4 Punjab (PB) 75.2 63.4 81.5 71.3 Rajasthan (RJ) 75.7 43.9 80.5 52.7 Tamil Nadu (TN) 82.4 64.4 86.8 73.9 Uttar Pradesh (UP) 68.8

42.2 79.2 59.3 Uttarakhand (UK) 83.3 59.6 88.3 70.7 West Bengal (WB) 77.0 59.6 82.7 71.2 India 75.3 53.7 82.1 65.5 2022-23 PRESENTATION OF DATA 47 Fig. 4.1: Bar diagram showing male literacy rates of major states of India, 2011. (Literacy rates relate to population aged 7 years and above) rate, registered unemployed over the years, literacy rates, etc.) (Fig 4.2). Bar diagrams can have different forms such as multiple bar diagram and component bar diagram. Activities • How many states (among the major states of India) had higher female literacy rate than the national average in 2011? • Has the gap between maximum and minimum female literacy rates over the states in two consecutive census years 2001 and 2011 declined? Multiple Bar Diagram Multiple bar diagrams (Fig.4.2) are used for comparing two or more sets of data, for example income and expenditure or import and export for different years, marks obtained in different subjects in different classes, etc. Component Bar Diagram Component bar diagrams or charts (Fig.4.3), also called sub-diagrams, are very useful in comparing the sizes of different component parts (the elements or parts which a thing is made up of) and also for throwing light on the relationship among these integral parts. For example, sales proceeds from different products, expenditure pattern in a typical Indian family (components being food, rent, medicine, education, power, etc.), budget outlay for receipts and expenditures, components of labour force, population etc. Component bar diagrams are usually shaded or coloured suitably. 2022-23 48 STATISTICS FOR ECONOMICS TABLE 4.7 Enrolment by gender at schools (per cent) of children aged 6–14 years in a district of Bihar Gender Enrolled Out of school (per cent) (per cent) Boy 91.5 8.5 Girl 58.6 41.4 All 78.0 22.0 Data Source: Unpublished data A component bar diagram shows the bar and its sub-divisions into two or more components. For example, the bar might show the total population of children in the age-group of 6–14 years. The components show the proportion of those who are enrolled and those who are not. A component bar diagram might also contain different component bars for boys, girls and the total of children in the given age group range, as shown in Figure 4.3. To construct a component bar diagram, first of all, a bar is constructed on the x-axis with its height equivalent to the total value of the bar [for per cent data the bar height is of 100 units (Figure 4.3)]. Otherwise the height is equated to total value of the bar and proportional heights of the components are worked out using unitary method. Smaller components are given priority in parting the bar. Fig. 4.2: Multiple bar (column) diagram showing female literacy rates over two census years 2001 and 2011 by major states of India. (Data Source Table 4.6) Interpretation: It can be very easily derived from Figure 4.2 that female literacy rate over the years was on increase throughout the country. Similar other interpretations can be made from the figure. For example, the figure shows that the states of Bihar, Jharkhand and Uttar Pradesh experienced the sharpest rise in female literacy, etc. Fig. 4.3: Enrolment at primary level in a district of Bihar (Component Bar Diagram) 2022-23 PRESENTATION OF DATA 49 Pie Diagram A pie diagram is also a component diagram, but unlike a bar diagram, here it is a circle whose area is proportionally divided among the components (Fig.4.4) it represents. It is also called a pie chart. The circle is divided into as many parts as there are components by drawing straight lines from the centre to the circumference. Pie charts usually are not drawn with absolute values of a category. The values of each category are first expressed as percentage of the total value of all the categories. A circle in a pie chart, irrespective of its value of radius, is thought of having 100 equal parts of 3.6° (360°/100) each. To find out the angle, the component shall subtend at the centre of the circle, each percentage figure of every component is multiplied by 3.6°. An example of this conversion of percentages of components into angular components of the circle is shown in Table 4.8. It may be interesting to note that data represented by a component bar diagram can also be represented equally well by a pie chart, the only requirement being that absolute values of the components have to be converted into percentages before they can be used for a pie diagram. TABLE 4.8 Distribution of Indian population (2011) by their working status (crores) Status Population Per cent Angular Component Marginal Worker 12 9.9 36° Main Worker 36 29.8 107° Non-worker 73 60.3 217° All 102 100.0 360°

Activities • Represent data presented through Figure 4.4 by a component bar diagram. • Does the area of a pie have any bearing on the total value of the data to be represented by the pie diagram? Fig. 4.4: Pie diagram for different categories of Indian population according to working status 2011. 2022-23 50 STATISTICS FOR ECONOMICS Frequency Diagram Data in the form of grouped frequency distributions are generally represented by frequency diagrams like histogram, frequency polygon, frequency curve and ogive. Histogram A histogram is a two dimensional diagram. It is a set of rectangles with base as the intervals between class boundaries (along X-axis) and with areas proportional to the class frequency (Fig.4.5). If the class intervals are of equal width, which they generally are, the area of the rectangles are proportional to their respective frequencies. However, in some type of data, it is convenient, at times necessary, to use varying width of class intervals. For example, when tabulating deaths by age at death, it would be very meaningful as well as useful too to have very short age intervals (0, 1, 2, ..., yrs/ 0, 7, 28, ..., days) at the beginning when death rates are very high compared to deaths at most other higher age segments of the population. For graphical representation of such data, height for area of a rectangle is the quotient of height (here frequency) and base (here width of the class interval). When intervals are equal, that is, when all rectangles have the same base, area can conveniently be represented by the frequency of any interval for purposes of comparison. When bases vary in their width, the heights of rectangles are to be adjusted to yield comparable measurements. The answer in such a situation is frequency density (class frequency divided by width of the class interval) instead of absolute frequency. TABLE 4.9 Distribution of daily wage earners in a locality of a town Daily No. earning of wage (Rs) earners (f) 45–49 2 50–54 3 55–59 5 60–64 3 65–69 6 70–74 7 75–79 12 80–84 13 85–89 9 90–94 7 95–99 6 100–104 4 105–109 2 110–114 3 115–119 3 Source: Unpublished data Since histograms are rectangles, a line parallel to the base line and of the same magnitude is to be drawn at a vertical distance equal to frequency (or frequency density) of the class interval. A histogram is never drawn. Since, for countinuous variables, the lower class boundary of a class interval fuses with the upper class boundary of the previous interval, equal or unequal, the rectangles are all adjacent and there is no open space between two consecutive rectangles. If the classes are not 2022-23 PRESENTATION OF DATA 51 continuous they are first converted into continuous classes as discussed in Chapter 3. Sometimes the common portion between two adjacent rectangles (Fig.4.6) is omitted giving a better impression of continuity. The resulting figure gives the impression of a double staircase. A histogram looks similar to a bar diagram. But there are more differences than similarities between the two than it may appear at the first impression. The spacing and the width or the area of bars are all arbitrary. It is the height and not the width or the area of the bar that really matters. A single vertical line could have served the same purpose as a bar of same width. Moreover, in histogram no space is left between two rectangles, but in a bar diagram some space must be left between consecutive bars (except in multiple bar or component bar diagram). Although the bars have the same width, the width of a bar is unimportant for the purpose of comparison. The width in a histogram is as important as its height. We can have a bar diagram both for discrete and continuous variables, but histogram is drawn only for a continuous variable. Histogram also gives value of mode of the frequency distribution graphically as shown in Figure 4.5 and the x-coordinate of the dotted vertical line gives the mode. Frequency Polygon A frequency polygon is a plane bounded by straight lines, usually four or more lines. Frequency polygon is an alternative to histogram and is also derived from histogram itself. A Fig. 4.5: Histogram for the distribution of 85 daily wage earners in a locality of a town. 2022-23 52 STATISTICS FOR ECONOMICS frequency polygon can be fitted to a histogram for studying the shape of the curve. The simplest method of drawing a frequency polygon is to join the midpoints of the topside of the consecutive rectangles of the histogram. It leaves us with the two ends away from the base line, denying the calculation of the area under the curve. The solution is to join the two end-points thus obtained to the base line at the mid-values of the two classes with zero

frequency immediately at each end of the distribution. Broken lines or dots may join the two ends with the base line. Now the total area under the curve, like the area in the histogram, represents the total frequency or sample size. Frequency polygon is the most common method of presenting grouped frequency distribution. Both class boundaries and class-marks can be used along the X-axis, the distances between two consecutive class marks being proportional/equal to the width of the class intervals. Plotting of data becomes easier if the class-marks fall on the heavy lines of the graph paper. No matter whether class boundaries or midpoints are used in the X-axis, frequencies (as ordinates) are always plotted against the mid-point of class intervals. When all the points have been plotted in the graph, they are carefully joined by a series of short straight lines. Broken lines join midpoints of two intervals, one in the beginning and the other at the end, with the two ends of the plotted curve (Fig.4.6). When comparing two or more distributions plotted on the same axes, frequency polygon is likely to be more useful since the vertical and horizontal lines of two Fig. 4.6: Frequency polygon drawn for the data given in Table 4.9 2022-23 PRESENTATION OF DATA 53 or more distributions may coincide in a histogram. Frequency Curve The frequency curve is obtained by drawing a smooth freehand curve passing through the points of the frequency polygon as closely as possible. It may not necessarily pass through all the points of the frequency polygon but it passes through them as closely as possible (Fig. 4.7). Ogive Ogive is also called cumulative frequency curve. As there are two types of cumulative frequencies, for example ‘‘less than’’ type and ‘‘more than’’ type, accordingly there are two ogives for any grouped frequency distribution data. Here in place of simple frequencies as in the case of frequency polygon, cumulative frequencies are plotted along y-axis against class limits of the frequency distribution. For ‘‘less than’’ ogive the cumulative frequencies are plotted against the respective upper limits of the class intervals whereas for more than ogives the cumulative frequencies are plotted against the respective lower limits of the class interval. An interesting feature of the two ogives together is that their intersection point gives the median Fig. 4.8 (b) of the frequency distribution. As the shapes of the two ogives suggest, ‘‘less than’’ ogive is never decreasing and ‘‘more than’’ ogive is never increasing. Arithmetic Line Graph An arithmetic line graph is also called time series graph. In this graph, time Fig. 4.7: Frequency curve for Table 4.9 2022-23 54 STATISTICS FOR ECONOMICS (hour, day/date, week, month, year, etc.) is plotted along x-axis and the value of the variable (time series data) along y-axis. A line graph by joining these plotted points, TABLE 4.10 Frequency distribution of marks obtained in mathematics thus, obtained is called arithmetic line graph (time series graph). It helps in understanding the trend, periodicity, etc., in a long term time series data. Table 4.10 (a) Table 4.10 (b) Table 4.10 (e) Frequency distribution Less than cumulative More than cumulative of marks obtained in frequency distribution frequency distribution mathematics of marks obtained in of markes obtained mathematics in mathematics Marks Number of Marks 'Less than' Marks 'More than' students cumulative cumulative frequency frequency 0-20 6 Less than 20 6 More than 0 64 20-40 5 Less than 40 11 More than 20 58 40-60 33 Less than 60 44 More than 40 53 60-80 14 Less than 80 58 More than 60 20 80-100 6 Less than 100 64 More than 80 6 Total 64 Fig. 4.8(b): ‘Less than’ and ‘More than’ ogive for data given in Table 4.10 Fig. 4.8(a): 'Less than' and 'More than' ogive for data given in Table 4.10 2022-23 PRESENTATION OF DATA 55 Fig. 4.9: Arithmetic line graph for time series data given in Table 4.11 Here you can see from Fig. 4.9 that for the period 1993-94 to 2013-14, the imports were more than the exports all through the period. You may notice the value of both exports and imports rising rapidy after 2001-02. Also the gap between the two (imports and exports) has widened after 2001-02. 6. CONCLUSION By now you must have been able to learn how the data could be presented using various forms of presentation — textual, tabular and diagrammatic. You are now also able to make an appropriate choice of the form of data presentation as well as the type of diagram to be used for a given set of data. Thus you can make presentation of data meaningful, comprehensive and purposeful. TABLE 4.11 Value of Exports and Imports of India (Rs in 100 crores) Year Exports Imports 1993-94 698 731

1994–95 827 900 1995–96 1064 1227 1996–97 1188 1389 1997–98 1301 1542 1998-99 1398 1783 1999-2000 1591 2155 2000-01 2036 2309 2001-02 2090 2452 2002-03 2549 2964 2003-04 2934 3591 2004-05 3753 5011 2005-06 4564 6604 2006-07 5718 8815 2007-08 6559 10123 2008-09 8408 13744 2009-10 8455 13637 2010-11` 11370 16835 2011-12 14660 23455 2012-13 16343 26692 2013-14 19050 27154 Source: DGCI&S, Kolkata 2022-23 56 STATISTICS FOR ECONOMICS Recap • Data (even voluminous data) speak meaningfully through presentation. • For small data (quantity) textual presentation serves the purpose better. • For large quantity of data tabular presentation helps in accommodating any volume of data for one or more variables. • Tabulated data can be presented through diagrams which enable quicker comprehension of the facts presented otherwise. EXERCISES Answer the following questions, 1 to 10, choosing the correct answer 1. Bar diagram is a (i) one-dimensional diagram (ii) two-dimensional diagram (iii) diagram with no dimension (iv) none of the above 2. Data represented through a histogram can help in finding graphically the (i) mean (ii) mode (iii) median (iv) all the above 3. Ogives can be helpful in locating graphically the (i) mode (ii) mean (iii) median (iv) none of the above 4. Data represented through arithmetic line graph help in understanding (i) long term trend (ii) cyclicity in data (iii) seasonality in data (iv) all the above 5. Width of bars in a bar diagram need not be equal (True/False). 6. Width of rectangles in a histogram should essentially be equal (True/ False). 7. Histogram can only be formed with continuous classification of data (True/False). 2022-23 PRESENTATION OF DATA 57 8. Histogram and column diagram are the same method of presentation of data. (True/False) 9. Mode of a frequency distribution can be known graphically with the help of histogram. (True/False) 10. Median of a frequency distribution cannot be known from the ogives. (True/False) 11. What kind of diagrams are more effective in representing the following? (i) Monthly rainfall in a year (ii) Composition of the population of Delhi by religion (iii) Components of cost in a factory 12. Suppose you want to emphasise the increase in the share of urban non-workers and lower level of urbanisation in India as shown in Example 4.2. How would you do it in the tabular form? 13. How does the procedure of drawing a histogram differ when class intervals are unequal in comparison to equal class intervals in a frequency table? 14. The Indian Sugar Mills Association reported that, ‘Sugar production during the first fortnight of December 2001 was about 3,87,000 tonnes, as against 3,78,000 tonnes during the same fortnight last year (2000). The off-take of sugar from factories during the first fortnight of December 2001 was 2,83,000 tonnes for internal consumption and 41,000 tonnes for exports as against 1,54,000 tonnes for internal consumption and nil for exports during the same fortnight last season.’ (i) Present the data in tabular form. (ii) Suppose you were to present these data in diagrammatic form which of the diagrams would you use and why? (iii) Present these data diagrammatically. 15. The following table shows the estimated sectoral real growth rates (percentage change over the previous year) in GDP at factor cost. Year Agriculture and allied sectors Industry Services 1994–95 5.0 9.2 7.0 1995–96 –0.9 11.8 10.3 1996–97 9.6 6.0 7.1 1997–98 –1.9 5.9 9.0 1998–99 7.2 4.0 8.3 1999–2000 0.8 6.9 8.2 Represent the data as multiple time series graphs. 2022-23Measures of Central Tendency 1. INTRODUCTION In the previous chapter, you have read about the tabular and graphic representation of the data. In this chapter, you will study the measures of central tendency which is a numerical method to explain the data in brief. You can see examples of summarising a large set of data in day-to-day life, like average marks obtained by students of a class in a test, average rainfall in an area, average production in a factory, average income of persons living in a locality or working in a firm, etc. Baiju is a farmer. He grows food grains in his land in a village called Balapur in Buxar district of Bihar. The village consists of 50 small farmers. Baiju has 1 acre of land. You are interested in knowing the economic condition of small farmers of Balapur. You want to compare the economic CHAPTER Studying this chapter should enable you to: • understand the need for summarising a set of data by one single number; • recognise and distinguish between the different types of averages; • learn to compute different types of averages; • draw meaningful

