

CHAPTER

3

Globalization and MNCs**3.1 GLOBALIZATION**

Humans have interacted with one another over long distances for thousands of years. The overland Silk Road that connected Asia, Africa, and Europe is a good example of the transformative power of trans-local exchange that existed in the "Old World". Philosophy, religion, language, arts, and other aspects of culture spread and mixed as nations exchanged products and ideas. In the 15th and 16th centuries, Europeans made important discoveries in their exploration of the oceans, including the start of transatlantic travel to the "New World" of the Americas. Global movement of people, goods, and ideas expanded significantly in the following centuries. Early in the 19th century, the development of new forms of transportation (such as the steamship and railroads) and telecommunications that "compressed" time and space allowed for increasingly rapid rates of global interchange. In the 20th century, road vehicles, intermodal transport, and airlines made transportation even faster. The advent of electronic communications, most notably mobile phones and the Internet, connected billions of people in new ways by the year 2010.

The term globalisation refers to the process of escalating the connectivity and interdependence of the world's markets and businesses. This term can also be defined as the rising global relationships of culture, people and economic activities, with a worldwide movement toward economic, financial, trade, and communications integration. It is the process of international integration arising from the interchange of world views, products, ideas and other aspects of culture. Advances in transportation and telecommunication infrastructure, including the rise of the telegraph and its posterity in the Internet, are major factors in globalization, generating further interdependence of economic and cultural activities.

(56)

Globalization implies the opening of local and nationalistic perspective to a broader outlook of an interconnected and interdependent world with free transfer of capital, goods, and services across national frontiers. However, it does not include unhindered movement of labour and, as suggested by some economist, may hurt smaller or fragile economies if applied indiscriminately. Globalization is the tendency of investment of funds and movement of businesses beyond domestic and national markets to other markets around the globe, thereby increasing the interconnectedness of different markets. It has had the effect of markedly increasing not only international trade, but also cultural exchange.

Globalization approached its modern form as a result of the industrial revolution. Industrialization allowed standardized production of household items using economies of the state, while rapid population growth created sustained demand for commodities. Globalization in this period was decisively shaped by nineteenth-century imperialism. In the 19th century, steamships reduced the cost of international transport significantly and railroads made inland transport cheaper. The transport revolution occurred some time between 1820 and 1850. More nations embraced international trade. Globalization in this period was decisively shaped by nineteenth-century imperialism such as in Africa and Asia. The invention of shipping containers in 1956 helped advance the globalization of commerce.

After the Second World War, work by politicians led to the Bretton Woods conference, an agreement by major governments to lay down the framework for international monetary policy, commerce and finance and the founding of several international institutions intended to facilitate economic growth with opening and simplification of multiple rounds of trade and lowered trade barriers. Initially, the General Agreement on Tariffs and Trade (GATT), led to a series of agreements to remove trade restrictions. GATT's successor was the World Trade Organization (WTO), which created an institution to manage the trading system. Exports nearly doubled from 8.5% of total gross world product in 1970 to 16.2% in 2001. The approach of using global agreements to advance trade stumbled with the failure of the Doha round of trade-negotiation. Many countries then shifted to bilateral or smaller multilateral agreements, such as the 2011 South Korea-United States Free Agreement.

Since the 1970s, aviation has become increasingly affordable to middle classes in developed countries. Open skies policies and low-cost carriers have helped to bring competition to the market. In the 1990s, the growth of low cost communication networks cut the cost of communicating between different countries. More work can be performed using a computer without regard to location. This includes accounting, software development, and engineering design.

In the late 19th century and early 20th century, the connectedness of the world's economies and cultures grew very quickly. This slowed down from the 1910s onward due to the World Wars and the Cold War, but picked up again with the neoliberal policies of the 1980s. Perestroika and the Chinese economic reforms of Deng Xiaoping opened the old Eastern Bloc to western capitalism. Private capital flow to developing countries soared during the 1990s, replacing "aid" or "development assistance" which fell significantly after the early 1980s. Foreign Direct Investment (FDI) became the most important category. Both portfolio investment and bank credit rose but they have been more volatile, falling sharply in the wake

of the financial crisis of the late 1990s. The migration and movement of people can also be highlighted as a prominent feature of the globalization process. In the period between 1965–90, the proportion of the labour force migrating approximately doubled. Most migration occurred between developing countries and Least Developed Countries.

The growth of international trade is a fundamental component of globalization. An absolute trade advantage exists when countries can produce a commodity with less cost per unit produced than could its trading partner. By the same reasoning, it should import commodities in which it has an absolute advantage. While the trade with absolute advantage is possible but the ability to offer goods and services at a lower marginal and opportunity cost extends the range of possible mutually beneficial exchanges. In a globalized business environment, companies argue that the comparative advantages offered by international trade have become essential to remain competitive.

The advantages and disadvantages of globalization have been heavily scrutinized and debated in recent years. Proponents of globalization say that it helps developing nations "catch up" to industrialized nations much faster through increased employment and technological advances. Critics of globalization say that it weakens national sovereignty and allows rich nations to ship domestic jobs overseas where labour is much cheaper.

3.1.1 Multinational Corporation (MNC)

International business arrangements have led to the formation of multinational enterprises (MNE), companies that have a worldwide approach to markets and production or one with operations in more than one country. A MNE may also be called a multinational corporation (MNC) or transnational company (TNC). Well known MNCs include fast food companies such as McDonald's and Yum Brands, vehicle manufacturers such as General Motors, Ford Motor Company and Toyota, consumer electronics companies like Samsung, LG and Sony, and energy companies such as ExxonMobil, Shell and BP. Most of the largest corporations operate in multiple national markets.

Business companies generally argue that survival in the new global marketplace requires companies to source goods, services, labour and materials overseas to continuously upgrade their products and technology in order to survive increased competition. According to a recent McKinsey Global Institute report, flows of goods, services, and finance reached \$26 trillion in 2012, or 36 % of global GDP i.e., 1.5 times the level in 1990.

3.1.2 Overall Effect of Globalisation on Earth

(i) **Trade agreements and Special Economic Zones (SEZ) for international trade.** The category 'SEZ' covers many areas, including Free Trade Zones (FTZ), Export Processing Zones (EPZ), Free Zones (FZ), Industrial parks or Industrial Estates (IE), Free Ports, Urban Enterprise Zones and others. Usually the goal of a structure is to increase foreign direct investment by foreign investors, typically an international business or a multinational corporation (MNC). These are designated areas in which companies are taxed very lightly or

not at all in order to encourage economic activity. Free ports have historically been endowed with favourable customs regulations, e.g., the free port of Trieste. Very often free ports constitute a part of free economic zones.

A FTZ is an area within which goods may be landed, handled, manufactured or reconfigured, and re-exported without the intervention of the customs authorities. Only when the goods are moved to consumers within the country in which the zone is located do they become subject to the prevailing customs duties.

(ii) **Global Tourism.** Globalization has made tourism a popular global leisure activity. It is estimated that up to 500,000 people are in flight at any one time. Tourism is travelling for recreational, leisure or business purposes. The World Tourism Organization World Tourism organization defines tourists as people "travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes". There are many forms of tourism such as agritourism, birth tourism, culinary tourism, cultural tourism, eco-tourism, extreme tourism, geo tourism, heritage tourism, LGBT tourism, medical tourism, nautical tourism, pop-culture tourism, religious tourism, slum tourism, war tourism and wildlife tourism etc.

(iii) **Global Sports Activities.** Globalization has continually increased international competition in sports. International sports events can be big business for as well as influencing the political, economical, and other cultural aspects of countries around the world. Especially with politics and sports, sports can affect countries, their identities, and in consequences. For example, the FIFA World Cup is the world's most widely viewed sporting event. Some economists are sceptical about the economic benefits of hosting the Olympic Games, emphasizing that such "mega-events" often have large costs for hosting, however the Olympics appear to increase the host country's exports, as the host or candidate country sends a signal about trade openness when bidding to host the Games.

SUMMARY

◆ The term globalization refers to the process of escalating the connectivity and interdependence of the world's markets and businesses. Humans have interacted with one another overland long distance for thousands of years in the old world. Development of new forms of transportation and telecommunications movement of people and goods expanded significantly in the following centuries increasingly rapid rates of global interchange. Globalization approached its modern form as a result of the industrial revolution. Globalization is the tendency of investment of funds and movement of businesses beyond domestic and national markets. General Agreement on Tariffs and Trade (GATT), led to a series of agreements to remove trade restrictions. GATT's successor was the World Trade Organization (WTO), which created an institution to manage the trading system. After the early 1980s, Foreign Direct Investment (FDI) became the most important category. Both portfolio investment and bank credit rose. The growth of international trade is a fundamental component of globalization. An absolute trade advantage exists when countries can produce a commodity with less cost per unit produced than could its trading partner. By the same reasoning, it should import commodities in which it has an absolute advantage. Critics of globalization say that it weakens national sovereignty and allows rich nations to ship domestic jobs overseas where labour is much cheaper.

- ❖ International business arrangements have led to the formation of Multinational companies / Corporation (MNC) that have a worldwide approach to markets and production or one with operations in more than one country. Most of the largest corporations operate in multiple national markets. Business companies generally argue that survival in the new global marketplace requires companies to source goods, services, labour and materials overseas to continuously upgrade their products and technology in order to survive increased competition.

Short Question Answers

1. *Describe globalization in the context of "Old World".*

Ans. The overland Silk Road that connected Asia, Africa, and Europe is a good example of the transformative power of trans-local exchange that existed in the "Old World". The two trading parties were far away and it was very time consuming and difficult to have business trade in old days. In the 20th century development of new forms of transportation like, road vehicles, intermodal transport, and airlines along with the advent of electronic communications has connected billions of people in new ways. The people in the whole globe have come so closer that the earth can be called a big village where accessibility to any trading partner is a job of few minutes.

2. *Describe the modern form of globalization.*

Ans. Development of new forms of transportation and telecommunications movement of people and goods expanded significantly in the following centuries increasingly rapid rates of global interchange. Globalization approached its modern form as a result of the industrial revolution. Globalization is the tendency of investment of funds and movement of businesses beyond domestic and national markets.

3. *Discuss the advantage and disadvantages of globalization.*

Ans. Globalization refers to the process of escalating the connectivity and interdependence of the world's markets and businesses. This term can also be defined as the rising global relationships of culture, people and economic activities, with a worldwide movement toward economic, financial, trade, and communications integration. Globalization implies the opening of local and nationalistic perspective to a broader outlook of an interconnected and interdependent world with free transfer of capital, goods, and services across national frontiers. Globalization approached its modern form as a result of the industrial revolution. Industrialization allowed standardized production of household items using economies of the state, while rapid population growth created sustained demand for commodities.

Exercise

1. How has General Agreement on Tariffs and Trade (GATT) and world trade organization (WTO) helped the world trade and economy ?
2. Name few multinational companies and describe impact on world economy.
3. Describe the overall effect of globalization on earth.

3.2 CASE STUDIES

3.2.1 Satyam Computers

History

Satyam Computers Services Ltd. was one of the leading global consulting and IT services company that offered end-to-end IT solutions for a range of key verticals and horizontals. Satyam Computers had domain expertise in verticals such as Automotive, Banking and Financial Service, Insurance and Healthcare, Manufacturing, Telecom, Infrastructure, Media, Entertainment and Semiconductors.

Satyam had nearly 40,000 employees on its rolls, working in development centers in India, USA, UK, UAE, Canada, Hungary, Singapore, Malaysia, China, Japan and Australia. Satyam Computers' network was spread over 55 countries across 6 continents. Satyam served over 558 global companies including over 163 Fortune 500 corporations.

Satyam Computers was founded in June 1977 as a private limited company by RamalingaRaju along with one of his brothers-in-law, D. V. S Raju. In June 1991, Satyam Computers got its first Fortune 500 Client. In the same year in August, Satyam Computers was recognized as a Public Limited Company. Satyam went public in May 1992 and its issue was oversubscribed 17 times. In July 1993, Satyam entered into a joint venture with Dun and Bradstreet. Satyam was awarded ISO 9001 Certification in March 1995. In December 1995, Satyam Infoway was incorporated. In May 1997, Satyam became the first Indian IT Company to get ITAA Certification for Y2K Solutions. In November 1998, Satyam became one of the first companies to enter Indian Internet service market with the launch of Satyam Infoway's ISP Service. In the same year Satyam entered into a joint venture with GE. In 1999, Satyam Infoway became the first Indian Internet company to be listed on NASDAQ. In February 2000 Satyam was declared one of '100 Most Pioneering Technology Companies' by World Economic Forum, Davos. In May 2000 Satyam became the first organization in the world to launch Customer-Oriented training for Global Organizations. In March 2001 Satyam became first ISO 9001:2000 Company certified by BVQI in the world. In May 2001 Satyam was listed on New York Stock Exchange. In 2003, Satyam announced business continuity center in Singapore, the first of its kind outside India. In 2004, Satyam opened new development center in Mississauga, Canada. In 2005 Satyam acquired 100% stake in Singapore based Knowledge Dynamics, a leading Data Warehousing and Business Intelligence solutions provider.

Satyam Computer Services Scandal

In 2009 company chairman RamalingaRaju confessed that the company's accounts had been falsified. The Global corporate community was shocked and scandalised when the chairman of Satyam, RamalingaRaju resigned on 7 January 2009 and confessed that he had manipulated the accounts by US\$1.47-Billion. RamalingamRaju along with 2 other accused of the scandal, were arrested two days after he admitted the scandal but later on were granted bail from Supreme court as the investigation agency CBI failed to file the chargesheet even after more than 33 months Raju was arrested.



Raju had appointed a task force to address the Maytas situation in the last few days before revealing the news of the accounting fraud. After the scandal broke, the then-board members elected Ram Mynampati to be Satyam's interim CEO.