conclusions from a set of data; • develop an understanding of which type of average would be the most useful in a particular situation. 2022-23 MEASURES OF CENTRAL TENDENCY 59 condition of Baiju in Balapur village. For this, you may have to evaluate the size of his land holding, by comparing with the size of land holdings of other farmers of Balapur. You may like to see if the land owned by Baiju is – 1. above average in ordinary sense (see the Arithmetic Mean) 2. above the size of what half the farmers own (see the Median) 3. above what most of the farmers own (see the Mode) In order to evaluate Baiju's relative economic condition, you will have to summarise the whole set of data of land holdings of the farmers of Balapur. This can be done by the use of central tendency, which summarises the data in a single value in such a way that this single value can represent the entire data. The measuring of central tendency is a way of summarising the data in the form of a typical or representative value. There are several statistical measures of central tendency or "averages". The three most commonly used averages are: • Arithmetic Mean • Median • Mode You should note that there are two more types of averages i.e. Geometric Mean and Harmonic Mean, which are suitable in certain situations. However, the present discussion will be limited to the three types of averages mentioned above. 2. ARITHMETIC MEAN Suppose the monthly income (in Rs) of six families is given as: 1600, 1500, 1400, 1525, 1625, 1630. The mean family income is obtained by adding up the incomes and dividing by the number of families. = = Rs 1,547 It implies that on an average, a family earns Rs 1,547. Arithmetic mean is the most commonly used measure of central tendency. It is defined as the sum of the values of all observations divided by the number of observations and is usually denoted by X . In general, if there are N observations as X1, X2, X3, ..., XN, then the Arithmetic Mean is given by X + X + X +...+ X 123 N X= N The right hand side can be written as 1 X N N i = i . Here, i is an index which takes successive values 1, 2, 3,...N. For convenience, this will be written in simpler form without the index i. Thus X X = N , where, ΣX = sum of all observations and N = total number of observations. 2022-23 60 STATISTICS FOR ECONOMICS How Arithmetic Mean is Calculated The calculation of arithmetic mean can be studied under two broad categories: 1. Arithmetic Mean for Ungrouped Data. 2. Arithmetic Mean for Grouped Data. Arithmetic Mean for Series of Ungrouped Data Direct Method Arithmetic mean by direct method is the sum of all observations in a series divided by the total number of observations. Example 1 Calculate Arithmetic Mean from the data showing marks of students in a class in an economics test: 40, 50, 55, 78, 58. X X N = Σ = ++++ = 40 50 55 78 58 5 56 2. The average mark of students in the economics test is 56.2. Assumed Mean Method If the number of observations in the data is more and/or figures are large, it is difficult to compute arithmetic mean by direct method. The computation can be made easier by using assumed mean method. In order to save time in calculating mean from a data set containing a large number of observations as well as large numerical figures, you can use assumed mean method. Here you assume a particular figure in the data as the arithmetic mean on the basis of logic/experience. Then you may take deviations of the said assumed mean from each of the observation. You can, then, take the summation of these deviations and divide it by the number of observations in the data. The actual arithmetic mean is estimated by taking the sum of the assumed mean and the ratio of sum of deviations to number of observations. Symbolically, (HEIGHT IN INCHES) 2022-23 MEASURES OF CENTRAL TENDENCY 61 Let, A = assumed mean X = individual observations N = total numbers of observations d = deviation of assumed mean from individual observation, i.e. d = X – A Then sum of all deviations is taken as Σd=Σ (X-A) Then find Then add A and Σd N to get X Therefore, You should remember that any value, whether existing in the data or not, can be taken as assumed mean. However, in order to simplify the calculation, centrally located value in the data can be selected as assumed mean. Example 2 The following data shows the weekly income of 10 families. Family ABC D E F G H I J Weekly Income (in Rs) 850 700 100 750 5000 80 420 2500 400 360 Compute mean family income. TABLE 5.1 Computation of Arithmetic Mean by Assumed Mean Method Families Income d = X – 850 d' (X) = (X – 850)/10 A 850 0 0 B 700 –150 –15 C

100 –750 –75 D 750 –100 –10 E 5000 +4150 +415 F 80 –770 –77 G 420 –430 –43 H 2500 +1650 +165 I 400 –450 –45 J 360 –490 –49 11160 +2660 +266 Arithmetic Mean using assumed mean method X A d N Rs =+ = + = Σ 850 2 660 10 1116 (,)/ , . Thus, the average weekly income of a family by both methods is Rs 1,116. You can check this by using the direct method. Step Deviation Method The calculations can be further simplified by dividing all the deviations taken from assumed mean by the common factor 'c'. The objective is to avoid large numerical figures, i.e., if d = X – A is very large, then find d'. This can be done as follows: d' = d c X A c = − . The formula is given below: X A d N = + c ′ × Σ where d' = (X – A)/c, c = common factor, N = number of observations, A= Assumed mean. Thus, you can calculate the arithmetic mean in the example 2, by the step deviation method, X = 850 + (266/10) × 10 = Rs 1,116. 2022-23 62 STATISTICS FOR ECONOMICS Calculation of arithmetic mean for Grouped data Discrete Series Direct Method In case of discrete series, frequency against each observation is multiplied by the value of the observation. The values, so obtained, are summed up and divided by the total number of frequencies. Symbolically, X fX f = Σ Σ Where, Σ fX = sum of the product of variables and frequencies. Σ f = sum of frequencies. Example 3 Plots in a housing colony come in only three sizes: 100 sq. metre, 200 sq. meters and 300 sq. metre and the number of plots are respectively 200 50 and 10. TABLE 5.2 Computation of Arithmetic Mean by Direct Method Plot size in No. of d' = X–200 Sq. metre X Plots (f) f X 100 fd' 100 200 20000 –1 –200 200 50 10000 0 0 300 10 3000 +1 10 260 33000 0 –190 Arithmetic mean using direct method, X = X N 33000 260 126.92 Sq.metre ∑ = = Therefore, the mean plot size in the housing colony is 126.92 Sq. metre. Assumed Mean Method As in case of individual series the calculations can be simplified by using assumed mean method, as described earlier, with a simple modification. Since frequency (f) of each item is given here, we multiply each deviation (d) by the frequency to get fd. Then we get Σ fd. The next step is to get the total of all frequencies i.e. Σ f. Then find out Σ fd/Σ f. Finally, the arithmetic mean is calculated by X A fd f = + Σ Σ using assumed mean method. Step Deviation Method In this case, the deviations are divided by the common factor 'c' which simplifies the calculation. Here we estimate d' = d c X A c = − in order to reduce the size of numerical figures for easier calculation. Then get fd' and Σ fd'. The formula for arithmetic mean using step deviation method is given as, X A fd f = + c ′ × Σ Σ Activity • Find the mean plot size for the data given in example 3, by using step deviation and assumed mean methods. 2022-23 MEASURES OF CENTRAL TENDENCY 63 Continuous Series Here, class intervals are given. The process of calculating arithmetic mean in case of continuous series is same as that of a discrete series. The only difference is that the mid-points of various class intervals are taken. We have already known that class intervals may be exclusive or inclusive or of unequal size. Example of exclusive class interval is, say, 0–10, 10–20 and so on. Example of inclusive class interval is, say, 0–9, 10–19 and so on. Example of unequal class interval is, say, 0–20, 20–50 and so on. In all these cases, calculation of arithmetic mean is done in a similar way. Example 4 Calculate average marks of the following students using (a) Direct method (b) Step deviation method. Direct Method Marks 0–10 10–20 20–30 30–40 40–50 50–60 60–70 No. of Students 5 12 15 25 8 3 2 TABLE 5.3 Computation of Average Marks for Exclusive Class Interval by Direct Method Mark No. of Mid fm d'=(m-35) fd' (x) students value (2)×(3) 10 (f) (m) (1) (2) (3) (4) (5) (6) 0–10 5 5 25 –3 –15 10–20 12 15 180 –2 –24 20–30 15 25 375 –1 –15 30–40 25 35 875 0 0 40–50 8 45 360 1 8 50–60 3 55 165 2 6 60–70 2 65 130 3 6 70 2110 –34 Steps: 1. Obtain mid values for each class denoted by m. 2. Obtain Σ fm and apply the direct method formula: X = fm f = 2110 70 = 30.14 marks Σ Σ Step deviation method 1. Obtain d' = 2. Take A = 35, (any arbitrary figure), c = common factor. Two interesting properties of A.M. (i) the sum of deviations of items about arithmetic mean is always equal to zero. Symbolically, Σ (X – X) = 0. (ii) arithmetic mean is affected by extreme values. Any large value, on either end, can push it up or down. Weighted Arithmetic Mean Sometimes it is important to assign weights to various items according to their importance when you calculate the arithmetic mean. For example, there are two commodities, mangoes and potatoes. You are interested in 2022-23 64 STATISTICS FOR

ECONOMICS finding the average price of mangoes (P1) and potatoes (P2). The arithmetic mean will be . However, you might want to give more importance to the rise in price of potatoes (P2). To do this, you may use as 'weights' the share of mangoes in the budget of the consumer (W1) and the share of potatoes in the budget (W2). Now the arithmetic mean weighted by the shares in the budget would be 11 2 2 1 2 WP +W P W +W . In general the weighted arithmetic mean is given by, When the prices rise, you may be interested in the rise in prices of commodities that are more important to you. You will read more about it in the discussion of Index Numbers in Chapter 8. Activities • Check property of arithmetic mean for the following example: X: 4 6 8 10 12 • In the above example if mean is increased by 2, then what happens to the individual observations. • If first three items increase by 2, then what should be the values of the last two items, so that mean remains the same. • Replace the value 12 by 96. What happens to the arithmetic mean? Comment. 3. MEDIAN Median is that positional value of the variable which divides the distribution into two equal parts, one part comprises all values greater than or equal to the median value and the other comprises all values less than or equal to it. The Median is the "middle" element when the data set is arranged in order of the magnitude. Since the median is determined by the position of different values, it remains unaffected if, say, the size of the largest value increases. Computation of median The median can be easily computed by sorting the data from smallest to largest and finding out the middle value. Example 5 Suppose we have the following observation in a data set: 5, 7, 6, 1, 8, 10, 12, 4, and 3. Arranging the data, in ascending order you have: 1, 3, 4, 5, 6, 7, 8, 10, 12. The "middle score" is 6, so the median is 6. Half of the scores are larger than 6 and half of the scores are smaller. If there are even numbers in the data, there will be two observations 2022-23 MEASURES OF CENTRAL TENDENCY 65 which fall in the middle. The median in this case is computed as the arithmetic mean of the two middle values. Activities • Find mean and median for all four values of the series. What do you observe? TABLE 5.4 Mean and Median of different series Series X (Variable Mean Median Values) A 1, 2, 3 ? ? B 1, 2, 30 ? ? C 1, 2, 300 ? ? D 1, 2, 3000 ? ? • Is median affected by extreme values? What are outliers? • Is median a better method than mean? Example 6 The following data provides marks of 20 students. You are required to calculate the median marks. 25, 72, 28, 65, 29, 60, 30, 54, 32, 53, 33, 52, 35, 51, 42, 48, 45, 47, 46, 33. Arranging the data in an ascending order, you get 25, 28, 29, 30, 32, 33, 33, 35, 42, 45, 46, 47, 48, 51, 52, 53, 54, 60, 65, 72. You can see that there are two observations in the middle, 45 and 46. The median can be obtained by taking the mean of the two observations: Median = 45+46 2 = 45.5 marks In order to calculate median it is important to know the position of the median i.e. item/items at which the median lies. The position of the median can be calculated by the following formula: Position of median = (N+1) 2 item th Where N = number of items. You may note that the above formula gives you the position of the median in an ordered array, not the median itself. Median is computed by the formula: Median = size of (N+1) 2 item th Discrete Series In case of discrete series the position of median i.e. (N+1)/2th item can be located through cumulative frequency. The corresponding value at this position is the value of median. Example 7 The frequency distributsion of the number of persons and their respective incomes (in Rs) are given below. Calculate the median income. Income (in Rs): 10 20 30 40 Number of persons: 2 4 10 4 In order to calculate the median income, you may prepare the frequency distribution as given below. 2022-23 66 STATISTICS FOR ECONOMICS TABLE 5.5 Computation of Median for Discrete Series Income No. of Cumulative (in Rs) persons(f) frequency(cf) 10 2 2 20 4 6 30 10 16 40 4 20 The median is located in the (N+1)/ 2 = (20+1)/2 = 10.5th observation. This can be easily located through cumulative frequency. The 10.5th observation lies in the c.f. of 16. The income corresponding to this is Rs 30, so the median income is Rs 30. Continuous Series In case of continuous series you have to locate the median class where N/2th item [not (N+1)/2th item] lies. The median can then be obtained as follows: Median = Where, L = lower limit of the median class, c.f. = cumulative frequency of the class preceding the median class, f = frequency of the median

class, h = magnitude of the median class interval. No adjustment is required if frequency is of unequal size or magnitude. Example 8 Following data relates to daily wages of persons working in a factory. Compute the median daily wage. Daily wages (in Rs): 55–60 50–55 45–50 40–45 35–40 30–35 25–30 20–25 Number of workers: 7 13 15 20 30 33 28 14 The data is arranged in descending order here. In the above illustration median class is the value of (N/2)th item (i.e.160/2) = 80th item of the series, which lies in 35–40 class interval. Applying the formula of the median as: 2022-23 MEASURES OF CENTRAL TENDENCY 67 TABLE 5.6 Computation of Median for Continuous Series Daily wages No. of Cumulative (in Rs) Workers (f) Frequency 20–25 14 14 25–30 28 42 30–35 33 75 35–40 30 105 40–45 20 125 45–50 15 140 50–55 13 153 55–60 7 160 Thus, the median daily wage is Rs 35.83. This means that 50% of the workers are getting less than or equal to Rs 35.83 and 50% of the workers are getting more than or equal to this wage. You should remember that median, as a measure of central tendency, is not sensitive to all the values in the series. It concentrates on the values of the central items of the data. Quartiles Quartiles are the measures which divide the data into four equal parts, each portion contains equal number of observations. There are three quartiles. The first Quartile (denoted by Q1) or lower quartile has 25% of the items of the distribution below it and 75% of the items are greater than it. The second Quartile (denoted by Q2) or median has 50% of items below it and 50% of the observations above it. The third Quartile (denoted by Q3) or upper Quartile has 75% of the items of the distribution below it and 25% of the items above it. Thus, Q1 and Q3 denote the two limits within which central 50% of the data lies. Percentiles Percentiles divide the distribution into hundred equal parts, so you can get 99 dividing positions denoted by P1, P2, P3, ..., P99. P50 is the median value. If you have secured 82 percentile in a management entrance examination, it means that your position is below 18 per cent of total candidates appeared in the examination. If a total of one lakh students appeared, where do you stand? Calculation of Quartiles The method for locating the Quartile is same as that of the median in case of individual and discrete series. The value of Q1 and Q3 of an ordered series can be obtained by the following 2022-23 68 STATISTICS FOR ECONOMICS formula where N is the number of observations. Q1= size of (N + 1) 4 th item Q3 = size of 3(N +1) 4 th item. Example 9 Calculate the value of lower quartile from the data of the marks obtained by ten students in an examination. 22, 26, 14, 30, 18, 11, 35, 41, 12, 32. Arranging the data in an ascending order, 11, 12, 14, 18, 22, 26, 30, 32, 35, 41. Q1 = size of (N +1) 4 th item = size of (10 +1) 4 th item = size of 2.75th item = 2nd item + .75 (3rd item – 2nd item) = 12 + .75(14 –12) = 13.5 marks. Activity • Find out Q3 yourself. 5. MODE Sometimes, you may be interested in knowing the most typical value of a series or the value around which maximum concentration of items occurs. For example, a manufacturer would like to know the size of shoes that has maximum demand or style of the shirt that is more frequently demanded. Here, Mode is the most appropriate measure. The word mode has been derived from the French word “la Mode” which signifies the most fashionable values of a distribution, because it is repeated the highest number of times in the series. Mode is the most frequently observed data value. It is denoted by Mo. Computation of Mode Discrete Series Consider the data set 1, 2, 3, 4, 4, 5. The mode for this data is 4 because 4 occurs most frequently (twice) in the data. Example 10 Look at the following discrete series: Variable 10 20 30 40 50 Frequency 2 8 20 10 5 Here, as you can see the maximum frequency is 20, the value of mode is 30. In this case, as there is a unique value of mode, the data is unimodal. But, the mode is not necessarily unique, unlike arithmetic mean and median. You can have data with two modes (bi-modal) or more than two modes (multi-modal). It may be possible that there may be no mode if no value appears more frequent than any other value in the distribution. For example, in a series 1, 1, 2, 2, 3, 3, 4, 4, there is no mode. Unimodal Data Bimodal Data 2022-23 MEASURES OF CENTRAL TENDENCY 69 Continuous Series In case of continuous frequency distribution, modal class is the class with largest frequency. Mode can be calculated by using the formula: Where L = lower limit of the modal class D1= difference between the frequency of the modal class and the frequency of the class preceding the

modal class (ignoring signs). D2 = difference between the frequency of the modal class and the frequency of the class succeeding the modal class (ignoring signs). h = class interval of the distribution. You may note that in case of continuous series, class intervals should be equal and series should be exclusive to calculate the mode. If mid points are given, class intervals are to be obtained. Example 11 Calculate the value of modal worker family's monthly income from the following data: Less than cumulative frequency distribution of income per month (in '000 Rs) Income per month Cumulative (in '000 Rs) Frequency Less than 50 97 Less than 45 95 Less than 40 90 Less than 35 80 Less than 30 60 Less than 25 30 Less than 20 12 Less than 15 4 As you can see this is a case of cumulative frequency distribution. In order to calculate mode, you will have to convert it into an exclusive series. In this example, the series is in the descending order. This table should be converted into an ordinary frequency table (Table 5.7) to determine the modal class. Income Group Frequency (in '000 Rs) 45–50 97 – 95 = 2 40–45 95 – 90 = 5 35–40 90 – 80 = 10 30–35 80 – 60 = 20 25–30 60 – 30 = 30 20–25 30 – 12 = 18 15–20 12 – 4 = 8 10–15 4 The value of the mode lies in 25–30 class interval. By inspection also, it can be seen that this is a modal class. Now L = 25, D1 = (30 – 18) = 12, D2 = (30 – 20) = 10, h = 5 Using the formula, you can obtain the value of the mode as: MO (in '000 Rs) 12 = 25 + ×5 = 27.273 12 +10 Thus the modal worker family's monthly income is Rs 27.273. 2022-23 70 STATISTICS FOR ECONOMICS Activities • A shoe company, making shoes for adults only, wants to know the most popular size of shoes. Which average will be most appropriate for it? • Which average will be most appropriate for the companies producing the following goods? Why? (i) Diaries and notebooks (ii) School bags (iii) Jeans and T-Shirts • Take a small survey in your class to know the students' preference for Chinese food using appropriate measure of central tendency. • Can mode be located graphically? 6. RELATIVE POSITION OF ARITHMETIC MEAN, MEDIAN AND MODE Suppose we express, Arithmetic Mean = Me Median = Mi Mode = Mo The relative magnitude of the three are Me >Mi >Mo or Me1. INTRODUCTION In the previous chapter, you have studied how to sum up the data into a single representative value. However, that value does not reveal the variability present in the data. In this chapter you will study those measures, which seek to quantify variability of the data. Three friends, Ram, Rahim and Maria are chatting over a cup of tea. During the course of their conversation, they start talking about their family incomes. Ram tells them that there are four members in his family and the average income per member is Rs 15,000. Rahim says that the average income is the same in his family, though the number of members is six. Maria says that there are five members in her family, out of which one is not working. She calculates that the average income in her family too, is Rs 15,000. They are a little surprised since they know that Maria's father is earning a huge salary. They go into details and gather the following data: Measures of Dispersion Studying this chapter should enable you to: • know the limitations of averages; • appreciate the need for measures of dispersion; • enumerate various measures of dispersion; • calculate the measures and compare them; • distinguish between absolute and relative measures. CHAPTER 2022-23 MEASURES OF DISPERSION 75 Family Incomes Sl. No. Ram Rahim Maria 1. 12,000 7,000 0 2. 14,000 10,000 7,000 3. 16,000 14,000 8,000 4. 18,000 17,000 10,000 5. ----- 20,000 50,000 6. ----- 22,000 ------ Total income 60,000 90,000 75,000 Average income 15,000 15,000 15,000 Do you notice that although the average is the same, there are considerable differences in individual incomes? It is quite obvious that averages try to tell only one aspect of a distribution i.e. a representative size of the values. To understand it better, you need to know the spread of values also. You can see that in Ram's family, differences in incomes are comparatively lower. In Rahim's family, differences are higher and in Maria's family, the differences are the highest. Knowledge of only average is insufficient. If you have another value which reflects the quantum of variation in values, your understanding of a distribution improves considerably. For example, per capita income gives only the average income. A measure of dispersion can tell you about income inequalities, thereby improving the understanding of the relative standards of living enjoyed by different strata of society.

Dispersion is the extent to which values in a distribution differ from the average of the distribution. To quantify the extent of the variation, there are certain measures namely: (i) Range (ii) Quartile Deviation (iii) Mean Deviation (iv) Standard Deviation Apart from these measures which give a numerical value, there is a graphic method for estimating dispersion. Range and quartile deviation measure the dispersion by calculating the spread within which the values lie. Mean deviation and standard deviation calculate the extent to which the values differ from the average. 2. MEASURES BASED UPON SPREAD OF VALUES Range Range (R) is the difference between the largest (L) and the smallest value (S) in a distribution. Thus, R = L – S Higher value of range implies higher dispersion and vice-versa. 2022-23 76 STATISTICS FOR ECONOMICS Activities Look at the following values: 20, 30, 40, 50, 200 • Calculate the Range. • What is the Range if the value 200 is not present in the data set? • If 50 is replaced by 150, what will be the Range? Range: Comments Range is unduly affected by extreme values. It is not based on all the values. As long as the minimum and maximum values remain unaltered, any change in other values does not affect range. It cannot be calculated for openended frequency distribution. Notwithstanding some limitations, range is understood and used frequently because of its simplicity. For example, we see the maximum and minimum temperatures of different cities almost daily on our TV screens and form judgments about the temperature variations in them. Open-ended distributions are those in which either the lower limit of the lowest class or the upper limit of the highest class or both are not specified. Activity • Collect data about 52-week high/ low of shares of 10 companies from a newspaper. Calculate the range of share prices. Which company's share is most volatile and which is the most stable? Quartile Deviation The presence of even one extremely high or low value in a distribution can reduce the utility of range as a measure of dispersion. Thus, you may need a measure which is not unduly affected by the outliers. In such a situation, if the entire data is divided into four equal parts, each containing 25% of the values, we get the values of quartiles and median. (You have already read about these in Chapter 5). The upper and lower quartiles (Q3 and Q1, respectively) are used to calculate inter-quartile range which is Q3 – Q1. Interquartile range is based upon middle 50% of the values in a distribution and is, therefore, not affected by extreme values. Half of the inter-quartile range is called quartile deviation (Q.D.). Thus: Q.D. is therefore also called SemiInter Quartile Range. Calculation of Range and Q.D. for ungrouped data Example 1 Calculate range and Q.D. of the following observations: 20, 25, 29, 30, 35, 39, 41, 48, 51, 60 and 70 Range is clearly 70 – 20 = 50 For Q.D., we need to calculate values of Q3 and Q1. 2022-23 MEASURES OF DISPERSION 77 Q1 is the size of n+1 th 4 value. n being 11, Q1 is the size of 3rd value. As the values are already arranged in ascending order, it can be seen that Q1, the 3rd value is 29. [What will you do if these values are not in an order?] Similarly, Q3 is size of 3 n +1 ( ) th 4 value; i.e. 9th value which is 51. Hence Q3 = 51 = 51 29 11 2 − = Do you notice that Q.D. is the average difference of the Quartiles from the median. Activity • Calculate the median and check whether the above statement is correct. Calculation of Range and Q.D. for a frequency distribution. Example 2 For the following distribution of marks scored by a class of 40 students, calculate the Range and Q.D. TABLE 6.1 Class intervals No. of students C I (f) 0–10 5 10–20 8 20–40 16 40–60 7 60–90 4 40 Range is just the difference between the upper limit of the highest class and the lower limit of the lowest class. So range is 90 – 0 = 90. For Q.D., first calculate cumulative frequencies as follows: Class- Frequencies Cumulative Intervals Frequencies CI f c. f. 0–10 5 05 10–20 8 13 20–40 16 29 40–60 7 36 60–90 4 40 n = 40 Q1 is the size of n th 4 value in a continuous series. Thus, it is the size of the 10th value. The class containing the 10th value is 10–20. Hence, Q1 lies in class 10–20. Now, to calculate the exact value of Q1, the following formula is used: 1 n cf 4 Q =L + × i f Where L = 10 (lower limit of the relevant Quartile class) c.f. = 5 (Value of c.f. for the class preceding the quartile class) i = 10 (interval of the quartile class), and f = 8 (frequency of the quartile class) Thus, − =+ × 10 5 Q 10 10 8 =16.25 Similarly, Q3 is the size of 3 4 n th 2022-23 78 STATISTICS FOR ECONOMICS value; i.e., 30th value, which lies in class 40–60. Now using the formula for Q3 , its value can be calculated as follows:

In individual and discrete series, Q1 is the size of n 1 th 4 + value, but in a continuous distribution, it is the size of n th 4 value. Similarly, for Q3 and median also, n is used in place of n+1. If the entire group is divided into two equal halves and the median calculated for each half, you will have the median of better students and the median of weak students. These medians differ from the median of the entire group by 13.31 on an average. Similarly, suppose you have data about incomes of people of a town. Median income of all people can be calculated. Now, if all people are divided into two equal groups of rich and poor, medians of both groups can be calculated. Quartile deviation will tell you the average difference between medians of these two groups belonging to rich and poor, from the median of the entire group. Quartile deviation can generally be calculated for open-ended distributions and is not unduly affected by extreme values. 3. MEASURES OF DISPERSION FROM AVERAGE Recall that dispersion was defined as the extent to which values differ from their average. Range and quartile deviation are not useful in measuring, how far the values are, from their average. Yet, by calculating the spread of values, they do give a good idea about the dispersion. Two measures which are based upon deviation of the values from their average are Mean Deviation and Standard Deviation. Since the average is a central value, some deviations are positive and some are negative. If these are added as they are, the sum will not reveal anything. In fact, the sum of deviations from Arithmetic Mean is always zero. Look at the following two sets of values. Set A : 5, 9, 16 Set B : 1, 9, 20 You can see that values in Set B are farther from the average and hence more dispersed than values in Set A. Calculate the deviations from Arithmetic Mean and sum them up. What do you notice? Repeat the same with Median. Can you comment upon the quantum of variation from the calculated values? Mean Deviation tries to overcome this problem by ignoring the signs of 2022-23 MEASURES OF DISPERSION 79 deviations, i.e., it considers all deviations positive. For standard deviation, the deviations are first squared and averaged and then square root of the average is found. We shall now discuss them separately in detail. Mean Deviation Suppose a college is proposed for students of five towns A, B, C, D and E which lie in that order along a road. Distances of towns in kilometres from town A and number of students in these towns are given below: Town Distance No. from town A of Students A 0 90 B 2 150 C 6 100 D 14 200 E 18 80 620 Now, if the college is situated in town A, 150 students from town B will have to travel 2 kilometers each (a total of 300 kilometres) to reach the college. The objective is to find a location so that the average distance travelled by students is minimum. You may observe that the students will have to travel more, on an average, if the college is situated at town A or E. If on the other hand, it is somewhere in the middle, they are likely to travel less. Mean deviation is the appropriate statistical tool to estimate the average distance travelled by students. Mean deviation is the arithmetic mean of the differences of the values from their average. The average used is either the arithmetic mean or median. (Since the mode is not a stable average, it is not used to calculate mean deviation.) Activities • Calculate the total distance to be travelled by students if the college is situated at town A, at town C, or town E and also if it is exactly half way between A and E. • Decide where, in your opinion, the college should be established, if there is only one student in each town. Does it change your answer? Calculation of Mean Deviation from Arithmetic Mean for ungrouped data. Direct Method Steps: (i) The A.M. of the values is calculated (ii) Difference between each value and the A.M. is calculated. All differences are considered positive. These are denoted as |d| (iii) The A.M. of these differences (called deviations) is the Mean Deviation. i.e. M.D. = |d| n ∑ Example 3 Calculate the mean deviation of the following values; 2, 4, 7, 8 and 9. The A.M. = X n = 6 ∑ 2022-23 80 STATISTICS FOR ECONOMICS X |d| 2 4 4 2 7 1 8 2 9 3 12 (x) 12 M.D. 2.4 5 Mean Deviation from median for ungrouped data. Method Using the values in Example 3, M.D. from the Median can be calculated as follows, (i) Calculate the median which is 7. (ii) Calculate the absolute deviations from median, denote them as |d|. (iii) Find the average of these absolute deviations. It is the Mean Deviation. Example 5 X d=|X-MEDIAN| 2 5 4 3 7 0 8 1 9 2 11 M. D. from Median is thus, (Median) |d| 11 M.D. 2.2 n 5 Mean Deviation from

Mean for Continuous Distribution TABLE 6.2 Profits of Number of companies Companies (Rs in lakh) Class intervals 10–20 5 20–30 8 30–50 16 50–70 8 70–80 3 40 Steps: (i) Calculate the mean of the distribution. (ii) Calculate the absolute deviations |d| of the class midpoints from the mean. (iii) Multiply each |d| value with its corresponding frequency to get f|d| values. Sum them up to get Σ f|d|. (iv) Apply the following formula, (x) f|d| M.D. f Mean Deviation of the distribution in Table 6.2 can be calculated as follows: Example 6 C.I. f m.p. |d| f|d| 10–20 5 15 25.5 127.5 20–30 8 25 15.5 124.0 30–50 16 40 0.5 8.0 50–70 8 60 19.5 156.0 70–80 3 75 34.5 103.5 40 519.0 2022-23 MEASURES OF DISPERSION 81 it ignores the signs of deviations and cannot be calculated for openended distributions. Standard Deviation Standard Deviation is the positive square root of the mean of squared deviations from mean. So if there are five values x1, x2, x3, x4 and x5, first their mean is calculated. Then deviations of the values from mean are calculated. These deviations are then squared. The mean of these squared deviations is the variance. Positive square root of the variance is the standard deviation. (Note that standard deviation is calculated on the basis of the mean only). Calculation of Standard Deviation for ungrouped data Four alternative methods are available for the calculation of standard deviation of individual values. All these methods result in the same value of standard deviation. These are: (i) Actual Mean Method (ii) Assumed Mean Method (iii) Direct Method (iv) Step-Deviation Method Actual Mean Method: Suppose you have to calculate the standard deviation of the following values: 5, 10, 25, 30, 50 First step is to calculate 5+10+25+30+50 120 X = = 24 5 5 = Mean Deviation from Median TABLE 6.3 Class intervals Frequencies 20–30 5 30–40 10 40–60 20 60–80 9 80–90 6 50 The procedure to calculate mean deviation from the median is the same as it is in case of M.D. from mean, except that deviations are to be taken from the median as given below: Example 7 C.I. f m.p. |d| f|d| 20–30 5 25 25 125 30–40 10 35 15 150 40–60 20 50 0 0 60–80 9 70 20 180 80–90 6 85 35 210 50 665 M D f d f Median . . | | ( ) = ∑ ∑ 665 13.3 50 = = Mean Deviation: Comments Mean deviation is based on all values. A change in even one value will affect it. Mean deviation is the least when calculated from the median i.e., it will be higher if calculated from the mean. However 2022-23 82 STATISTICS FOR ECONOMICS Example 8 X d (x-x¯) d2 5 –19 361 10 –14 196 25 +1 1 30 +6 36 50 +26 676 0 1270 Then the following formula is used: Do you notice the value from which deviations have been calculated in the above example? Is it the Actual Mean? Assumed Mean Method For the same values, deviations may be calculated from any arbitrary value A x such that d = X – A x . Taking A x = 25, the computation of the standard deviation is shown below: Example 9 X d (x-A x) d2 5 –20 400 10 –15 225 25 0 0 30 +5 25 50 +25 625 –5 1275 Formula for Standard Deviation σ = − Σ Σ d n d n 2 2 σ = − = = 1275 5 5 5 254 15 937 2 . Note that the sum of deviations from a value other than actual mean will not be equal to zero. Standard deviation is not affected by the value of the constant from which deviations are calculated. The value of the constant does not figure in the standard deviation formula. Thus, Standard deviation is Independent of Origin. Direct Method Standard Deviation can also be calculated from the values directly, i.e., without taking deviations, as shown below: Example 10 X X 2 5 25 10 100 25 625 30 900 50 2500 120 4150 (This amounts to taking deviations from zero) Following formula is used. 2022-23 MEASURES OF DISPERSION 83 or 4150 2 (24) 5 σ = − or σ = = 254 15.937 Step-deviation Method If the values are divisible by a common factor, they can be so divided and standard deviation can be calculated from the resultant values as follows: Example 11 Since all the five values are divisible by a common factor 5, we divide and get the following values: x x' d' = (x'-x ') d'2 5 1 –3.8 14.44 10 2 –2.8 7.84 25 5 +0.2 0.04 30 6 +1.2 1.44 50 10 +5.2 27.04 0 50.80 In the above table, x x ' c = where c = common factor First step is to calculate ' 1+2+5+6+10 24 X = = 4.8 5 5 = The following formula is used to calculate standard deviation: Substituting the values, σ = × 50.80 5 5 σ = × 10.16 5 s =15 937. Alternatively, instead of dividing the values by a common factor, the deviations can be calculated and then divided by a common factor. Standard deviation can be calculated as shown below: Example 12 x d =(x-25) d' =(d/5) d'2 5 –20 –4 16 10 –15 –3 9 25 00 0 30 +5 +1 1 50 +25