On 10th January 2009, the Company Law Board decided to bar the current board of Satyam from functioning and appoint 10 nominal directors. On the same day, the Crime Investigation Department (CID) team arrested VadlamaniSrinivas, Satyam's then-CFO. Chartered accountants regulator ICAI issued show-cause notice to Satyam's auditor PricewaterhouseCoopers (PwC) to reply with in 21 days about the accounts fudging. On 11th January 2009, the government nominated noted banker Deepak Parekh, former NASSCOM chief KiranKarnik and former SEBI member C. Achuthan to Satyam's board.

PricewaterhouseCoopers was the statutory auditor of Satyam Computer Services when the report of scandal in the account books of Satyam Computer Services broke. The Indian arm of PwC was fined \$6 million by the SEC (US Securities and Exchange Commission) for not following the code of conduct and auditing standards in the performance of its duties related to the auditing of the accounts of Satyam Computer Services.

Immediately following the news, Merrill Lynch (now a part of Bank of America) and State Farm Insurance terminated its engagement with the company. Apart from it, Suisse also suspended its coverage of Satyam. It was also reported that Satyam's auditing firm PricewaterhouseCoopers will be scrutinized for complicity in this scandal. SEBI, the stock market regulator, also said that, if found guilty, its license to work in India may be revoked. Satyam was the 2008 winner of the coveted Golden Peacock Award for Corporate Governance under Risk Management and Compliance Issues, which was stripped from them in the aftermath of the scandal. The New York Stock Exchange halted trading in Satyam stock w.e.f. 7th January 2009. India's National Stock Exchange announced that it will remove Satyam from its SandP CNX Nifty 50-share index w.e.f. 12th January. Satyam's shares fell to 11.50 rupees on 10th January 2009, their lowest level since March 1998, compared to a high of 544 rupees in 2008.

On 22nd January 2009, CID informed the court that the actual number of employees in Satyam were only 40,000 and not 53,000 as reported earlier and that Mr.Raju had been allegedly causing fraud by withdrawing ₹200 million (US\$3 million) every month for paying these 13,000 non-existent employee.

Acquisition by Mahindra Group

On 13 April 2009, via a formal public auction process, a 46% stake in Satyam was purchased by Tech Mahindra, a Mahindra and Mahindra owned company. Effective July 2009, Satyam rebranded its services under the new Mahindra management as "Mahindra Satyam". After a delay due to tax issues. Mahindra announced its merger with Mahindra Satyam on 21 March 2012, after the board of two companies gave the approval.

SUMMARY

- ❖ Satyam Computers' founded in June 1977 as a private limited company was one of the leading global consulting and IT services company having network spread over 55 countries across

6 continents had nearly 40,000 employees on its rolls. It offered end-to-end IT solutions for a range of key verticals and horizontals, such as Automotive, Banking and Financial Service, Insurance and Healthcare, Manufacturing, Telecom, Infrastructure, Media, Entertainment and Semiconductors. Satyam went public in May 1992 and its issue was oversubscribed 17 times. In December 1995, Satyam Infoway was incorporated which became the first Indian Internet company to be listed on NASDAQ. In February 2000 Satyam was declared one of '100 Most Pioneering Technology Companies' by World Economic Forum, Davos. In May 2001 Satyam was listed on New York Stock Exchange. Company chairman RamalingaRaju resigned on 7 January 2009 and confessed that he had manipulated the accounts by US\$1.47-Billion. It was reported that Mr.Raju had been allegedly causing fraud by withdrawing ₹200 million (US\$3 million) every month for paying these 13,000 non-existent employees.

Short Question Answers

1. Write in brief the business domains of Satyam Computers.
Ans. Satyam Computers had domain expertise in verticals such as Automotive, Banking and Financial Service, Insurance and Healthcare, Manufacturing, Telecom, Infrastructure, Media, Entertainment and Semiconductors.
2. From a modest Indian private company Satyam Computers was listed on New York stock exchange in year 2003, explain how ?
Ans. Satyam Computers was founded in June 1977 as a private limited company by RamalingaRaju. Satyam went public in May 1992 and its issue was oversubscribed 17 times. In December 1995, Satyam Infoway was incorporated. In December 1995, Satyam Infoway was incorporated which became the first Indian Internet company to be listed on NASDAQ. In February 2000 Satyam was declared one of '100 Most Pioneering Technology Companies' by World Economic Forum, Davos. In May 2001 Satyam was listed on New York Stock Exchange.
3. Where were the development centers set up by Satyam Computers ?
Ans. Satyam, working in development centers in India, USA, UK, UAE, Canada, Hungary, Singapore, Malaysia, China, Japan and Australia. Satyam Computers' network was spread in over 55 countries across 6 continents. Satyam served over 558 global companies including over 163 Fortune 500 corporations.

Exercise

1. Explain the dimensions of financial fraud in Satyam Computers Services.
2. What was modus operandi of M.D. of Satyam Computers to cause fraud of millions of rupees per month ?
3. What is the present status of Satyam Computers ?



3.2.2 Infosys Ltd. and Infosys Foundation

3.2.2A Infosys Ltd.

In 1981 Infosys Ltd. was incorporated as "Infosys Consultants Pvt. Ltd." with a capital of ₹10,000 (roughly \$250) in Pune. It changed its name to "Infosys Technologies Private Limited" in April 1992 and to "Infosys Technologies Limited" when it became a public limited company in June 1992. It was later renamed to "Infosys Limited" in June 2011.

Infosys Ltd. is an Indian multinational corporation that provides business consulting, information technology, software engineering and outsourcing services. It is headquartered in Bangalore, Karnataka. Infosys is the third-largest India-based IT services company, and the fifth largest employer of professionals in the United States. On 31st March 2014, its market capitalization was ₹188,510 crores (\$31.11 billion), making it India's fifth largest publicly traded company.

Infosys made an initial public offer (IPO) in February 1993 with an offer price of ₹98 per share against book value of ₹10 per share. The Infosys IPO was under subscribed but it was "bailed out" by US investment bank Morgan Stanley which picked up 13% of equity at the offer price. Its shares were listed in stock exchanges in June 1993 with trading opening at ₹145 per share. In October 1994, it made a private placement of 5,50,000 shares at ₹450 each against book value of ₹10 per share to Foreign Institutional Investors (FIIs), Financial Institutions (FIs) and Corporates. The share price surged to ₹8,100 by 1999 making it the costliest share on the market at the time. At that time, Infosys was among the 20 biggest companies by market capitalization on the NASDAQ. In December 2012, Infosys transferred the listing of its Shares from the NASDAQ to the NYSE (New York Stock Exchange). The credit rating of the company is A- (given by Standard and Poor's in Dec. 2013).

Infosys has a global presence with 72 offices and 94 development centers in the United States, India, China, Australia, Japan, Middle East and Europe. Recently, Infosys has begun shifting operations to the United States and other countries. In 2012, Infosys announced a new office in Milwaukee, Wisconsin to service Harley-Davidson, being the 18th international office in the United States.

Products and Services

It provides software development, maintenance and independent validation services to companies in banking, finance, insurance, manufacturing and other domains. One of its known products is Finacle which is a universal banking solution with various modules for retail and corporate banking.

Academic Relations

Infosys' Global Academic Relations team forges Academic Entente with academic and partner institutions. It explores co-creation opportunities between Infosys and academia through case studies, student trips and speaking engagements. They also collaborate on

technology, emerging economies, globalization, and research. Some initiatives include research collaborations, publications, conferences and speaking sessions, campus visits and campus hiring.

Infosys gives annual awards to scientists, researchers, engineers and social scientists in India. It is given by the Infosys Science Foundation, a not-for-profit trust which was set up in February 2009 by Infosys and some members of its Board. The prize is given under six categories. Each category includes a gold medallion, a citation certificate, and a prize money of ₹55 Lakh.

Infosys has a total of 160,405 employees as on 31 March 2014. Its workforce consists of employees representing 89 nationalities working from 32 countries. Out of its total workforce, 79% are software professionals.

Awards and Recognitions

- ❖ Infosys was ranked 15th largest IT services provider in the world by HFS Research in its 2013 ranking.
- ❖ Infosys was ranked #19 amongst the world's most innovative companies by Forbes.
- ❖ Infosys was ranked number one among the best managed companies in Asia Pacific.
- ❖ Infosys was identified as one of the top 25 performers in Caring for Climate Initiative by UN Global Environment Program.
- ❖ It won the Oracle Excellence Award for Specialized Partner of the Year, in both Financial Management and Human Capital Management categories.
- ❖ Boston Consulting Group has listed it in the list of top ten technology companies.
- ❖ Company's corporate governance practices were recognized by The Asset Platinum award and the IR Global Rankings. In 2014 Infosys was also ranked as the most trusted Software Services brand in India by The Brand Trust Report 2014.

3.2.2B Controversies

In 2011, Infosys was accused of committing visa fraud by using B-1 (visitor) for work requiring H-1B (work) visas. The allegations were initially made by an American employee of Infosys in an internal complaint. He subsequently sued the company, claiming that he was harassed and sidelined after speaking out. Although that case was dismissed, it along with another similar case, brought the allegations to the notice of the US authorities and the U.S. Department of Homeland Security and a federal grand jury started investigating.

In October 2013, Infosys agreed to settle the civil suit with US authorities by paying US\$34 million. Infosys refused to admit guilt and stressed that it only agreed to pay the fine to avoid the nuisance of 'prolonged litigation'. In its statement the company said "As reflected in the settlement, Infosys denies and disputes any claims of systematic visa fraud, misuse of visas for competitive advantage, or immigration abuse."

In July 2014 Former US employees of Infosys filed a lawsuit against it for alleging discrimination because of their inability to communicate in Hindi. According to the lawsuit filed in the US District Court of Eastern District of Wisconsin, the former employees alleged that they were "excluded" from work conversations by their supervisors and co-workers who "regularly spoke in Hindi" in front of them. The case has been filed by Layla Bolten, Gregor Handloser and two more employees. Bolten was hired as a tester, while Handloser was hired by Infosys in 2004 as a sales manager.

3.2.2C Infosys Foundation

In 1996, Infosys established the Infosys Foundation, to support the underprivileged sections of society. At the outset, the Infosys foundation implemented programs in Karnataka. It subsequently covered Tamil Nadu, Andhra Pradesh, Maharashtra, Odisha and Punjab in a phased manner. A team at the Foundation identifies programs in the areas of Healthcare, Education, Culture, Destitute Care and Rural Development.

Infosys Foundation came into being with the objective of supporting the underprivileged in our society. The Foundation Trustees comprise of Ms. Sudha Murty (an educationist, a writer and a computer engineer), Chairperson ; Mr. Sudha Gopalkrishnan and Mr. Srinath Batni (Director, Infosys Technologies Ltd.). The Foundation primarily aims at improving the health, education and basic facilities, benefiting a large number of individuals and institutions.' By March 31, 2004 the foundation has given grants totaling about 40 crore rupees. At the end of 2004, the market value of Infosys was over 56,000 crore rupees. It means that it contributed less than 0.1 percent of its market value wealth to Infosys Foundation over the past 8 years. Murthy family who held about 7.5 percent of Infosys shares during this period, contributed Infosys Foundation about 3 crore rupees (7.5 percent of 40 crores).

Benefits of 'Charity' to Infosys

- (i) **Investors.** The leading world companies prefer investing in Indian companies that have defined social responsibility cells.'
- (ii) **Branding.** Helps to attract good employees and keep attrition rate low.
- (iii) **'Purchasing Goodwill'.** Many customers prefer to do business with companies perceived to have social responsibilities. Government officials are receptive to new requests for more land etc.
- (iv) **Association with the famous.** They are going to benefit out of associating their names with Tata family or Bill Gates, by mentioning them as often as possible.

SUMMARY

- ❖ Infosys Ltd. is an Indian multinational corporation that provides business consulting, information technology, software engineering and outsourcing services. It was incorporated as "Infosys Consultants Pvt Ltd" in the year 1981 with a capital of ₹10000 only, however with progress and time in December 2012, Infosys transferred the listing of its Shares from the NASDAQ to the NYSE (New York Stock Exchange). It provides software development,

maintenance and independent validation services to companies in banking, finance, insurance, manufacturing and other domains. One of its known products is Finacle which is a universal banking solution with various modules for retail and corporate banking.

- ❖ In 1996, Infosys established the Infosys Foundation, to support the underprivileged sections of Culture, Destitute Care and Rural Development in six states in India. The Foundation Trustees comprise of Ms. Sudha Murty (an educationist, a writer and a computer engineer), Chairperson ; Mr. Sudha Gopalkrishnan and Mr. Srinath Batni (Director, Infosys Technologies Ltd.). The Foundation primarily aims at improving the health, education and basic facilities, benefiting a large number of individuals and institutions.' By March 31, 2004 the foundation has given grants totaling about 40 crore rupees. Charity of Infosys Ltd. through Infosys Foundation gave it benefits on account of its impacts on 'investors', 'Branding as good employer', 'Purchasing Goodwill of customers and Govt. officials' and 'Association with the famous names like Tata families and Bill Gates'.

Short Question Answers

1. Write the products and services of business of Infosys Ltd. which made it one of India's largest company while traverse from the year 1981 onwards.

Ans. It provides software development, maintenance and independent validation services to companies in banking, finance, insurance, manufacturing and other domains. One of its known products is Finacle which is a universal banking solution with various modules for retail and corporate banking.

2. Describe the academic relations of Infosys Ltd. with other global academic partners.

Ans. It explores co-creation opportunities between Infosys and academia through case studies, student trips and speaking engagements. They also collaborate on technology, emerging economies, globalization, and research. Some initiatives include research collaborations, publications, conferences and speaking sessions, campus visits and campus hiring. Infosys gives annual awards to scientists, researchers, engineers and social scientists in India.

Exercise

1. Name the awards and recognitions earned by Infosys Ltd.
2. Describe the activities and programmes of Infosys Foundation.
3. Infosys earned benefits of charity, name them.