+5 25 –1 51 Deviations have been calculated from an arbitrary value 25. Common factor of 5 has been used to divide deviations. s = ×= 10 16 5 15 937 . . Standard deviation is not independent of scale. Thus, if the values or deviations are divided by a common factor, the value of the common factor is used in the formula to get the value of standard deviation. 2022-23 84 STATISTICS FOR ECONOMICS Standard Deviation in Continuous frequency distribution: Like ungrouped data, S.D. can be calculated for grouped data by any of the following methods: (i) Actual Mean Method (ii) Assumed Mean Method (iii) Step-Deviation Method Actual Mean Method For the values in Table 6.2, Standard Deviation can be calculated as follows: Example 13 (1) (2) (3) (4) (5) (6) (7) CI f m fm d fd fd2 10–20 5 15 75 –25.5 –127.5 3251.25 20–30 8 25 200 –15.5 –124.0 1922.00 30–50 16 40 640 –0.5 –8.0 4.00 50–70 8 60 480 +19.5 +156.0 3042.00 70–80 3 75 225 +34.5 +103.5 3570.75 40 1620 0 11790.00 Following steps are required: 1. Calculate the mean of the distribution. x fm f == = Σ Σ 1620 40 40 5. 2. Calculate deviations of mid-values from the mean so that (Col. 5) 3. Multiply the deviations with their corresponding frequencies to get 'fd' values (Col. 6) [Note that Σ fd = 0] 4. Calculate 'fd2' values by multiplying 'fd' values with 'd' values. (Col. 7). Sum up these to get Σ fd2. 5. Apply the formula as under: σ= = = Σfd n 2 11790 40 17 168. Assumed Mean Method For the values in example 13, standard deviation can be calculated by taking deviations from an assumed mean (say 40) as follows: Example 14 (1) (2) (3) (4) (5) (6) CI f m d fd fd2 10–20 5 15 -25 –125 3125 20–30 8 25 -15 –120 1800 30–50 16 40 0 0 0 50–70 8 60 +20 160 3200 70–80 3 75 +35 105 3675 40 +20 11800 The following steps are required: 1. Calculate mid-points of classes (Col. 3) 2. Calculate deviations of mid-points from an assumed mean such that d = m – A –(Col. 4). Assumed Mean = 40. 3. Multiply values of 'd' with corresponding frequencies to get 'fd' values (Col. 5). (Note that the total of this column is not zero since deviations have been taken from assumed mean). 4. Multiply 'fd' values (Col. 5) with 'd' values (col. 4) to get fd2 values (Col. 6). Find Σ fd2. 5. Standard Deviation can be calculated by the following formula. 2022-23 MEASURES OF DISPERSION 85 σ= – □□□□□□ Σ Σ fd n fd n 2 2 or σ= – □□□□□□ 11800 40 20 40 2 or σ= = 294 75 17 168 . . Step-deviation Method In case the values of deviations are divisible by a common factor, the calculations can be simplified by the step-deviation method as in the following example. Example 15 (1) (2) (3) (4) (5) (6) (7) CI f m d d' fd' fd'2 10–20 5 15 –25 –5 –25 125 20–30 8 25 –15 –3 –24 72 30–50 16 40 00 0 0 50–70 8 60 +20 +4 +32 128 70–80 3 75 +35 +7 +21 147 40 +4 472 Steps required: 1. Calculate class mid-points (Col. 3) and deviations from an arbitrarily chosen value, just like in the assumed mean method. In this example, deviations have been taken from the value 40. (Col. 4) 2. Divide the deviations by a common factor denoted as 'c'. c = 5 in the above example. The values so obtained are 'd'' values (Col. 5). 3. Multiply 'd'' values with corresponding 'f'' values (Col. 2) to obtain 'fd'' values (Col. 6). 4. Multiply 'fd'' values with 'd'' values to get 'fd'2' values (Col. 7) 5. Sum up values in Col. 6 and Col. 7 to get Σ fd' and Σ fd'2 values. 6. Apply the following formula. s = ' – □ ' □□□□□□ × Σ Σ Σ fd f fd f c 2 2 or s = – □□□□□□ × 472 40 4 40 5 2 or s = −× 11 8 0 01 5 . . or s s = × = 11 79 5 17 168 . . Standard Deviation: Comments Standard Deviation, the most widely used measure of dispersion, is based on all values. Therefore a change in even one value affects the value of standard deviation. It is independent of origin but not of scale. It is also useful in certain advanced statistical problems. 4. ABSOLUTE AND RELATIVE MEASURES OF DISPERSION All the measures, described so far, are absolute measures of dispersion. They calculate a value which, at times, is difficult to interpret. For example, consider the following two data sets: Set A 500 700 1000 Set B 1,00,000 1,20,000 1,30,000 Suppose the values in Set A are the daily sales recorded by an ice-cream vendor, while Set B has the daily sales of a big departmental store. Range for Set A is 500 whereas for Set B, it is 2022-23 86 STATISTICS FOR ECONOMICS 30,000. The value of Range is much higher in Set B. Can you say that the variation in sales is higher for the departmental store? It can be easily observed that the highest value in Set A is double the smallest value, whereas for the Set B, it is only 30% higher. Thus, absolute measures may give misleading ideas about the extent of variation specially when the averages differ significantly. Another weakness

of absolute measures is that they give the answer in the units in which original values are expressed. Consequently, if the values are expressed in kilometers, the dispersion will also be in kilometers. However, if the same values are expressed in meters, an absolute measure will give the answer in meters and the value of dispersion will appear to be 1000 times. To overcome these problems, relative measures of dispersion can be used. Each absolute measure has a relative counterpart. Thus, for range, there is coefficient of range which is calculated as follows: Coefficient of Range = − + L S L S where L = Largest value S = Smallest value Similarly, for Quartile Deviation, it is Coefficient of Quartile Deviation which can be calculated as follows: Coefficient of Quartile Deviation = − + Q Q Q Q 3 3 1 1 where Q3=3rd Quartile Q1 = 1st Quartile For Mean Deviation, it is Coefficient of Mean Deviation. Coefficient of Mean Deviation = MD x x or M D Median Median . .( ) . .( ) Thus, if Mean Deviation is calculated on the basis of the Mean, it is divided by the Mean. If Median is used to calculate Mean Deviation, it is divided by the Median. For Standard Deviation, the relative measure is called Coefficient of Variation, calculated as below: Coefficient of Variation = Standard Deviation Arithmetic Mean ×100 It is usually expressed in percentage terms and is the most commonly used relative measure of dispersion. Since relative measures are free from the units in which the values have been expressed, they can be compared even across different groups having different units of measurement. 5. LORENZ CURVE The measures of dispersion discussed so far give a numerical value of dispersion. A graphical measure called Lorenz Curve is available for estimating inequalities in distribution. You may have heard of statements like 'top 10% of the people of a country earn 50% of the national income while top 20% account for 80%'. An idea about income disparities is given by such figures. Lorenz Curve uses the information expressed in a cumulative manner to indicate the degree of 2022-23 MEASURES OF DISPERSION 87 as a percentage (%) of the grand total income of all classes together. Thus obatain Col. (6) of Table 6.4. 5. Prepare less than cumulative frequency and Cumulative income Table 6.5. 6. Col. (2) of Table 6.5 shows the cumulative frequency of empolyees. 7. Col. (3) of Table 6.5 shows the cumulative income going to these persons. 8. Draw a line joining Co-ordinate (0,0) with (100,100). This is called the line of equal distribution shown as line 'OE' in figure 6.1. 9. Plot the cumulative percentages of empolyees on the horizontal axis and cumulative income on the vertical axis. We will the thus gate the line. inequality. For example, Lorenz Curve of income gives a relationship between percentage of population and its share of income in total income. It is specially useful in comparing the variability of two or more distributions by drawing two or more Lorenz curves on the same axis. Construction of the Lorenz curve Following steps are required. 1. Calculate class Midpoints to obtain Col.2 of Table 6.4. 2. Calculate the estmated total income of employees in each class by multiplying the midpoint of the class by the frequency in the class. Thus obtain Col. (4) of Table 6.4. 3. Express frequency in each class as a percentage (%) of total frequency. Thus, obtain Col. (5) of Table 6.4. 4. Express total income of each class Given below are the monthly incomes of employees of a company: TABLE 6.4 Income Midpoint (X) Frequency (f) Total income % of frequency % of Total class of class (FX) income (1) (2) (3) (4) (5) (6) 0-5000 2500 5 12500 10 1.29 5000-10000 7500 10 75000 20 7.71 10000-20000 15000 18 270000 36 27.76 20000-40000 30000 10 300000 20 30.85 40000-50000 45000 7 315000 14 32.39 50 972500 100 2022-23 88 STATISTICS FOR ECONOMICS TABLE 6.5 'Less Than' Cumulative Frequency and Income 'Less Than' Cumulative Cumulative frequency Income (Rs) (%) (%) 5,000 10 1.29 10,000 3 9.00 20,000 66 36.76 40,000 86 67.61 50,000 100 100.00 Studying the Lorenz Curve OE is called the line of equal distribution, since it would imply a situation like, top 20% people earn 20% of total income and top 60% earn 60% of the total income. The farther the curve OABCDE from this line, the greater is the inequality present in the distribution. If there are two or more curves on the same axes, the one which is the farthest from line OE has the highest inequality. 8. CONCLUSION Although Range is the simplest to calculate and understand, it is unduly affected by extreme values. QD is not affected by extreme values as it is based on only middle 50% of the data. However, it is more difficult to interpret

M.D. and S.D. Both are based upon deviations of values from their average. M.D. calculates average of deviations from the average but ignores signs of deviations and therefore appears to be unmathematical. Standard deviation attempts to calculate average deviation from mean. Like M.D., it is based on all values and is also applied in more advanced statistical problems. It is the most widely used measure of dispersion. Recap • A measure of dispersion improves our understanding about the behaviour of an economic variable. • Range and Quartile Deviation are based upon the spread of values. • M.D. and S.D. are based upon deviations of values from the average. • Measures of dispersion could be Absolute or Relative. • Absolute measures give the answer in the units in which data are expressed. • Relative measures are free from these units, and consequently can be used to compare different variables. • A graphic method, which estimates the dispersion from shape of a curve, is called Lorenz Curve. 2022-23 MEASURES OF DISPERSION 89 EXERCISES 1. A measure of dispersion is a good supplement to the central value in understanding a frequency distribution. Comment. 2. Which measure of dispersion is the best and how? 3. Some measures of dispersion depend upon the spread of values whereas some are estimated on the basis of the variation of values from a central value. Do you agree? 4. In a town, 25% of the persons earned more than Rs 45,000 whereas 75% earned more than 18,000. Calculate the absolute and relative values of dispersion. 5. The yield of wheat and rice per acre for 10 districts of a state is as under: District 1 2 3 4 5 6 7 8 9 10 Wheat 12 10 15 19 21 16 18 9 25 10 Rice 22 29 12 23 18 15 12 34 18 12 Calculate for each crop, (i) Range (ii) Q.D. (iii) Mean deviation about Mean (iv) Mean deviation about Median (v) Standard deviation (vi) Which crop has greater variation? (vii)Compare the values of different measures for each crop. 6. In the previous question, calculate the relative measures of variation and indicate the value which, in your opinion, is more reliable. 7. A batsman is to be selected for a cricket team. The choice is between X and Y on the basis of their scores in five previous tests which are: X 25 85 40 80 120 Y 50 70 65 45 80 Which batsman should be selected if we want, (i) a higher run getter, or (ii) a more reliable batsman in the team? 8. To check the quality of two brands of lightbulbs, their life in burning hours was estimated as under for 100 bulbs of each brand. Life No. of bulbs (in hrs) Brand A Brand B 0–50 15 2 50–100 20 8 100–150 18 60 150–200 25 25 200–250 22 5 100 100 2022-23 90 STATISTICS FOR ECONOMICS (i) Which brand gives higher life? (ii) Which brand is more dependable? 9. Averge daily wage of 50 workers of a factory was Rs 200 with a standard deviation of Rs 40. Each worker is given a raise of Rs 20. What is the new average daily wage and standard deviation? Have the wages become more or less uniform? 10. If in the previous question, each worker is given a hike of 10 % in wages, how are the mean and standard deviation values affected? 11. Calculate the mean deviation using mean and Standard Deviation for the following distribution. Classes Frequencies 20–40 3 40–80 6 80–100 20 100–120 12 120–140 9 50 12. The sum of 10 values is 100 and the sum of their squares is 1090. Find out the coefficient of variation. 2022-23As the summer heat rises, hill stations, are crowded with more and more visitors. Ice-cream sales become more brisk. Thus, the temperature is related to number of visitors and sale of ice-creams. Similarly, as the supply of tomatoes increases in your local mandi, its price drops. When the local harvest starts reaching the market, the price of tomatoes drops from Rs 40 per kg to Rs 4 per kg or even less. Thus supply is related to price. Correlation analysis is a means for examining such relationships systematically. It deals with questions such as: • Is there any relationship between two variables? Correlation 7 1. INTRODUCTION In previous chapters you have learnt how to construct summary measures out of a mass of data and changes among similar variables. Now you will learn how to examine the relationship between two variables. Studying this chapter should enable you to: • understand the meaning of the term correlation; • understand the nature of relationship between two variables; • calculate the different measures of correlation; • analyse the degree and direction of the relationships. CHAPTER 2022-23 92 STATISTICS FOR ECONOMICS • It the value of one variable changes, does the value of the other also change? given a cause and effect interpretation. Others

may be just coincidence. The relation between the arrival of migratory birds in a sanctuary and the birth rates in the locality cannot be given any cause and effect interpretation. The relationships are simple coincidence. The relationship between size of the shoes and money in your pocket is another such example. Even if relationships exist, they are difficult to explain it. In another instance a third variable's impact on two variables may give rise to a relation between the two variables. Brisk sale of ice-creams may be related to higher number of deaths due to drowning. The victims are not drowned due to eating of icecreams. Rising temperature leads to brisk sale of ice-creams. Moreover, large number of people start going to swimming pools to beat the heat. This might have raised the number of deaths by drowning. Thus, temperature is behind the high correlation between the sale of ice-creams and deaths due to drowning. What Does Correlation Measure? Correlation studies and measures the direction and intensity of relationship among variables. Correlation measures covariation, not causation. Correlation should never be interpreted as implying cause and effect relation. The presence of correlation between two variables X and Y simply means that when the value of one variable is found to change in one direction, the value of the other • Do both the variables move in the same direction? • How strong is the relationship? 2. TYPES OF RELATIONSHIP Let us look at various types of relationship. The relation between movements in quantity demanded and the price of a commodity is an integral part of the theory of demand, which you will study in Class XII. Low agricultural productivity is related to low rainfall. Such examples of relationship may be 2022-23 CORRELATION 93 variable is found to change either in the same direction (i.e. positive change) or in the opposite direction (i.e. negative change), but in a definite way. For simplicity we assume here that the correlation, if it exists, is linear, i.e. the relative movement of the two variables can be represented by drawing a straight line on graph paper. Types of Correlation Correlation is commonly classified into negative and positive correlation. The correlation is said to be positive when the variables move together in the same direction. When the income rises, consumption also rises. When income falls, consumption also falls. Sale of icecream and temperature move in the same direction. The correlation is negative when they move in opposite directions. When the price of apples falls its demand increases. When the prices rise its demand decreases. When you spend more time in studying, chances of your failing decline. When you spend less hours in your studies, chances of scoring low marks/grades increase. These are instances of negative correlation. The variables move in opposite direction. 3. TECHNIQUES FOR MEASURING CORRELATION Three important tools used to study correlation are scatter diagrams, Karl Pearson's coefficient of correlation and Spearman's rank correlation. A scatter diagram visually presents the nature of association without giving any specific numerical value. A numerical measure of linear relationship between two variables is given by Karl Pearson's coefficient of correlation. A relationship is said to be linear if it can be represented by a straight line. Spearman's coefficient of correlation measures the linear association between ranks assigned to indiviual items according to their attributes. Attributes are those variables which cannot be numerically measured such as intelligence of people, physical appearance, honesty, etc. Scatter Diagram A scatter diagram is a useful technique for visually examining the form of relationship, without calculating any numerical value. In this technique, the values of the two variables are plotted as points on a graph paper. From a scatter diagram, one can get a fairly good idea of the nature of relationship. In a scatter diagram the degree of closeness of the scatter points and their overall direction enable us to examine the relationship. If all the points lie on a line, the correlation is perfect and is said to be in unity. If the scatter points are widely dispersed around the line, the correlation is low. The correlation is said to be linear if the scatter points lie near a line or on a line. Scatter diagrams spanning over Fig. 7.1 to Fig. 7.5 give us an idea of 2022-23 94 STATISTICS FOR ECONOMICS the relationship between two variables. Fig. 7.1 shows a scatter around an upward rising line indicating the movement of the variables in the same direction. When X rises Y will also rise. This is positive correlation. In Fig. 7.2 the points are found to be scattered around a

downward sloping line. This time the variables move in opposite directions. When X rises Y falls and vice versa. This is negative correlation. In Fig.7.3 there is no upward rising or downward sloping line around which the points are scattered. This is an example of no correlation. In Fig. 7.4 and Fig. 7.5, the points are no longer scattered around an upward rising or downward falling line. The points themselves are on the lines. This is referred to as perfect positive correlation and perfect negative correlation respectively. Activity • Collect data on height, weight and marks scored by students in your class in any two subjects in class X. Draw the scatter diagram of these variables taking two at a time. What type of relationship do you find? A careful observation of the scatter diagram gives an idea of the nature and intensity of the relationship. Karl Pearson's Coefficient of Correlation This is also known as product moment correlation coefficient or simple correlation coefficient. It gives a precise numerical value of the degree of linear relationship between two variables X and Y. It is important to note that Karl Pearson's coefficient of correlation should be used only when there is a linear relation between the variables. When there is a non-linear relation between X and Y, then calculating the Karl Pearson's coefficient of correlation can be misleading. Thus, if the true relation is of the linear type as shown by the scatter diagrams in figures 7.1, 7.2, 7.4 and 7.5, then the Karl Pearson's coefficient of correlation should be calculated and it will tell us the direction and intensity of the relation between the variables. But if the true relation is of the type shown in the scatter diagrams in Figures 7.6 or 7.7, then it means there is a non-linear relation between X and Y and we should not try to use the Karl Pearson's coefficient of correlation. It is, therefore, advisable to first examine the scatter diagram of the relation between the variables before calculating the Karl Pearson's correlation coefficient. Let X1, X2, ..., XN be N values of X and Y1, Y2 ,..., YN be the corresponding values of Y. In the subsequent presentations, the subscripts indicating the unit are dropped for the sake of simplicity. The arithmetic means of X and Y are defined as X Y X ;Y N N