3.2.3 Tata Group of Companies

The Tata group comprises of over 100 operating companies in seven business sectors: communications and information technology, engineering, materials, services, energy, consumer products and chemicals. The group has operations in more than 100 countries across six continents, and its companies export products and services to 150 countries.

The Tata name has been respected in India for more than 140 years for its adherence to strong values and business ethics. The group has always believed in returning wealth to the society they serve. Two-thirds of the equity of Tata Sons, the Tata promoter holding company, is held by philanthropic trusts that have created national institutions for science and technology, medical research, social studies and the performing arts.

Tata Group was founded in 1868 by Jamsetji Tata as a trading company. Tata Group remains a family-owned business, as the descendants of the founder (from the Tata family) own a majority stake in the company. The current chairman of the Tata group is Cyrus Pallonji Mistry, who took over from Ratan Tata in 2012. The role played by Mr. Ratan Tata and Mr. JRD Tata in making the group truly global has been deservedly recognized all over the world. The Tata Group and its companies and enterprises is perceived to be India's best-known global brand within and outside the country. The national and international recognition of the TATA group of industries can be envisaged from the fact that apart from it only few other Indian companies e.g., Infosys Technologies, Wipro, Mahindra and Mahindra and Aditya Birla Group were the other major Indian corporate houses listed to have made their mark on the global business landscape. The major Tata companies are Tata Steel, Tata Motors, Tata Consultancy Services (TCS), Tata Power, Tata Chemicals, Tata Global Beverages, Tata Teleservices, Titan Industries, Tata Communications and Taj Hotels.

In a 2011 investor poll conducted by equity research firm Equity master, TATA Group was voted as the most trustworthy among the Indian corporate houses. Over 61% of the respondents "showed their confidence in the Tata Group". The Tata Group retained its "Most Trustworthy" status in the quality and the popularity of Tata brand products, which is quite evident from the following table :

Year	Global Rank in top 500 companies	Global Rank in top 250 companies	India Rank in top 100 companies	India Rank in top 50 companies
2014	34			
2013	39			
2012	45			
2011	50			
2010	53			
2009	51			
2008	57			
2007		100		

India has an old religious tradition of philanthropy, passed on down the ages by kings, noblemen and rich merchants. Jamsetji Tata, the founder of the Tata Group, gave new

meaning to this term. In his words : "There is one kind of charity common enough among us. It is that patchwork philanthropy which clothes the ragged, feeds the poor, and heals the sick. I am far from decrying the noble spirit which seeks to help a poor or suffering fellow being. What advance a nation or a community is not so much to prop up its weakest and most helpless members, but to lift up the best and the most gifted, so as to make them of the greatest service to the country." This was the sentiment which led Jamsetji Tata to establish the JN. Tata Endowment Scheme for higher education in 1892. The scheme helped bright Indian students of moderate means to become administrators, scientists, doctors, lawyers and engineers, by funding their education through loans and grants.

The Sir Dorabji Tata Trust is best known for promoting six pioneering institutions of national importance. Four of these were established in Mumbai: the Tata Institute of Social Sciences, in 1936 ; The Tata Memorial Centre for Cancer Research and Treatment, in 1941 ; the Tata Institute of Fundamental Research, in 1945 ; and the National Centre for the Performing Arts, in 1966. The National Institute of Advanced Studies (set up in 1988) and the Sir Dorabji Tata Centre for Research in Tropical Diseases (1999) are in Bangalore. The trusts do not usually encourage or consider supporting projects run by Tata companies. The trustees' are of the view that if a company has started something then it should sustain itself through its own funds, instead of asking the trusts for financial support.

3.2.3A Controversies

The Tata group has also attracted several controversies and criticisms, including the following as mentioned below :

- (i) The Kerala Government had filed an affidavit in the high court saying that Tata Tea had 'grabbed' forest land of 3,000 acres (12 km^2) at Munnar. The Tatas, on the other hand, say they possess 58,741.82 acres (237.7197 km^2) of land, which they are allowed to retain under the Kannan Devan Hill (Resumption of Lands) Act, 1971, and there is still a shortage of 278.23 hectares in that.
- (ii) Tata Motors were reported to have supplied hardware and automobiles to Burma's oppressive and anti-democratic military junta which has come in for criticism from human rights and democracy activists.
- (iii) The Singur controversy in West Bengal led to further questions over Tata's social record, with protests by locals and political parties (though the involvement of Mamata Banerjee's party is widely criticized as an act for political gains) over the forced acquisition, eviction and inadequate compensation to those farmers displaced for the Tata Nano plant. As the protests grew, Tata eventually pulled the project out of West Bengal, citing safety concerns.
- (iv) The Dhamra port, a venture between Tata Steel and Larsen and Toubro, has come in for criticism for its proximity to the Gahirmatha Sanctuary and Bhitar Kanika National Park, from Indian and international organizations, including Greenpeace. Gahirmatha Beach is one of the world's largest mass nesting sites for the Olive Ridley Turtle and Bhitar Kanika is a designated Ramsar site and India's second largest mangrove forest.

- (v) Tata group, along with a Tanzanian company, joined forces to build a soda ash extraction plant in Tanzania. The Tanzania government is all for the project. On the other hand, environmental activists are opposing the plant because it would be near Lake Natron, and it could possibly affect the lake's ecosystem and its neighbouring dwellers.

SUMMARY

Tata Group was founded in 1868 by Jamsetji Tata as a trading company. It remains a family-owned business, of descendants of the founder. The Tata name has been respected in India for more than 140 years for its adherence to strong values and business ethics. It comprises of over 100 operating companies in seven business sectors i.e., communications and information technology, engineering, materials, services, energy, consumer products and chemicals. The major Tata companies are Tata Steel, Tata Motors, Tata Consultancy Services (TCS), Tata Power, Tata Chemicals, Tata Global Beverages, Tata Teleservices, Titan Industries, Tata Communications and Taj Hotels. The role played by Mr. Ratan Tata and Mr. JRD Tata in establishing the Tata Endowment Scheme for higher education in 1892, which has helped bright Indian students of moderate means to become administrators, scientists, doctors, lawyers and engineers, by funding their education through loans and grants. The Sir Dorabji Tata Trust is best known for promoting six pioneering institutions of national importance. The current chairman of the Tata group is Cyrus Pallonji Mistry, who took over from Ratan Tata in 2012.

Short Question Answers

1. Introduce the Tata Group of Companies and list the names of companies.

Ans. Tata Group was founded in 1868 by Jamsetji Tata as a trading company. It remains a family-owned business, of descendants of the founder. The major Tata companies are Tata Steel, Tata Motors, Tata Consultancy Services (TCS), Tata Power, Tata Chemicals, Tata Global Beverages, Tata Teleservices, Titan Industries, Tata Communications and Taj Hotels.

2. How do you envisage recognition given to TATA group at national and international level ?

Ans. The national and international recognition of the TATA group of industries can be envisaged from the fact that apart from it only few other Indian companies e.g., Infosys Technologies, Wipro, Mahindra and Mahindra and Aditya Birla Group were the other major Indian corporate houses listed to have made their mark on the global business landscape.