2022-23 CORRELATION 95 Fig. 7.1: Positive Correlation Fig. 7.2: Negative Correlation Fig. 7.4: Perfect Positive Correlation Fig. 7.6: Positive non-linear relation Fig. 7.7: Negative non-linear relation Fig. 7.5: Perfect Negative Correlation Fig. 7.3: No Correlation 2022-23 96 STATISTICS FOR ECONOMICS and their variances are as follows 2 2 2 2 (X X) X x X N N and 2 2 2 2 (Y Y) Y y Y N N

The standard deviations of X and Y, respectively, are the positive square roots of their variances. Covariance of X and Y is defined as Cov(X,Y) (X X)(Y Y) xy N N Where xX X and yYY are the deviations of the ith value of X and Y from their mean values respectively. The sign of covariance between X and Y determines the sign of the correlation coefficient. The standard deviations are always positive. If the covariance is zero, the correlation coefficient is always zero. The product moment correlation or the Karl Pearson's measure of correlation is given by xy x y r /N

...(1) or 2 2 (X X)(Y Y) r (X X (Y Y)) ...(2) or 2 2 2 2 XY (X)(Y) N r (X) (Y) X Y N N

...(3) or 2 2 2 2 N XY – (X)(Y) r N X – (X) N Y – (Y) Σ ∑∑ = Σ Σ•Σ Σ ...(4) Properties of Correlation Coefficient Let us now discuss the properties of the correlation coefficient • r has no unit. It is a pure number. It means units of measurement are not part of r. r between height in feet and weight in kilograms, for instance, could be say 0.7. • A negative value of r indicates an inverse relation. A change in one variable is associated with change in the other variable in the opposite direction. When price of a commodity rises, its demand falls. When the rate of interest rises the demand for funds also falls. It is because now funds have become costlier. • If r is positive the two variables move in the same direction. When the price of coffee, a substitute of tea, rises the demand for tea also rises. Improvement in irrigation facilities is associated with higher yield. When temperature rises the sale of ice-creams becomes brisk. 2022-23 CORRELATION 97 • The value of the correlation coefficient lies between minus one and plus one, –1 ≤ r ≤1. If, in any exercise, the value of r is outside this range it indicates error in calculation. • The magnitude of r is unaffected by the change of origin and change of scale. Given two variables X and Y let us define two new variables. U

= X–A B ;V = Y–C D where A and C are assumed means of X and Y respectively. B and D are common factors and of same sign. Then rxy = ruv This. property is used to calculate correlation coefficient in a highly simplified manner, as in the step deviation method. • If r = 0 the two variables are uncorrelated. There is no linear relation between them. However other types of relation may be there. • If r = 1 or r = –1 the correlation is perfect and there is exact linear relation. • A high value of r indicates strong linear relationship. Its value is said to be high when it is close to +1 or –1. • A low value of r (close to zero) indicates a weak linear relation. But there may be a non-linear relation. As you have read in Chapter 1, the statistical methods are no substitute for common sense. Here, is another example, which highlights the need for understanding the data properly before correlation is calculated and interpreted. An epidemic spreads in some villages and the government sends a team of doctors to the affected villages. The correlation between the number of deaths and the number of doctors sent to the villages is found to be positive. Normally, the healthcare facilities provided by the doctors are expected to reduce the number of deaths showing a negative correlation. This happened due to other reasons. The data relate to a specific time period. Many of the reported deaths could be terminal cases where the doctors could do little. Moreover, the benefit of the presence of doctors becomes visible only after some time. It is also possible that the reported deaths are not due to the epidemic. A tsunami suddenly hits the state and death toll rises. Let us illustrate the calculation of r by examining the relationship between years of schooling of farmers and the annual yield per acre. 2022-23 98 STATISTICS FOR ECONOMICS Example 1 No. of years Annual yield per of schooling acre in ’000 (Rs) of farmers 0 4 2 4 4 6 6 10 8 10 10 8 12 7 Formula 1 needs the value of Xy x y ∑ , , σ σ From Table 7.1 we get, xy X X N x ∑ = = ∑ − = 42 112 7 2 , ( ) σ , 2 y (Y Y) 38 N 7 Substituting these values in formula (1) 42 r 0.644 112 38 7 7 7 The same value can be obtained from formula (2) also. 2 2 (X X) (Y Y) r (X X) (Y Y) ...(2) 42 r 0.644 112 38 Thus, years of education of farmers and annual yield per acre are positively correlated. The value of r is also large. It implies that more the number of years farmers invest in education, higher will be the yield per acre. It underlines the importance of farmers’ education. To use formula (3) TABLE 7.1 Calculation of r between years of schooling of farmers and annual yield Years of (X– X) (X– X) 2 Annual yield (Y– Y) (Y– Y) 2 (X– X)(Y– Y) Education per acre in ’000 Rs (X) (Y) 0 –6 36 4 –3 9 18 2 –4 16 4 –3 9 12 4 –2 4 6 –1 1 2 6 0 0 10 3 9 0 8 2 4 10 3 9 6 1 0 4 16 8 1 1 4 12 6 36 7 0 0 0 Σ X=42 Σ (X– X) 2=112 Σ Y=49 Σ (Y– Y) 2=38 Σ (X– X)(Y– Y)=42 2022-23 CORRELATION 99 2 2 2 2 (X)(Y) XY N r (X) (Y) X Y N N ...(3) the value of the following expressions have to be calculated i.e. 2 2 XY, X , Y . Now apply formula (3) to get the value of r. Let us know the interpretation of different values of r. The correlation coefficient between marks secured in English and Statistics is, say, 0.1. It means that though the marks secured in the two subjects are positively correlated, the strength of the relationship is weak. Students with high marks in English may be getting relatively low marks in statistics. Had the value of r been, say, 0.9, students with high marks in English will invariably get high marks in Statistics. An example of negative correlation is the relation between arrival of vegetables in the local mandi and price of vegetables. If r is –0.9, vegetable supply in the local mandi will be accompanied by lower price of vegetables. Had it been –0.1, large vegetable supply will be accompanied by lower price, not as low as the price, when r is –0.9. The extent of price fall depends on the absolute value of r. Had it been zero, there would have been no fall in price, even after large supplies in the market. This is also a possibility if the increase in supply is taken care of by a good transport network transferring it to other markets. Activity • Look at the following table. Calculate r between annual growth of national income at current price and the Gross Domestic Saving as percentage of GDP. Step deviation method to calculate correlation coefficient. When the values of the variables are large, the burden of calculation can be considerably reduced by using a property of r. It is that r is independent of change in origin and scale. It is also known as step deviation method. It involves the transformation of the variables X and Y as follows: TABLE 7.2 Year Annual growth Gross Domestic of National Saving as

Income percentage of GDP 1992–93 14 24 1993–94 17 23 1994–95 18 26 1995–96 17 27 1996–97 16 25 1997–98 12 25 1998–99 16 23 1999–00 11 25 2000–01 8 24 2001–02 10 23 Source: Economic Survey, (2004–05) Pg. 8,9 2022-23 100 STATISTICS FOR ECONOMICS XA YC U ;V B D where A and B are assumed means, h and k are common factors and have same signs. Then rUV = rXY This can be illustrated with the exercise of analysing the correlation between price index and money supply. Example 2 Price 120 150 190 220 230 index (X) Money 1800 2000 2500 2700 3000 supply in Rs crores (Y) The simplification, using step deviation method is illustrated below. Let A = 100; h = 10; B = 1700 and k = 100 The table of transformed variables is as follows: Calculation of r between price index and money supply using step deviation method TABLE 7.3 U V X 100 10 Y 1700 100

U2 V2 UV 2 1 412 5 3 25 9 15 9 8 81 64 72 12 10 144 100 120 13 13 169 169 169 ΣU = 41; ΣU = 35; ΣU2 = 423; ΣV2 = 343; ΣUV = 378 Substituting these values in formula (3) r= Σ Σ Σ Σ Σ Σ UV U U U U V 2 2 V − ( )( ) − ( ) − ( ) N N N 2 2 (3) = − × − − 378 41 35 5 423 41 5 343 35 5 2 2 ( ) ( ) = 0.98 The strong positive correlation between price index and money supply is an important premise of monetary policy. When the money supply grows the price index also rises. Activity • Using data related to India's population and national income, calculate the correlation between them using step deviation method. Spearman's rank correlation Spearman's rank correlation was developed by the British psychologist C.E. Spearman. It is used in the following situations: 1. Suppose we are trying to estimate the correlation between the heights and weights of students in a remote village where neither measuring rods nor weighing machines are 2022-23 CORRELATION 101 available. In such a situation, we cannot measure height or weight, but we can certainly rank the students according to weight and height. These ranks can then be used to calculate Spearman's rank correlation coefficient. 2. Suppose we are dealing with things such as fairness, honesty or beauty. These cannot be measured in the same way as we measure income, weight or height. At most, these things can be measured relatively, for example, we may be able to rank people according to beauty (some people would argue that even this is not possible because standards and criteria of beauty may differ from person to person and culture to culture). If we wish to find the relation between variables, at least one of which is of this type, then Spearman's rank correlation coefficient is to be used. 3. Spearman's rank correlation coefficient can be used in some cases where there is a relation whose direction is clear but which is nonlinear as shown when the scatter diagrams are of the type shown in Figures 7.6 and 7.7. 4. Spearman's correlation coefficient is not affected by extreme values. In this respect, it is better than Karl Pearson's correlation coefficient. Thus if the data contains some extreme values, Spearman's correlation coefficient can be very useful. Rank correlation coefficient and simple correlation coefficient have the same interpretation. Its formula has been derived from simple correlation coefficient where individual values have been replaced by ranks. These ranks are used for the calculation of correlation. This coefficient provides a measure of linear association between ranks assigned to these units, not their values. The Spearman's rank correlation formula is 2 a 3 6 D r 1 n n ...(4) where n is the number of observations and D the deviation of ranks assigned to a variable from those assigned to the other variable. All the properties of the simple correlation coefficient are applicable here. Like the Pearsonian Coefficient of correlation it lies between 1 and –1. However, generally it is not as accurate as the ordinary method. This is due the fact that all the information concerning the data is not utilised. The first difference is the difference of consecutive values. The first differences of the values of items in the series, arranged in order of magnitude, are almost never constant. Usually the data cluster around the central values with smaller differences in the middle of the array. If the first differences were constant, then r and rk would give identical results. In general rk is less than or equal to r. Calculation of Rank Correlation Coefficient The calculation of rank correlation will be illustrated under three situations. 2022-23 102 STATISTICS FOR ECONOMICS 1. The ranks are given. 2. The ranks are not given. They have to be worked out from the data. 3. Ranks are repeated. Case 1: When the ranks are given Example 3 Five persons are assessed

by three judges in a beauty contest. We have to find out which pair of judges has the nearest approach to common perception of beauty. Competitors Judge 12 3 4 5 A 12 3 4 5 B 2 4 1 53 C 13 5 2 4 There are 3 pairs of judges necessitating calculation of rank correlation thrice. Formula (4) will be used. r D n n s = − − 1 6 2 3 Σ ...(4) The rank correlation between A and B is calculated as follows: A B D D2 1 2 –1 1 2 4 –2 4 3 12 4 4 5 –1 1 5 32 4 Total 14 Substituting these values in formula (4) r D n n s = − − 1 6 2 3 Σ ...(4) = − × − 1 =− =− = 6 14 5 5 1 84 120 1 07 03 3 . . The rank correlation between A and C is calculated as follows: A C D D2 1 10 0 2 3 –1 1 3 5 –2 4 4 2 2 4 5 41 1 Total 10 Substituting these values in formula (4) the rank correlation is 0.5. Similarly, the rank correlation between the rankings of judges B and C is 0.9. Thus, the perceptions of judges A and C are the closest. Judges B and C have very different tastes. Case 2: When the ranks are not given Example 4 We are given the percentage of marks, secured by 5 students in Economics and Statistics. Then the ranking has to be worked out and the rank correlation is to be calculated. Student Marks in Marks in Statistics Economics (X) (Y) A 85 60 B 60 48 C 55 49 D 65 50 E 75 55 2022-23 CORRELATION 103 Student Ranking in Ranking in Statistics Economics (Rx) (RY) A 1 1 B 4 5 C 5 4 D 3 3 E 2 2 Once the ranking is complete formula (4) is used to calculate rank correlation. Case 3: When the ranks are repeated and ranks of not given Example 5 The values X and Y are given as follows X Y 1200 75 1150 65 1000 50 990 100 800 90 780 85 760 90 750 40 730 50 700 60 620 50 600 75 In order to work out the rank correlation, the ranks of the values are worked out. Common ranks are given to the repeated items. The common rank is the mean of the ranks which those items would have assumed if they were slightly different from each other. The next item will be assigned the rank next to the rank already assumed. Here Y has the value 50 at the 9th, 10th and 11th rank. Hence all three are given the average rank i.e.10, Rank of X Rank of Y Deviation D2 in Ranks 1 5.5 –4.5 20.25 2 7 –5 25.00 3 10 –7 49.00 4 1 3 9.00 5 2.5 2.5 6.25 6 4 2 4.00 7 2.5 4.5 20.25 8 12 –4 16.00 9 10 –1 1.00 10 8 2 4.00 11 10 1 1.00 12 5.5 6.5 42.25 198.00 The formula of Spearman's rank correlation coefficient when the ranks are repeated is as follows r D mm mm n n s = − + − + − + □□□□□□ − 1 6 12 12 1 2 1 3 1 2 3 2 2 Σ ( )( ) ... ( ) where m1, m2, ..., are the number of repetitions of ranks and m m 31 1 12 − ..., their corresponding correction factors. The necessary correction for this data thus is 3 3 3 -3 2 -2 30 + = = 2.5 12 12 12 Substituting the values of these expressions s 3 6 (198 + 2.5) r =1- = (1-0.70)= 0.30 12 - 12 Thus, there is positive rank correlation between X and Y. Both X and Y move in the same direction. However, the 2022-23 104 STATISTICS FOR ECONOMICS relationship cannot be described as strong. Activity • Collect data on marks scored by 10 of your classmates in class IX and X examinations. Calculate the rank correlation coefficient between them. If your data do not have any repetition, repeat the exercise by taking a data set having repeated ranks. What are the circumstances in which rank correlation coefficient is preferred to simple correlation coefficient? If data are precisely measured will you still prefer rank correlation coefficient to simple correlation? When can you be indifferent to the choice? Discuss in class. 4. CONCLUSION We have discussed some techniques for studying the relationship between two variables, particularly the linear relationship. The scatter diagram gives a visual presentation of the relationship and is not confined to linear relations. Karl Pearson's coefficient of correlation and Spearman's rank correlation measure linear relationship among variables. When the variables cannot be measured precisely, rank correlation can be used. These measures however do not imply causation. The knowledge of correlation gives us an idea of the direction and intensity of change in a variable when the correlated variable changes. Recap • Correlation analysis studies the relation between two variables. • Scatter diagrams give a visual presentation of the nature of relationship between two variables. • Karl Pearson's coefficient of correlation r measures numerically only linear relationship between two variables. r lies between –1 and 1. • When the variables cannot be measured precisely Spearman's rank correlation can be used to measure the linear relationship numerically. • Repeated ranks need correction factors. • Correlation does not mean causation. It only means covariation. 2022-23 CORRELATION 105

EXERCISES 1. The unit of correlation coefficient between height in feet and weight in kgs is (i) kg/feet (ii) percentage (iii) non-existent 2. The range of simple correlation coefficient is (i) 0 to infinity (ii) minus one to plus one (iii) minus infinity to infinity 3. If rxy is positive the relation between X and Y is of the type (i) When Y increases X increases (ii) When Y decreases X increases (iii) When Y increases X does not change 4. If rxy = 0 the variable X and Y are (i) linearly related (ii) not linearly related (iii) independent 5. Of the following three measures which can measure any type of relationship (i) Karl Pearson's coefficient of correlation (ii) Spearman's rank correlation (iii) Scatter diagram 6. If precisely measured data are available the simple correlation coefficient is (i) more accurate than rank correlation coefficient (ii) less accurate than rank correlation coefficient (iii) as accurate as the rank correlation coefficient 7. Why is r preferred to covariance as a measure of association? 8. Can r lie outside the –1 and 1 range depending on the type of data? 9. Does correlation imply causation? 10. When is rank correlation more precise than simple correlation coefficient? 11. Does zero correlation mean independence? 12. Can simple correlation coefficient measure any type of relationship? 13. Collect the price of five vegetables from your local market every day for a week. Calculate their correlation coefficients. Interpret the result. 14. Measure the height of your classmates. Ask them the height of their 2022-23 106 STATISTICS FOR ECONOMICS Activity • Use all the formulae discussed here to calculate r between India's national income and exports taking at least ten observations. benchmate. Calculate the correlation coefficient of these two variables. Interpret the result. 15. List some variables where accurate measurement is difficult. 16. Interpret the values of r as 1, –1 and 0. 17. Why does rank correlation coefficient differ from Pearsonian correlation coefficient? 18. Calculate the correlation coefficient between the heights of fathers in inches (X) and their sons (Y) X 65 66 57 67 68 69 70 72 Y 67 56 65 68 72 72 69 71 (Ans. r = 0.603) 19. Calculate the correlation coefficient between X and Y and comment on their relationship: X –3 –2 –1 123 Y 941149 (Ans. r = 0) 20. Calculate the correlation coefficient between X and Y and comment on their relationship X1 3 4 5 7 8 Y 268 10 14 16 (Ans. r = 1) 2022-23Index Numbers Studying this chapter should enable you to: • understand the meaning of the term index number; • become familiar with the use of some widely used index numbers; • calculate an index number; • appreciate its limitations. 1. INTRODUCTION You have learnt in the previous chapters how summary measures can be obtained from a mass of data. Now you will learn how to obtain summary measures of change in a group of related variables. Rabi goes to the market after a long gap. He finds that the prices of most commodities have changed. Some items have become costlier, while others have become cheaper. On his return from the market, he tells his father about the change in price of the each and every item, he bought. It is bewildering to both. The industrial sector consists of many subsectors. Each of them is changing. The output of some subsectors are rising, while it is falling in some subsectors. The changes are not uniform. Description of the individual rates of change will be difficult to understand. Can a single figure summarise these changes? Look at the following cases: Case 1 An industrial worker was earning a salary of Rs 1,000 in 1982. Today, he CHAPTER 2022-23 108 STATISTICS FOR ECONOMICS earns Rs 12,000. Can his standard of living be said to have risen 12 times during this period? By how much should his salary be raised so that he is as well off as before? Case 2 You must be reading about the sensex in the newspapers. The sensex crossing 8000 points is, indeed, greeted with euphoria. When, sensex dipped 600 points recently, it eroded investors' wealth by Rs 1,53,690 crores. What exactly is sensex? Case 3 The government says inflation rate will not accelerate due to the rise in the price of petroleum products. How does one measure inflation? These are a sample of questions you confront in your daily life. A study of the index number helps in analysing these questions. 2. WHAT IS AN INDEX NUMBER An index number is a statistical device for measuring changes in the magnitude of a group of related variables. It represents the general trend of diverging ratios, from which it is calculated. It is a measure of the average change in a group of related variables over two different situations. The comparison may be between like categories such as persons, schools, hospitals etc.

An index number also measures changes in the value of the variables such as prices of specified list of commodities, volume of production in different sectors of an industry, production of various agricultural crops, cost of living etc. Conventionally, index numbers are expressed in terms of percentage. Of the two periods, the period with which the comparison is to be made, is known as the base period. The value in the base period is given the index number 100. If you want to know how much the price has changed in 2005 from the level in 1990, then 1990 becomes the base. The index number of any period is in proportion with it. Thus an index number of 250 indicates that the value is two and half times that of the base period. Price index numbers measure and permit comparison of the prices of certain goods. Quantity index numbers measure the changes in the physical volume of production, construction or employment. Though price index numbers are more widely used, a production index is also an important indicator of the level of the output in the economy. 2022-23 INDEX NUMBERS 109 3. CONSTRUCTION OF AN INDEX NUMBER In the following sections, the principles of constructing an index number will be illustrated through price index numbers. Let us look at the following example: Example 1 Calculation of simple aggregative price index TABLE 8.1 Commodity Base Current Percentage period period change price (Rs) price (Rs) A 2 4 100 B 5 6 20 C 4 5 25 D 2 3 50 As you observe in this example, the percentage changes are different for every commodity. If the percentage changes were the same for all four items, a single measure would have been sufficient to describe the change. However, the percentage changes differ and reporting the percentage change for every item will be confusing. It happens when the number of commodities is large, which is common in any real market situation. A price index represents these changes by a single numerical measure. There are two methods of constructing an index number. It can be computed by the aggregative method and by the method of averaging relatives. The Aggregative Method The formula for a simple aggregative price index is P P P 01 1 0 = × 100 Σ Σ Where P1 and P0 indicate the price of the commodity in the current period and base period respectively. Using the data from example 1, the simple aggregative price index is P01 4653 2542 = 100 138 5 +++ +++ × = . Here, price is said to have risen by 38.5 per cent. Do you know that such an index is of limited use? The reason is that the units of measurement of prices of various commodities are not the same. It is unweighted, because the relative importance of the items has not been properly reflected. The items are treated as having equal importance or weight. But what happens in reality? In reality the items purchased differ in order of importance. Food items occupy a large proportion of our expenditure. In that case an equal rise in the price of an item with large weight and that of an item with low weight will have different implications for the overall change in the price index. The formula for a weighted aggregative price index is P P q P q 01 1 0 0 0 = ×100 Σ Σ An index number becomes a weighted index when the relative importance of items is taken care of. 2022-23 110 STATISTICS FOR ECONOMICS Here weights are quantity weights. To construct a weighted aggregative index, a well-specified basket of commodities is taken and its worth each year is calculated. It thus measures the changing value of a fixed aggregate of goods. Since the total value changes with a fixed basket, the change is due to price change. Various methods of calculating a weighted aggregative index use different baskets with respect to time. Example 2 Calculation of weighted aggregative price index TABLE 8.2 Base period Current period Commodity Price Quantity Price Quality P0 q0 p1 q1 A 2 10 4 5 B 5 12 6 10 C 4 20 5 15 D 2 15 3 10 P P q P q 01 1 0 0 0 = × 100 Σ Σ = × +× +× +× × +× +× +× × 4 10 6 12 5 20 3 15 2 10 5 12 4 20 2 15 100 = ×= 257 190 100 135 3. This method uses the base period quantities as weights. A weighted aggregative price index using base period quantities as weights, is also known as Laspeyre's price index. It provides an explanation to the question that if the expenditure on base period basket of commodities was Rs 100, how much should be the expenditure in the current period on the same basket of commodities? As you can see here, the value of base period quantities has risen by 35.3 per cent due to price rise. Using base period quantities as weights, the price is said to have risen by 35.3 percent. Since the current period

quantities differ from the base period quantities, the index number using current period weights gives a different value of the index number. P P q P q 01 1 1 0 1 = × 100 Σ Σ = ×+× +× +× ×+× +× +× × 4 5 6 10 5 15 3 10 2 5 5 10 4 15 2 10 100 = ×= 185 140 100 132 1. It uses the current period quantities as weights. A weighted aggregative price index using current period quantities as weights is known as Paasche's price index. It helps in answering the question that, if the 2022-23 INDEX NUMBERS 111 current period basket of commodities was consumed in the base period and if we were spending Rs 100 on it, how much should be the expenditure in current period on the same basket of commodities. Paasche's price index of 132.1 is interpreted as a price rise of 32.1 per cent. Using current period weights, the price is said to have risen by 32.1 per cent. Method of Averaging relatives When there is only one commodity, the price index is the ratio of the price of the commodity in the current period to that in the base period, usually expressed in percentage terms. The method of averaging relatives takes the average of these relatives when there are many commodities. The price index number using price relatives is defined as P n p p 01 1 0 1 = ×Σ 100 where P1 and Po indicate the price of the ith commodity in the current period and base period respectively. The ratio (P1/P0) × 100 is also referred to as price relative of the commodity. n stands for the number of commodities. In the current exmple P01 1 4 4 2 6 5 5 4 3 2 = +++ 100 149 □□□□□□ × = Thus, the prices of the commodities have risen by 49 per cent. The weighted index of price relatives is the weighted arithmetic mean of price relatives defined as P W P P W i i i i n i i n 01 1 0 1 1 100 = ∑ × ∑ □□□□□□ = □ = where W = Weight. In a weighted price relative index weights may be determined by the proportion or percentage of expenditure on them in total expenditure during the base period. It can also refer to current period depending on the formula used. These are, essentially, the value shares of different commodities in the total expenditure. In general the base period weight is preferred to the current period weight. It is because calculating the weight every year is inconvenient. It also refers to the changing values of different baskets. They are strictly not comparable. Example 3 shows the type of information one needs for calculating weighted price index. Example 3 Calculation of weighted price relatives index TABLE 8.3 Commodity Weight Base Current Price in % year price year relative price (in Rs) (in Rs.) A 40 2 4 200 B 30 5 6 120 C 20 4 5 125 D 10 2 3 150 2022-23 112 STATISTICS FOR ECONOMICS The weighted price index is P W P P W i i i i n i i n 01 1 0 1 1 100 = ∑ × ∑ □□□□□□ = □ = = 40 200 30 120 20 125 10 150 × +× +× +× 100 = 156 The weighted price index is 156. The price index has risen by 56 per cent. The values of the unweighted price index and the weighted price index differ, as they should. The higher rise in the weighted index is due to the doubling of the most important item A in Example 3. Activity • Interchange the current period values with the base period values, in the data given in Example 2. Calculate the price index using Laspeyre's, and Paasche's formula. What difference do you observe from the earlier illustration? 4. SOME IMPORTANT INDEX NUMBERS Consumer price index Consumer price index (CPI), also known as the cost of living index, measures the average change in retail prices. Consider the statement that the CPI for industrial workers (2001=100) is 277 in December 2014. What does this statement mean? It means that if the industrial worker was spending Rs 100 in 2001 for a typical basket of commodities, he needs Rs 277 in December 2014 to be able to buy an identical basket of commodities. It is not necessary that he/she buys the basket. What is important is whether he has the capability to buy it. Example 4 Construction of consumer price index number. CPI WR W == = Σ Σ 9786 85 100 97 86 . . This exercise shows that the cost of living has declined by 2.14 per cent. What does an index larger than 100 indicate? It means a higher cost of living necessitating an upward adjustment in wages and salaries. The rise is equal to the amount, it exceeds 100. If the index is 150, 50 per cent upward adjustment is required. The salaries of the employees have to be raised by 50 per cent. TABLE 8.4 Item Weight in % Base period Current period R=P1/P0 × 100 WR W price (Rs) price (Rs) (in%) Food 35 150 145 96.67 3883.45 Fuel 10 25 23 92.00 920.00 Cloth 20 75 65 86.67 1733.40 Rent 15 30 30 100.00 1500.00 Misc. 20 40 45 112.50 2250.00 9786.85 2022-23 INDEX NUMBERS 113 This index is

now being prepared with base 2012 = 100 and many improvements have been made in accordance with international standards. The basket of items and weighing diagrams for the revised series has been prepared using the Modified Mixed Reference Period (MMRP) data of the Consumer Expenditure Survey (CES), 2011-12 of the 68th Round of National Sample Survey (NSS). The weights are as follows: Major Groups Weight Food and beverages 45.86 Pan, tobacco and intoxicants 2.38 Clothing & footwear 6.53 Housing 10.07 Fuel & light 6.84 Misc. group 28.32 General 100.00 Source: Economic Survey, 2014-15 Government of India. Data are provided on the rate of change per year of each of the sub-groups and main groups. So, we can find out from this data which prices are rising most of all and are, thereby, contributing to inflation. The Consumer Food Price Index (CFPI) is the same as the Consumer Price Index for 'Food and Beverages' except that it does not include alcoholic beverages' and 'Prepared meals, snacks, sweets, etc'. Wholesale Price Index The Wholesale price index number indicates the change in the general price level. Unlike the CPI, it does not have any reference consumer category. Consumer Price Index Number Government agencies in India prepare a large number of consumer price index numbers. Some of them are as follows: • Consumer Price Index Numbers for Industrial Workers with base 2001=100. Value of Index in May 2017 was 278. • All-India Consumer Price Index Numbers for Agricultural Labourers with base 1986- 87=100. Value of Index in May 2017 was 872. • All-India Consumer Price Index Numbers for Rural Labourers with base 1986-87=100. Value of Index in May 2017 was 878. • All-India Rural Consumer Index with base 2012 = 100. Value of Index in May 2017 was 133.3 • All-India Urban Consumer Price Index with base 2012 = 100. Value of Index in May 2017 was 129.3 All-India Combined Consumer Price with base 2012 = 100. Value of Index in May 2017 was 131.4 In addition, these indices are available at the state level. The detailed methods used for calculating each of these index numbers is different and it is not necessary to go into these details. The Reserve Bank of India is using the All-India Combined Consumer Price Index as the main measure of how consumer prices are changing. Therefore, some details are necessary about this index number. 2022-23 114 STATISTICS FOR ECONOMICS It does not include items pertaining to services like barber charges, repairing, etc. What does the statement "WPI with 2004-05 as base is 253 in October, 2014" mean? It means that the general price level has risen by 153 per cent during this period. The Wholesale Price Index is now being prepared with base 2011-12 = 100. The value of the index for May 2017 was 112.8. This index uses the prices that are prevailing at the wholesale level. Only the prices of goods are included. The main types of goods and their weights are as follows: Major Groups Weight Primary Articles 22.62 Fuel and Power 13.15 Manufactured Products 64.23 All Commodities 'Headline Inflation' 100.00 'WPI Food Index' 24.23 Source: Ministry of Statistics and Programme Implementation, 2016-17 Usually the data on Wholesale Prices is available quickly. The 'All Commodities Inflation Rate' is often referred to as 'Headline Inflation'. Sometimes the focus is on food items which comprise 24.23% of the total weight. This Food Index is made up of Food Articles from the Primary Articles group and Food Products from the Manufactured Products group. Other economists like to focus on the wholesale prices in manufactured goods (other than food articles and also excluding fuel) and for this they study 'Core Inflation' which make up around 55% of the total weight of the wholesale price index. Index of Industrial production Unlike the Consumer Price Index or the Wholesale Price Index, this is an index which tries to measure quantities. With effect from April 2017, the base year has been fixed at 2011-12 = 100. The reason for the fast changes in the base year is that every year a large number of items either stop being manufactured or become inconsequential, while many other new items start getting manufactured. While the price indices were essentially weighted averages of price relatives, the index of industrial production is a weighted arithmetic mean of quantity relatives with weights being allotted to various items in proportion to value added by manufacture in the base year by using Laspeyre's formula: IIP q W W i i i n i i n 01 1 1 1 = 100 ∑ ∑ × = = Where IIP01 is the index, qi1 is the quantity relative for year 1 with year 0 as base for good i, Wi is the weight allotted to the good