Exercise

- How is Sir Dorabji Tata Trust famous, explain its achievements ?
- Tata group has had a very long innings with many controversies, name a few of them.
- What were the views of founder of the TATA Group, on charity ?

3.3 BUSINESS ETHICS

Business Ethics are essential for the long-term success of an organization. Implementing an ethical programme will foster a successful company culture and increase profitability. Developing a Business Ethics programme takes time and effort, but doing so will do more than improve business, it will change lives. A company's ethics will have an influence on all levels of business. It will influence all who interact with the company including customers, employees, suppliers, competitors, etc. All of these groups will have an effect on the way a company's ethics are developed. It is a two-way street ; the influence goes both ways, which makes understanding ethics a very important part of doing business today. Ethics is very important, as news can now spread faster and farther than ever before. Ethical issues include the rights and duties between a company and its employees, suppliers, customers and neighbours, and its responsibility to its shareholders. Issues concerning relations between different companies include hostile take-overs and industrial espionage. Related issues include corporate governance ; finance and accounting ; Intellectual Property Right (IPR) and the marketing of corporations' ethics policies. The four major areas of public concern regarding business ethics are executive pay, corporate tax avoidance, bribery and corruption.

Ethics are the rules or standards that govern our decisions on a daily basis. Many equate "ethics" with conscience or a simplistic sense of "right" and "wrong". Others would say that ethics is an internal code that governs an individual's conduct, ingrained into each person by family, faith, tradition, community, laws, and personal mores. Corporations and professional organizations, particularly licensing boards, generally will have a written "Code of Ethics" that governs standards of professional conduct expected of all in the field. It is important to note that "law" and "ethics" are not synonymous, nor are the "legal" and "ethical" course of action in a given situation necessarily the same. Statutes and regulations passed by legislative bodies and administrative boards set forth the "law".

3.3.1 Business Ethics in Corporate Governance

Corporate governance lies at the very heart of the way businesses are run. Often defined as '*the way businesses are directed and controlled*', it concerns the work of the board as the body which bears ultimate responsibility for the business. Governance relates to how the board is constituted and how it performs its role. It encompasses issues of board composition and structure, the board's remit and how it is carried out and the framework of the board's accountability to its stakeholders. It also concerns how the board delegates authority to manage the business throughout the organization. It does this by cascading down specified limits of authority to committees, the CEO and the executive team, who in turn delegate tasks to management and employees. This authority allows management to carry out, in accordance with specified budgets and timings, the purpose, vision and strategy which the board has agreed to.



The extent to which business decisions reflect ethical values and principles is a key to long term success. The business case for business ethics has been well proven by the costs and impacts of the repeated high profile cases of corporate greed and misconduct, often by senior individuals, crossing ethical boundaries as well as ignoring or circumventing the rules set out in law. Trust is essential in establishing an organisation's licence to operate. Maintaining successful business relationships and operations requires businesses to manage their risks, including their integrity risks, and guard their reputations. Trustworthiness is a valuable asset and guarding that asset is a core remit for those running a company ; it is a core remit of good corporate governance.

Business ethics, defined as the application of ethical values to business behavior, is essentially about the discretionary decision a board takes to deliver on its duties as set down in law, specified by best practice, and demanded by shareholders and other stakeholders. Ethical choices are relevant within the core business strategies that they pursue and the way they direct the business as a whole to achieve them. Boards take decisions which have far-reaching consequences and directly affect the lives of their employees and other stakeholders. Conversely, a lack of decisive action may also have significant consequences.

Business ethics also refer to the way the board conducts itself and the way board members choose to behave in carrying out their role. High levels of competency and skill are required of the board, with directors exercising proper care in their duties, upholding high standards of integrity and acting fairly. The culture of an organization will be strongly influenced by the nature as well as the quality of the leadership shown by the board. A lack of strong and clear leadership from the board will generally result in inconsistencies in the ways of behaving and working, with practices derived from employees' personal preferences and habits continued from previous employment rather than being ethically driven. A board is responsible for determining, articulating and communicating the values and standards of the business, and for ensuring that the policies, procedures and controls in place act to embed, rather than hinder, ethical values throughout the business.

3.3.1A Guidance for Corporate Governance practice

A possible reason for why many boards are still found wanting is the fact that despite rigorous efforts to raise governance standards, insufficient attention has been paid to the behavioural standards as opposed to the technical challenges of the boardrooms, hence "*board evaluation can be an occasion to monitor the behavioural rules*". This presupposes that board evaluation avoids a 'tick box' approach and that it is open to discussion on behavioral issues. Both should be the case in any well conducted, open evaluation, and indeed a focus on behavioural issues widely considered to be a key element of a serious board evaluation. With increasing globalization, companies are importing good practices developed elsewhere, for their own legal and governance framework. A number of '*best practices*' adopted and followed in European companies include :

- ❖ The creation of a '*lead director*', where the roles of Chairman and CEO are combined.

- ❖ Increased transparency in governance reporting, such as more use of tables and diagrams on board evaluation outcomes.
- ❖ The increase in the culture of consensus inspired by the role of employees on the board of companies.
- ❖ Greater focus on information on compliance systems such as on fraud prevention and anti-money laundering and risk management.

Accountability

In ethics and governance, accountability is about the board being answerable to stakeholders for performance, both financial and non-financial. Accountability encompasses a two-way process and there are many organizations which exert pressure and influence on corporate practice and demand greater accountability, such as trade unions and campaign organizations. This also includes the investment industry and most recent debate around corporate governance has focused on the relationship between companies and their shareholders.

The following are the few of a Director's integrity requirements :

- (i) A Director Acts with Integrity.
- (ii) A director acts ethically and with integrity (base of minimum requirements for moral values) in accordance with the applicable governance codes and company practices. A director is able to describe the behavior and to identify the common values of the company (for example, respect, dialogue, tolerance, diversity or pluralism).
- (iii) A director has the personal and professional qualities that meet the highest definition and most demanding standards in terms of integrity, honesty and loyalty.

3.3.1B Conflicts of Interest

Conflicts of interest are avoided in order to prevent individuals seeking personal gain from their position within a company which can often be to the company's disadvantage. This is seen as an ethical issue and that fairness and honesty are typically absent when there is a conflict of interest. The accountability to shareholders as stated above includes the conflicts of interest potentially experienced by institutional investors.

The board and its members can be a subject to conflicts of interest in a number of ways. Directors may represent a major shareholder or other key stakeholders or they may be an executive director on a unitary board balancing executive and governance responsibilities. It is essential for the good standing of the organization that such conflicts be recognized and managed in an ethical way, so that the director does not profit from his or her position or suffer from impaired judgement. In essence, directors are in a position of trust and should

exercise their stewardship of the company without regard to any personal gain or avoidance of loss. This presupposes both a clear understanding of their role and responsibilities, including the applicable rules on managing conflicts, and a high degree of integrity.