i. There are n goods in the production index. The index of Industrial Production is available at the level of Industrial Sectors and sub-sectors. The main branches are 'Mining', 'Manufacturing' and 'Electricity'. Sometimes the focus is on what are called "core" industries 2022-23 INDEX NUMBERS 115 namely coal, crude oil, natural gas, refinery products, fertilisers, steel, cement and electricity. The Eight Core Industries have a combined weight of 40.27 per cent in the IIP. TABLE 8.5 Weightage Pattern of IIP (Industrial Production Sectors) Sector Weight Mining 14.4 Manufacturing 77.6 Electricity 8.0 General Index 100.0 Source: Ministry of Statistics and Programme Implementation, 2016-17 The index of Industrial Production is also available according to the "use" of the product, that is, for example, "Primary Goods", "Consumer Durables" and so on. TABLE 8.6 Weightage Pattern of IIP (Use-based Groups) Group Weight Primary 34.1 Capital Goods 8.2 Intermediate Goods 17.2 Infrastructure/Construction Goods 12.3 Consumer Durables 12.8 Consumer Non-durables 15.3 General Index 100.0 Source: Ministry of Statistics and Programme Implementation, 2016-17 Human Development Index Another useful index widely used to know the development of a country is Human Development Index (HDI) about which you might have studied in Class X. SENSEX Sensex is the short form of Bombay Stock Exchange Sensitive Index with 1978–79 as base. The value of the sensex is with reference to this period. It is the benchmark index for the Indian stock market. It consists of 30 stocks which represent 13 sectors of the economy and the companies listed are leaders in their respective industries. If the sensex rises, it indicates that the market is doing well and investors expect better earnings from companies. It also indicates a growing confidence of 2022-23 116 STATISTICS FOR ECONOMICS investors in the basic health of the economy. 5. ISSUES IN THE CONSTRUCTION OF AN INDEX NUMBER You should keep certain important issues in mind, while constructing an index number. • You need to be clear about the purpose of the index. Calculation of a volume index will be inappropriate, when one needs a value index. • Besides this, the items are not equally important for different groups of consumers when a consumer price index is constructed. The rise in petrol price may not directly impact the living condition of the poor agricultural labourers. Thus the items to be included in any index have to be selected carefully to be as representative as possible. Only then you will get a meaningful picture of the change. • Every index should have a base year. This base year should be as normal as possible. Years having extreme values should not be selected as base year. The period should also not belong to too far in the past. The comparison between 1993 and 2005 is much more meaningful than a comparison between 1960 and 2005. Many items in a 1960 typical consumption basket have disappeared at present. Therefore, the base year for any index number is routinely updated. • Another issue is the choice of the formula, which depends on the nature of question to be studied. The only difference between the Laspeyre's index and Paasche's index is the weights used in these formulae. • Besides, there are many sources of data with different degrees of reliability. Data of poor reliability will give misleading results. Hence, due care should be taken in the collection of data. If primary data are not being used, then the most reliable source of secondary data should be chosen. Activity • Collect data from the local vegetable market over a week for, at least 10 items. Try to construct the daily price index for the week. What problems do you encounter in applying both methods for the construction of a price index? 6. INDEX NUMBER IN ECONOMICS Why do we need to use the index numbers? Wholesale price index number (WPI), consumer price index number (CPI) and industrial production index (IIP) are widely used in policy making. • Consumer index number (CPI) or cost of living index numbers are helpful in wage negotiation, formulation of income policy, price policy, rent control, taxation and general economic policy formulation. • The wholesale price index (WPI) is used to eliminate the effect of changes in prices on aggregates, such as national income, capital formation, etc. • The WPI is widely used to measure the rate of inflation. Inflation is a general and continuing increase in prices. If inflation becomes sufficiently large, 2022-23 INDEX NUMBERS 117 money may lose its traditional function as a medium of exchange and as a unit of account. Its primary impact lies in lowering the value of

money. The weekly inflation rate is given by where Xt and Xt-1 refer to the WPI for the tth and (t-1)th weeks. • CPI are used in calculating the purchasing power of money and real wage: (i) Purchasing power of money = 1/ Cost of living index (ii) Real wage = (Money wage/Cost of living index) × 100 If the CPI (1982=100) is 526 in January 2005 the equivalent of a rupee in January, 2005 is given by Rs 100 526 = 0 19 . . It means that it is worth 19 paise in 1982. If the money wage of the consumer is Rs 10,000, his real wage will be Rs 10 000 Rs 100 526 , × = 1 901 , It means Rs 1,901 in 1982 has the same purchasing power as Rs 10,000 in January, 2005. If he/she was getting Rs 3,000 in 1982, he/she is worse off due to the rise in price. To maintain the 1982 standard of living the salary should be raised to Rs 15,780 which is obtained by multiplying the base period salary by the factor 526/100. • Index of industrial production gives us a quantitative figure about the change in production in the industrial sector. • Agricultural production index provides us a ready reckoner of the performance of agricultural sector. • Sensex is a useful guide for investors in the stock market. If the sensex is rising, investors are optimistic of the future performance of the economy. It is an appropriate time for investment. Where can we get these index numbers? Some of the widely used index numbers — WPI, CPI, Index Number of Yield of Principal Crops, Index of Industrial Production, Index of Foreign Trade — are available in Economic Survey. Activity • Check from the newspapers and construct a time series of sensex with 10 observations. What happens when the base of the consumer price index is shifted from 1982 to 2000? 7. CONCLUSION Estimating index number enables you to calculate a single measure of change of a large number of items. Index numbers can be calculated for price, quantity, volume, etc. It is also clear from the formulae that the index numbers need to be interpreted carefully. The items to be included and the choice of the base period are important. Index numbers are extremely important in policy making as is evident by their various uses. 2022-23 118 STATISTICS FOR ECONOMICS Recap • An index number is a statistical device for measuring relative change in a large number of items. • There are several formulae for working out an index number and every formula needs to be interpreted carefully. • The choice of formula largely depends on the question of interest. • Widely used index numbers are wholesale price index, consumer price index, index of industrial production, agricultural production index and sensex. • The index numbers are indispensable in economic policy making. EXERCISES 1. An index number which accounts for the relative importance of the items is known as (i) weighted index (ii) simple aggregative index (iii) simple average of relatives 2. In most of the weighted index numbers the weight pertains to (i) base year (ii) current year (iii) both base and current year 3. The impact of change in the price of a commodity with little weight in the index will be (i) small (ii) large (iii) uncertain 4. A consumer price index measures changes in (i) retail prices (ii) wholesale prices (iii) producers prices 5. The item having the highest weight in consumer price index for industrial workers is (i) Food (ii) Housing (iii) Clothing 2022-23 INDEX NUMBERS 119 6. In general, inflation is calculated by using (i) wholesale price index (ii) consumer price index (iii) producers' price index 7. Why do we need an index number? 8. What are the desirable properties of the base period? 9. Why is it essential to have different CPI for different categories of consumers? 10. What does a consumer price index for industrial workers measure? 11. What is the difference between a price index and a quantity index? 12. Is the change in any price reflected in a price index number? 13. Can the CPI for urban non-manual employees represent the changes in the cost of living of the President of India? 14. The monthly per capita expenditure incurred by workers for an industrial centre during 1980 and 2005 on the following items are given below. The weights of these items are 75,10, 5, 6 and 4 respectively. Prepare a weighted index number for cost of living for 2005 with 1980 as the base. Items Price in 1980 Price in 2005 Food 100 200 Clothing 20 25 Fuel & lighting 15 20 House rent 30 40 Misc 35 65 15. Read the following table carefully and give your comments. INDEX OF INDUSTRIAL PRODUCTION BASE 1993–94 Industry Weight in % 1996–97 2003–2004 General index 100 130.8 189.0 Mining and quarrying 10.73 118.2 146.9 Manufacturing 79.58 133.6 196.6 Electricity 10.69 122.0 172.6 16. Try to list the

important items of consumption in your family. 17. If the salary of a person in the base year is Rs 4,000 per annum and the current year salary is Rs 6,000, by how much should his salary be raised to maintain the same standard of living if the CPI is 400? 18. The consumer price index for June, 2005 was 125. The food index was 120 and that of other items 135. What is the percentage of the total weight given to food? 2022-23 120 STATISTICS FOR ECONOMICS 19. An enquiry into the budgets of the middle class families in a certain city gave the following information; Expenses on items Food Fuel Clothing Rent Misc. 35% 10% 20% 15% 20% Price (in Rs) in 2004 1500 250 750 300 400 Price (in Rs) in 1995 1400 200 500 200 250 What is the cost of living index during the year 2004 as compared with 1995? 20. Record the daily expenditure, quantities bought and prices paid per unit of the daily purchases of your family for two weeks. How has the price change affected your family? 21. Given the following dataYear CPI of industrial CPI of agricultural WPI workers labourers (1993–94=100) (1982 =100) (1986–87 = 100) 1995–96 313 234 121.6 1996–97 342 256 127.2 1997–98 366 264 132.8 1998–99 414 293 140.7 1999–00 428 306 145.3 2000–01 444 306 155.7 2001–02 463 309 161.3 2002–03 482 319 166.8 2003–04 500 331 175.9 Source: Economic Survey, 2004–2005, Government of India (i) Comment on the relative values of the index numbers. (ii) Are they comparable? 22. The monthly expenditure (Rs.) of a family on some important items and the Goods and Services Tax (GST) rates applicable to these items is as follows: Item Monthly Expense(Rs) GST Rate % Cereals 1500 0 Eggs 250 0 Fish, Meat 250 0 Medicines 50 5 Biogas 50 5 Transport 100 5 Butter 50 12 Babool 10 12 Tomato Ketchup 40 12 2022-23 INDEX NUMBERS 121 Biscuits 75 18 Cakes, Pastries 25 18 Branded Garments 100 18 Vacuum Cleaner, Car 1000 28 Calculate the average tax rate as far as this family is concerned. The calculation of the average GST rate makes use of the formula for weighted average. In this case, the weights are the shares of expenditure on each category of goods. The total weight is equal to the total expenditure of the family. And the variables are the GST rates. Category Expenditure Weight (w) GST Rate (x) WX Category 1 2000 0 0 Category 2 200 0.05 10 Category 3 100 0.12 12 Category 4 200 0.18 36 Category 5 1000 0.28 280 3500 338 The mean GST rate as far as this family is concerned is (338)/ (3500) = 0.966 i.e. 9.66% Activity • Consult your classteacher to make a list of widely used index numbers. Get the most recent data indicating the source. Can you tell what the unit of an index number is? • Make a table of consumer price index for industrial workers in the last 10 years and calculate the purchasing power of money. How is it changing? 2022-23Use of Statistical Tools Studying this chapter should enable you to: • be familiar with steps in designing a project; • apply various statistical tools in analysing a problem. 1. INTRODUCTION You have studied about the various statistical tools. These tools are important for us in daily life and are used in the analysis of data pertaining to economic activities such as production, consumption, distribution, banking and insurance, trade, transport, etc. In this chapter, you will learn the method of developing a project. This will help in understanding how statistical tools and methods can be used for various types of analysis. For example, you may have to collect information about a product from the consumer or about a new product or service to be launched in the market by the producer or analyse the spread of information technology in schools and so on. Developing a project by conducting a survey and preparing a report will help in analysing relevant information and suggesting improvements in a product or system. Steps Towards Making a Project Identifying a problem or an area of study At the outset, you should be clear about what you want to study. On the basis CHAPTER 2022-23 USE OF STATISTICAL TOOLS 123 of your objective, you will proceed with the collection and processing of the data. For example, production or sale of a product like car, mobile phone, shoe polish, bathing soap or a detergent, may be an area of interest to you. You may like to address certain water or electricity problems relating to households of a particular area. You may like to study about consumer awareness among households, i.e., awareness about rights of consumers. Choice of Target Group The choice or identification of the target group is important for framing appropriate questions for your questionnaire. If your project relates to cars, then your target group will mainly be the

middle income and the higher income groups. For the project studies relating to consumer products like soap, you will target all rural and urban consumers. For the availability of safe drinking water your target group can be both urban and rural population. Therefore, the choice of target groups, to identify those persons on whom you focus your attention, is very important while preparing the project report. Collection of Data The objective of the survey will help you to determine whether the data collection should be undertaken by using primary method, secondary method or both the methods. As you have read in Chapter 2, a first hand collection of data by using primary method can be done by using a questionnaire or an interview schedule, which may be obtained by personal interviews, mailing/postal surveys, phone, email, etc. Postal questionnaire must have a covering letter giving details about the purpose of inquiry. Your objective will be to determine the size and characteristics of your target group. For example, in a study pertaining to the primary and secondary level female literacy or consumption of a particular brand or soap, you will have to go to each and every family or household to collect the information i.e. you have to collect primary data. If sampling is used in your method of data collection, then care has to be taken about the suitability of the method of sampling. Secondary data can also be used provided it suits your requirement. Secondary data are usually used when there is paucity of time, money and manpower resources and the information is easily available. Organisation and Presentation of Data After collecting the data, you need to process the information so received, by organising and presenting them with the help of tabulation and suitable diagrams, e.g. bar diagrams, pie diagrams, etc. about which you have studied in chapter 3 and 4. 2022-23 124 STATISTICS FOR ECONOMICS Analysis and Interpretation Measures of Central Tendency (e.g. mean), Measures of Dispersion (e.g. Standard deviation), and Correlation will enable you to calculate the average, variability and relationship, if it exists among the variables. You have acquired the knowledge related to abovementioned measures in chapters 5, 6 and 7. Conclusion The last step will be to draw meaningful conclusions after analysing and interpreting the results. If possible you must try to predict the future prospects and suggestions relating to growth and government policies, etc. on the basis of the information collected. Bibliography In this section, you need to mention the details of all the secondary sources, i.e., magazines, newspapers, research reports used for developing the project. 2. SUGGESTED LIST OF PROJECTS These are a few suggested projects. You are free to choose any topic that deals with an economic issue. 1. Consider yourself as an advisor to Transport Minister who aims to bring about a better and coordinated system of transportation. Prepare a project report. 2. You may be working in a village cottage industry. It could be a unit manufacturing dhoop, agarbatti, candles, jute products, etc. You want to start a new unit of your own. Prepare a project proposal for getting a bank loan. 3. Suppose you are a marketing manager in a company and recently you have put up advertisements about your consumer product. Prepare a report on the effect of advertisements on the sale of your product. 4. You are a District Education Officer, who wants to assess the literacy levels and the reasons for dropping out of school children. Prepare a report. 5. Suppose you are a Vigilance Officer of an area and you receive complaints about overcharging of goods by traders i.e., charging a higher price than the Maximum Retail Price (MRP). Visit a few shops and prepare a report on the complaint. 6. Consider yourself to be the head of Gram Panchayat of a particular village who wants to improve amenities like safe drinking water to your people. Address your issues in a report form. 7. As a representative of a local government, you want to assess the participation of women in various employment schemes in your area. Prepare a project report. 8. You are the Chief Health Officer of a rural block. Identify the issues to be addressed through a project study. This may include health and sanitation problems in the area. 9. As the Chief Inspector of Food and Civil Supplies department, you have received a complaint about 2022-23 USE OF STATISTICAL TOOLS 125 food adulteration in the area of your duty. Conduct a survey to find the magnitude of the problem. 10. Prepare a report on Polio immunisation programme in a particular area. 11. You are a Bank Officer and want to survey the saving habits of the people by

taking into consideration income and expenditure of the people. Prepare a report. 12. Suppose you are part of a group of students who wants to study farming practices and the problems facing farmers in a village. Prepare a project report. 3. SAMPLE PROJECT This is a sample project for your guidance. Depending on the subject of your study the method used will obviously be different from the one used here. Project X is a young entrepreneur who wants to set up a factory to produce toothpaste. You are asked to advise X about how he should proceed. One of the first things you could do would be to study people's tastes with regard to toothpastes, their monthly expenses on toothpaste and other relevant facts. For this, you may decide to collect primary data. The data is to be collected with the help of a questionnaire. Whatever questionnaire you use must be capable of generating the information which you need for your study. Suppose you decide that the most important information that you need for your study is: • The average monthly expenditure on toothpaste • The brands of toothpaste that are currently in demand • The attitude of the customers towards these brands • Customers' preferences in regard to ingredients in the toothpaste • The major media influences on consumers' demand for toothpaste • The relation between income and all the above factors. If you can get hold of a questionnaire that has already been tried out and tested (perhaps for some similar study), you could use it after suitably modifying it to suit your requirements. Otherwise, you may need to prepare the questionnaire yourself, making sure that all the required information has been asked for. 2022-23 126 STATISTICS FOR ECONOMICS EXAMPLE OF QUESTIONNAIRE TO BE USED FOR THIS PROJECT REPORT 1. Name 2. Sex 3. Ages of family members (in years) .... 4. Total Number of family members:- 5. Monthly family income 6. Location of residence Urban Rural 7. Major occupation of the main bread-winner: (i) Service (ii) Professional (iii) Manufacturer (iv) Trader (v) Any other (please specify) 8. Does your family use toothpaste to clean your teeth? Yes No 9. If Yes, then according to you what should be the essential qualities of a good toothpaste (you can tick more than one option): (i) Plain (ii) Gel (iii) Antiseptic (iv) Flavoured (v) Carries Protection (vi) Fluoride (vii) Other ——— 10. If Yes, which brand of toothpaste do you use? ——— 11. How many 100 gram packs of this toothpaste do you use per month? 12.Are you satisfied with this toothpaste? Yes No 13. Are you prepared to try out a new toothpaste? Yes No 14. If Yes, what are the features you would like in the new toothpaste? (you can tick more than one option): (i) Plain (ii) Gel (iii) Antiseptic (iv) Flavoured (v) Carries Protection (vi) Fluoride (vii) Other ——— 15. What are the main sources of your information about toothpaste? (i) Cinema (ii) Exhibitions (iii) Internet (iv) Magazines (v) Newspapers (vi) Radio (vii)Sales Representatives (viii) Television (ix) Other ——— DATA ANALYSIS AND INTERPRETATION After collecting the required information you now have to organise and analyse. The final report may be as follows: EXAMPLE OF SIMPLIFIED PROJECT REPORT 1. Total Sample Size: 100 households 2. Location: Urban 67% Rural 33% Observation: Majority of users belonged to urban area. 2022-23 USE OF STATISTICAL TOOLS 127 (i) Age distribution Age in years No. of Persons Below 10 74 10–20 56 20–30 91 30–40 146 40–50 93 Above 50 40 Total 500 Fig. 9.1: Bar diagram Fig. 9.2: Bar diagram Observation: Majority of the families surveyed have 3–6 members. (iii) Monthly Family Income status Income No. of Households 0 - 10,000 20 10,000–20,000 40 20,000–30,000 30 30,000 - 40,000 10 Frequncy Distribution of Monthly Family Income and Calculation of Mean and Standard Deviation Income Class Midpoint x Freq. f d'=(X-20000)/5000 fd' f'd'2 (1) (2) (3) (4) (5) (6) 0-10000 5000 20 -3 -60 180 10000-20000 15000 40 -1 -40 40 20000-30000 25000 30 1 30 30 30000-40000 35000 10 3 30 90 100 -40 340 Observation: Majority of the persons surveyed belonged to age group 20–50 years. (ii) Family Size Family size No. of families 1–2 20 3–4 40 5–6 30 Above 6 10 Total 100 Histogram for this data is shown below. Fig. 9.3: Histogram 2022-23 128 STATISTICS FOR ECONOMICS Observation: Majority of the families surveyed have monthly income between 10,000 to 30,000. The mean income