Directors also have a conflict if they have a personal connection with any part of the business or any proposed transaction. They may also have a conflict of interest because of a position they hold outside the business. They must subordinate this interest to that of the company. In practice this may mean withdrawing from board discussion of a matter, not receiving papers on it, not voting on it or a combination of these or any other steps agreed to, by the board.

Conflict management can be said to begin with the appointment process. Directors should be appointed using a process which is as objective as possible to avoid persons being appointed, who have close connections with the board and who may not therefore act impartially in the best interests of the company as a whole. This requires a "formal, rigorous and transparent" appointments process.

Transparency

Transparency is an ethical issue for boards as they seek to meet stakeholders' expectations and demonstrate fair and honest practices to shareholders and other stakeholders. It enables the stakeholder to gain an informed and accurate view of the organization and the way it is doing business, negative points as well as positive. It reduces the scope for an unscrupulous company to conceal unwelcome facts. It is also important in the context of the ownership structure of the company and the extent to which it is possible for a company to identify its ultimate shareholders, so that, it can communicate effectively with them and they can exercise their full governance rights.

SUMMARY

- ❖ Corporate Governance relates to how the board is constituted and how it performs its role. It encompasses issues of board composition and structure, how it carries out its accountability to its stakeholders and delegates authority to manage the business throughout the organization. Maintaining successful business relationships and operations requires businesses to manage their risks, including their integrity risks, and guard their reputations. Trustworthiness is a valuable asset, and core remit of good corporate governance. Business ethics also refer to the way board members choose to behave in carrying out their role, upholding high standards of integrity and acting fairly.
- ❖ In ethics and governance, accountability is about the board being answerable to stakeholders for performance, both financial and non-financial. Conflicts of interest are avoided in order to prevent individuals seeking personal gain from their position.
- ❖ Directors also have a conflict of interest if they have a personal connection with any part of the business. They must subordinate this interest to that of the company. Transparency in work is an ethical issue for boards as they seek to meet stakeholders' expectations.

Short Question Answers

1. How will you define corporate Governance ?

Ans. Corporate governance is defined as 'the way businesses are directed and controlled', it concerns the work of the board as the body which bears ultimate responsibility for the business. Governance relates to how the board is constituted and how it performs its role. It encompasses issues of board composition and structure, the board's remit and how it is carried out and the framework of the board's accountability to its stakeholders. It also concerns how the board delegates authority to manage the business throughout the organization.

2. Suggest some "best practices" adopted and followed in big companies.

Ans. With increasing globalization, companies are adopting a number of 'best practices' adopted and followed in European companies which include: i) creation of a 'lead director', ii) increased transparency in governance reporting, iii) increase in the culture of consensus, and iv) focus on information on compliance systems.

3. Write down the requirement in the accountability and integrity of a director to the stakeholders.

Ans. A Director's integrity requirements include :

- (i) acts with Integrity,
- (ii) acts ethically,
- (iii) able to describe the behaviour and to identify the common values of the company e.g., respect, dialogue, tolerance, diversity etc. and
- (iv) personal and professional qualities that meet the most demanding standards in terms of integrity, honesty and loyalty.

Exercise

1. What is the importance of business ethics in corporate governance and business behaviour ?
2. How is board of director basically guided by business ethics ?
3. How does business ethic prevent conflict of interest in the corporate governance ?
4. Explain transparency as an ethical issue for the board of directors.



3.3.2 Business Ethics in Finance and Accounting

Accounting is a profession that gives rise to moral dilemmas and ethical questions at all levels of an organization. Sometimes, there are timing differences when recording transactions that can mean the difference between managers receiving bonuses or losing their jobs. In these instances, ethics play a key role in accounting decision-making. Without adherence to ethical guidelines, accountants are neither living up to their professional responsibilities, nor are they fulfilling their duties to business owners.

For a company's accounting to truly represent what is going on in its financial arena, its bookkeeping must be honest and accurate. Honesty and accuracy in accounting are ethical as well as financial issues. Bookkeepers and accountants have a responsibility to represent information in the ways which genuinely represent the situation going on in the business. Shareholders, potential shareholders, Partners, investors and other users of the financial statements rely heavily on the yearly financial statements of a company, as they can use this information to make an informed decision about investment. They rely on the opinion of the accountants who prepared the statements, as well as, the auditors who verified it to present a true and fair view of the company. Knowledge of ethics can help accountants and auditors to overcome ethical dilemmas, allowing for the right choice that although may not benefit the company, but will benefit the public who relies on the accountant/ auditor's reporting.

Accountants must follow the code of ethics set out by the professional body (of which they are a member) i.e., "independence, integrity, and objectivity"; "competence and technical standards"; "responsibilities to clients"; "responsibilities to colleagues"; as well as "other responsibilities and practices". Each of these ethics provides guidelines on how a Certified Chartered Accountant (CCA) should act as a professional. Failure to comply with the guidelines could cause an accountant to be barred from practicing.

There has been debate on whether ethics should be taught in a university setting. Supporters point out that ethics are important to the profession, and should be taught to accountants entering the field. In addition, the education would help to reinforce students' ethical values and inspire them to prevent others from making unethical decisions. Critics argue that whether an individual is ethical or not, teaching an ethics course would serve no purpose. Despite opposition, instruction on accounting ethics by universities and conferences, has been encouraged by professional organizations and accounting firms.

3.3.2A Accounting Scandals

Fraud in financial statement can be committed in five ways i.e.,

- (i) Fictitious revenue-revenues not actually earned,
- (ii) Fraudulent timing differences,
- (iii) Concealed liabilities and expenses,
- (iv) Fraudulent disclosures or Omissions and
- (v) Fraudulent assets valuation-false statement of the inventory available.

On the basis of so many of these possible frauds, accounting ethics has been deemed difficult to control. As accountants and auditors must consider the interest of the public (which relies on the information gathered in audits), they must consider how best to apply accounting standards even when faced with issues that could cause a company to face a significant loss and/or even winding up. Due to several accounting scandals within the profession, critics of accountants have stated that when asked by a client "what does two plus two equal?" the accountant would be likely to respond "what would you like it to be?" This thought process along with other criticisms of the profession's issues with conflict of interest, have led to various increased standards of professionalism while stressing ethics in the work environment.

The role of accountants is critical to society. Accountants serve as financial reporters and intermediaries in the capital markets and owe their primary obligation the public interest. The information they provide is crucial in aiding managers, investors and others in making critical economic decisions. Accordingly, ethical improprieties by accountants can be detrimental to society, resulting in distrust by the public and disruption of efficient capital market operations. There have been multiple accounting scandals that resulted in fraud charge, bankruptcy protection requests, and the closure of companies and accounting firms. The scandals were the result of creating accounting, misleading financial analysis, as well as bribery. Various companies had issues with fraudulent accounting practices. In India, one of the most widely reported violation of accounting ethics involved Satyam Computers (a multinational company) which for several years had shown untrue and unfair financial statements on the advice of its M.D. Their company auditor, a very famous international accounting firm, signed off on the validity of the accounts despite the inaccuracies in the financial statements.