was Rs.18000 and standard deviation was Rs.9000 (iv) Monthly Family budget on toothpaste The mean expenditure on toothpaste per household was Rs. 104 per month and standard deviation was Rs.35.60. Frequncy Distribution of Monthly Family Expenditure on Toothpaste and Calculation of Mean and Standard Deviation Income Class Midpoint x Freq. f d'=(X-100)/40 fd' fd'2 (1) (2) (3) (4) (5) (6) 0-40 20 5 -2 -10 20 40-80 60 20 -1 -20 20 80-120 100 40 0 0 0 120-160 140 30 1 30 30 160-200 180 5 2 10 20 100 10 90 2022-23 USE OF STATISTICAL TOOLS 129 (v) Major Occupational Status Family Occupation No. of Families Service 30 Professional 5 Manufacture 10 Trader 40 Any other (please specify) 15 (vii) Basis of selection Features Family members Advertisement 15 Persuaded by the Dentist 5 Price 35 Quality 45 Taste 20 Ingredients 10 Standardised marking 50 Tried new product 10 Company's brand name 35 Observation: Majority of the people selected the toothpaste on the basis of standardised markings, quality, price and company's brand name. (viii) Taste and Preferences Brand Satisfied Unsatisfied Aquafresh 2 3 Cibaca 5 4 Close up 10 2 Colgate 16 2 Meswak 3 2 Pepsodent 18 2 Anchor 2 2 Babool 2 1 Promise 2 1 OralB 4 3 Sensodyne 5 2 Pearl 2 2 Observation: Amongst the most used toothpastes the percentage of dissatisfaction was relatively less. (ix) Ingredients Preference Plain 40 Gel 70 Antiseptic 80 Flavoured 50 Carries protective 30 Fluoride 10 Observation: Majority of the people preferred gel and antiseptic-based toothpastes over the others. Fig. 9.4: Pie diagram Observation: Majority of the families surveyed were either service class or traders. (vi) Preferred use of toothpaste Brand No. of Hh. Brand No. of Hh. Aquafresh 5 Anchor 4 Cibaca 9 Babool 3 Close-up 12 Promise 3 Colgate 18 Meswak 5 Pepsodent 20 OralB 7 Pearl 4 Sensodyne 7 Any other 3 Observation: Pepsodent, Colgate and Close-up were the most preferred brands. 2022-23 130 STATISTICS FOR ECONOMICS (x) Media Influence Advertisement Families Influenced Television 47 Newspaper 30 Magazine 20 Cinema 25 Sales representative 15 Exhibits - stall 10 Radio 18 Role of Media 0 10 20 30 40 50 Role of Media 47 30 20 25 15 10 18 TV News paper Maga Cinema Sales -repre Exhibits stall Radio Families Influenced -zine -sentative Fig. 9.5: Bar diagram Observation: Majority of people came to know about the product either Recap • The objective of the study should be clearly identified. • The population and sample has to be chosen carefully. • The objective of survey will indicate the type of data to be used. • A questionnaire/interview schedule is prepared. • Collected data can be analysed by using various statistical tools. • Results are interpreted to draw meaningful conclusions. through television or through newspaper. (xi) Concluding Note of the Project Report Majority of the users belonged to urban area. Most of the people who were surveyed belonged to age group 25 to 50 years and had an average 3–6 members in a family. The monthly income of these families ranged between Rs 10,000 and Rs 30,000 and their main occupations were service and trading. Expenditure on toothpaste accounted for about Rs.104 per month per household. Pepsodent, Colgate and Close-up were the most preferred brands in the households surveyed. People preferred those brands of toothpaste which has either gel or antiseptic based. A lot of people get influenced by advertisements and the most popular medium to get across through people is television. 2022-23 APPENDIX A GLOSSARY OF STATISTICAL TERMS Analysis Understanding and explaining an economic problem in terms of the various causes behind it. Assumed Mean An approximate value in order to simplify calculation. Attribute A characteristic that is qualitative in nature. It cannot be measured. Bimodal Distribution A distribution which has two mode values. Bivariate Distribution Frequency distribution of two variables. Census Method A method of data collection, which requires that observations are taken on all the individuals in a population. Chronological Classification Classification based on time. Class Frequency Number of observations in a class. Class Interval Difference between the upper and the lower class limits. Class Mark Class midpoint Class Midpoint Middle value of a class. It is the representative value of different observations in a class. It is equal to (upper class limit + lower class limit)/2. Classification Arranging or organising similar things into groups or classes. Consumer One who buys goods for one's own personal needs or for the needs of one's family or as a gift to

someone. Constant A constant is also a quantity used to describe an attribute, but it will not change during calculation or investigation. Continuous Variable A quantitative variable that can take any numerical value. Cyclicity Periodicity in data variation with time period of more than one year. Decile A partition value that divides the data into ten equal parts. Discrete Variable A quantitative variable that takes only certain values. It changes from one value to another by finite "jumps". The intermediate values between two adjacent values are not taken by the variable. Economics Study of how people and society choose to employ scarce resources that could have alternative uses in order to produce various commodities that satisfy their wants and to distribute them for consumption among various persons and groups in society. 2022-23 132 STATISTICS FOR ECONOMICS Employee One who gets paid for a job or for working for another person. Employer One who pays another person to do or do some work. Enumerator A person who collects the data. Exclusive Method A method of classifying observations in which an observation equal to either the upper class limit or the lower class limit of a class is not put in that class but is put in the class above or below. Frequency The number of times an observation occurs in raw data. In a frequency distribution it means the number of observations in a class. Frequency Array A classification of a discrete variable that shows different values of the variable along with their corresponding frequencies. Frequency Curve The graph of a frequency distribution in which class frequencies on Y-axis are plotted against the values of class marks on X-axis. Frequency Distribution A classification of a quantitative variable that shows how different values of the variable are distributed in different classes along with their corresponding class frequencies. Inclusive Method A method of classifying observations in which an observations equal to the upper class limit of a class as well as the lower class limit is put in that class. Informant Individual/unit from whom the desired information is obtained. Multi Modal Distribution The distribution that has more than two modes. Non-Sampling Error It arises in data collection due to (i) sampling bias, (ii) non-response, (iii) error in data acquisition. Observation A unit of raw data. Percentiles A value which divides the data into hundred equal parts so there are 99 percentiles in the data. Policy The measure to solve an economic problem. Population Population means all the individuals/units for whom the information has to be sought. Qualitative Classification Classification based on quality. For example classification of people according to gender, marital status etc. Qualitative Data Information or data expressed in terms of qualities. Quantitative Data A (often large) set of numbers systematically arranged for conveying specific information on a subject for better understanding or decision-making. 2022-23 APPENDIX A 133 Questionnaire A list of questions prepared by an investigator on the subject of enquiry. The respondent is required to answer the questions. Random Sampling It is a method of sampling in which the representative set of informants is selected in a way that every individual is given equal chance of being selected as an informant. Range Difference between the maximum and the minimum values of a variable. Relative Frequency Frequency of a class as proportion or percentage of total frequency Sample Survey Method A method, where observations are obtained on a representative set of individuals (the sample), selected from the population. Sampling Error It is the numerical difference between the estimate from the sample and the corresponding true value of the parameter from the population. Scarcity It means the lack of availability. Seasonality Periodicity in data variation with time period less than one year. Seller One who sells goods for profit. Service Provider One who provides a service to others for a payment. Spatial Classification Classification based on geographical location. Statistics The method of collecting, organising, presenting and analysing data to draw meaningful conclusion. Further, it also means data. Structured Questionnaire Structured Questionnaire consists of "closedended" questions, for which alternative possible answers to choose from are provided. Tally Marking The counting of observations in a class using tally (/) marks. Tallies are grouped in fives. Time Series Data arranged in chronological order or two variable data where one of the variables is time. Univariate Distribution The frequency distribution of one variable. Variable A variable is a quantity used to

measure an “attribute” (such as height, weight, number etc.) of some thing or some persons, which can take different values in different situations. Weighted Average The average is calculated by providing the different data points with different weights. 2022-23 APPENDIX B TABLE OF TWO-DIGIT RANDOM NUMBERS 03 47 43 73 86 36 96 47 36 61 46 98 63 71 62 33 26 16 80 45 60 11 14 10 95 97 74 24 67 62 42 81 14 57 20 42 53 32 37 32 27 07 36 07 51 24 51 79 89 73 16 76 62 27 66 56 50 26 71 07 32 90 79 78 53 13 55 38 58 59 88 97 54 14 10 12 56 85 99 26 96 96 68 27 31 05 03 72 93 15 57 12 10 14 21 88 26 49 81 76 55 59 56 35 64 38 54 82 46 22 31 62 43 09 90 06 18 44 32 53 23 83 01 30 30 16 22 77 94 39 49 54 43 54 82 17 37 93 23 78 87 35 20 96 43 84 26 34 91 64 84 42 17 53 31 57 24 55 06 88 77 04 74 47 67 21 76 33 50 25 83 92 12 06 76 63 01 63 78 59 16 95 55 67 19 98 10 50 71 75 12 86 73 58 07 44 39 52 38 79 33 21 12 34 29 78 64 56 07 82 52 42 07 44 38 15 51 00 13 42 99 66 02 79 54 57 60 86 32 44 09 47 27 96 54 49 17 46 09 62 90 52 84 77 27 08 02 73 43 28 18 18 07 92 46 44 17 16 58 09 79 83 86 19 62 06 76 50 03 10 55 23 64 05 05 26 62 38 97 75 84 16 07 44 99 83 11 46 32 24 20 14 85 88 45 10 93 72 88 71 23 42 40 64 74 82 97 77 77 81 07 45 32 14 08 32 98 94 07 72 93 85 79 10 75 52 36 28 19 95 50 92 26 11 97 00 56 76 31 38 80 22 02 53 53 86 60 42 04 53 37 85 94 35 12 83 39 50 08 30 42 34 07 96 88 54 42 06 87 98 35 85 29 48 39 70 29 17 12 13 40 33 20 38 26 13 89 51 03 74 17 76 37 13 04 07 74 21 19 30 56 62 18 37 35 96 83 50 87 75 97 12 25 93 47 70 33 24 03 54 97 77 46 44 80 99 49 57 22 77 88 42 95 45 72 16 64 36 16 00 04 43 18 66 79 94 77 24 21 90 16 08 15 04 72 33 27 14 34 09 45 59 34 68 49 12 72 07 34 45 99 27 72 95 14 31 16 93 32 43 50 27 89 87 19 20 15 37 00 49 52 85 66 60 44 38 68 88 11 80 68 34 30 13 70 55 74 30 77 40 44 22 78 84 26 04 33 46 09 52 68 07 97 06 57 74 57 25 65 76 59 29 97 68 60 71 91 38 67 54 13 58 18 24 76 15 54 55 95 52 27 42 37 86 53 48 55 90 65 72 96 57 69 36 10 96 46 92 42 45 97 60 49 04 91 00 39 68 29 61 66 37 32 20 30 77 84 57 03 29 10 45 65 04 26 11 04 96 67 24 29 94 98 94 24 68 49 69 10 82 53 75 91 93 30 34 25 20 57 27 40 48 73 51 92 16 90 82 66 59 83 62 64 11 12 67 19 00 71 74 60 47 21 29 68 02 02 37 03 31 11 27 94 75 06 06 09 19 74 66 02 94 37 34 02 76 70 90 30 86 38 45 94 30 38 35 24 10 16 20 33 32 51 26 38 79 78 45 04 91 16 92 53 56 16 02 75 50 95 98 38 23 16 86 38 42 38 97 01 50 87 75 66 81 41 40 01 74 91 62 48 51 84 08 32 31 96 25 91 47 96 44 33 49 13 34 86 82 53 91 00 52 43 48 85 27 55 26 89 62 66 67 40 67 14 64 05 71 95 86 11 05 65 09 68 76 83 20 37 90 57 16 00 11 66 14 90 84 45 11 75 73 88 05 90 52 27 41 14 86 22 98 12 22 08 07 52 74 95 80 68 05 51 18 00 33 96 02 75 19 07 60 62 93 55 59 33 82 43 90 49 37 38 44 59 20 46 78 73 90 97 51 40 14 02 04 02 33 31 08 39 54 16 49 36 47 95 93 13 30 64 19 58 97 79 15 06 15 93 20 01 90 10 75 06 40 78 78 89 62 02 67 74 17 33 05 26 93 70 60 22 35 85 15 13 92 03 51 59 77 59 56 78 06 83 52 91 05 70 74 07 97 10 88 23 09 98 42 99 64 61 71 62 99 15 06 51 29 16 93 58 05 77 09 51 68 71 86 85 85 54 87 66 47 54 73 32 08 11 12 44 95 92 63 16 29 56 24 29 48 26 99 61 65 53 58 37 78 80 70 42 10 50 67 42 32 17 55 85 74 94 44 67 16 94 14 65 52 68 75 87 59 36 22 41 26 78 63 06 55 13 08 27 01 50 15 29 39 39 43 2022-23 APPENDIX B (Cont.) 17 53 77 58 71 71 41 61 50 72 12 41 94 96 26 44 95 27 36 99 02 96 74 30 83 90 26 59 21 19 23 52 23 33 12 96 93 02 18 39 07 02 18 36 07 25 99 32 70 23 41 23 52 55 99 31 04 49 69 96 10 47 48 45 88 13 41 43 89 20 97 17 14 49 17 60 20 50 81 69 31 99 73 68 68 35 81 33 03 76 24 30 12 48 60 18 99 10 72 34 91 25 38 05 90 94 58 28 41 36 45 37 59 03 09 90 35 57 29 12 82 62 54 65 60 34 50 57 74 37 98 80 33 00 91 09 77 93 19 82 74 94 80 04 04 45 07 31 66 49 85 22 04 39 43 73 81 53 94 79 33 62 46 86 28 08 31 54 46 31 53 94 13 38 47 09 79 13 77 48 73 82 97 22 21 05 03 27 24 83 72 89 44 05 60 35 80 39 94 88 88 75 80 18 14 22 95 75 42 49 39 32 82 22 49 02 48 07 70 37 16 04 61 67 87 90 96 23 70 00 39 00 03 06 90 55 85 78 38 36 94 37 30 69 32 90 89 00 76 33 53 74 23 99 67 61 32 28 69 84 94 62 67 86 24 98 33 41 19 95 47 53 53 38 09 63 38 06 86 54 99 00 65 26 94 02 82 90 23 07 79 62 67 80 60 75 91 12 81 19 35 30 58 21 46 06 72 17 10 94 25 21 31 75 96 49 28 24 00 49 55 65 79 78 07 63 43 36 82 69 65 51 18 37 88 61 38 44 12 45 32 92 85 88 65 54 34 81 85 35 98 25 37 55 26 01 91 82 81 46 74 71 12 94 97 24 02 71 37 07 03 92 18 66 75 02 63 21 17 69 71 50 80 89 56 38 15 70 11 48 43 40 45 86 98 00 83 26 91 03 64 55 22 21 82 48 22 28 06 00 61 54 13 43 91 82 78 12 23 29 06 66 24 12 27 85 07 26 13 89 01 10 07 82 04 59 63 69 36 03 69 11 15 83 80 13 29 54 19 28 58 54 16 24 15 51 54 44 82 00 62 61 65 04 69 38 18 65

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53 89 74 60 41 93 66 13 83 27 92 79 64 64 72 28 54 96 53 84 48 14 52 98 94 56 07 93 89 30 135
2022-23 WHAT THEY SAY Statistics are no substitute for judgement. Henry Clay I abhor averages, I like the individual case. A man may have six meals one day and none the next, making an average of three meals per day, but that is not a good way to live. Louis D. Brandies The weather man is never wrong. Suppose he says that there’s an 80% chance of rain. If it rains, the 80% chance came up, if it doesn’t, the 20% chance come up. Saul Barron The death of one man is a tragedy. The death of millions is a statistic. Joseph Stalin When she told me I was average, she was just being mean. Mike Beckman Why is a physician held in much higher esteem than a statistician? A physician makes an analysis of a complex illness whereas a statistician makes you ill with a complex analysis! Gary C. Ramseyer ? ? ? ? ? ? 2022-23