One or more factors responsible for failure/ connivance of the accountants and auditors include: "self-interest, failure to maintain objectivity and independence, inappropriate professional judgment, lack of ethical sensitivity, improper leadership and ill-culture, failure to withstand advocacy threats, lack of competence, lack of organizational and peer support, and lack of professional body support." The main factor, self-interest, is the motivation to an accountant to act in his/ her best interest or when facing a conflict of interest. For example, if an auditor finds any irregularity/ fraud in an account being audited by him/her, but is receiving financial incentives to ignore these issues, the auditor may act unethically.

3.3.2B Ethical Responsibility of the Management

For ethical issues in Finance and importance of financial statement the management of a company may consider acting on the following lines of action:

- (i) Steps should be taken by the management for true, fair and reliable accounts,
- (ii) Determining the key elements of the business e.g., the objectives and to see how can they be defined and measured from the financial point of view,
- (iii) Making sure that the funds are allocated to different activities on the basis of their importance, and
- (iv) Frame finance rules that have a positive effect on business activities.

SUMMARY

- ◆ Accounting is a profession that gives rise to moral dilemmas and ethical questions at all levels of organization. Without adherence to ethical guidelines, accountants do not fulfill their professional responsibility to business owners. Honesty and accuracy in accounting are ethical as well as financial issues, as the investors use this information to make an informed decision about investment.
- ◆ Accountants must follow the code of ethics set out by their professional body. Failure to comply with the guidelines could cause an accountant to be barred from practicing. On the basis of so many frauds in financial statement, accounting ethics has been deemed difficult to control. Ethical misappropriates by accountants can be detrimental to society, resulting in distrust by the public and disruption of efficient capital market operations. The main factor, self-interest, is the motivation for an accountant to act in his/her best interest or when facing a conflict of interest. For ethical issues it is the responsibility of the management of a company to take necessary steps.

Short Question Answers

1. Enumerate the code of ethics set out by their professional body for chartered accountants.

Ans. Accountants must follow the code of ethics set out by the professional body (of which they are a member), i.e., "Independence, integrity, and objectivity"; "competence and technical standards"; "responsibilities to clients"; "responsibilities to colleagues"; as well as "other responsibilities and practices".

2. Describe the many ways of frauds committed in financial statements.

Ans. Frauds in financial statement have been committed in five ways i.e., (i) Fictitious revenue-revenues not actually earned, (ii) Fraudulent timing differences, (iii) Concealed liabilities and expenses, (iv) Fraudulent disclosures or Omissions and (v) Fraudulent assets valuation-false statement of the inventory available.

3. How is the role of accountants critical to society?

Ans. Accountants serve as financial reporters and intermediaries in the capital markets and owe their primary obligation to the public interest. The information they provide is crucial in aiding managers, investors and others in making critical economic decisions. Accordingly, ethical improprieties by accountants can be detrimental to society.

Exercise

1. How accounting as a profession is important for organizations?
2. Name the factors responsible for connivance of accountants/auditors.
3. What lines of action should be followed by a ethical responsible management?

3.3.3 Intellectual Property Right (IPR)

According to the definition of intellectual property rights it provides the exclusive rights to the holder/creator of the intellectual property for varying lengths of time. Intellectual property is an idea, invention, or process derived from the work of one's intellect or its application providing right of registration relating to it. It is a generic term which encompasses all expressions of human creativity. Ownership of intellectual property is usually expressed as 'intellectual property rights'. These are individual rights which result from assertion of ownership of intellectual property. In general, these are monopoly rights to use the intellectual property. There are many different ways in which rights may be asserted. Some of these are automatic, some require formal registration to achieve protection. In any case, it is for the owner of these rights to use it, as and when any infringement occurs. Intellectual property rights are subject to limitations in several ways:

- (i) Rights exist for a limited period,
- (ii) Rights are restricted geographically,
- (iii) Rights are limited by subject matter and
- (iv) Rights are potentially limited by competition and free movement requirements.

Intellectual property can consist of patents, trade secrets, copyrights and trademarks, or simply ideas. The concept of intellectual property relates to the fact that certain products of human intellect should be afforded the same protective rights that apply to physical property. Most developed economies have legal measures in place to protect both forms of property. In India Controller General of Patents, Designs and Trademark, in the Department of Industrial Policy and Promotion under the Ministry of Commerce and Industry has been entrusted with the job of registration of patents, Trademark and other such related matters filed by the individuals and companies.

Intellectual Property Rights, by providing exclusive rights to the inventor or creator, encourages more and more people to invest time, efforts and money in such innovations and creations. Intellectual property is divided into two categories :

- (i) **Industrial property**, which includes inventions (patents), trademarks, industrial designs, and geographic indications of source ; and
- (ii) **Copyright**, which includes literary and artistic works such as novels, poems and plays, films, musical works, artistic works such as drawings, paintings, photographs and sculptures, and architectural designs. Right related to copyright include those of performing artists in their performance, producers of phonograms in their recordings, and those of broadcasters in their radio and television programs.

The issue of Intellectual Property Rights was brought on an international platform of negotiation by World Trade Organization (WTO) through its Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPS). This agreement narrowed down the difference existing in the extent of protection and enforcement of the Intellectual Property

Rights (IPRS) around the world by bringing them under a common minimum internationally agreed trade standards. The member countries are required to abide by these standards within stipulated time-frame. India, being a signatory of TRIPS has evolved an elaborate administrative and legislative framework for protection of its intellectual property.

Quoting WIPO, (World Intellectual Property Organization), "intellectual property shall include rights relating to :

- ❖ Literary, artistic and scientific works,
- ❖ Performance of performing artists, phonograms and broadcasts.
- ❖ Inventions in all fields of human endeavor.
- ❖ Scientific discoveries.
- ❖ Industrial designs.
- ❖ Trademarks, service marks and commercial names and designations.
- ❖ Protection against unfair competition".

(a) Copyright and rights related to copyright

The rights of authors of literary and artistic works (such as books and other writings, musical compositions, paintings, sculpture, computer programs and films) are protected by copyright. Also, protection is granted to related or neighbouring rights like the rights of performers (e.g., actors, singers and musicians), producers of phonograms (sound recordings) and broadcasting organizations. Copyright protects intellectual property of a creative or artistic nature. Copyright often lasts 50 to 70 years after the creator's death. In some countries, your copyright must be registered to become effective, however in U.S.A. a copyright is established as soon as a work is created. In the case of software or a digital drawing it is even established as soon as it is saved to the hard drive. However, registering your copyright gives you additional rights.

(b) Industrial property

Industrial property, which is divided into two main areas :

- (i) One area can be characterized as the protection of distinctive signs, in particular trademarks (which distinguish the goods or services of one undertaking from those of other undertakings) and geographical indications (which identify a good as originating in a place where a given characteristic of the good is essentially attributable to its geographical origin).
- (ii) Other types of industrial property are protected primarily to stimulate innovation, design and the creation of technology. This category includes inventions (protected by patents), industrial designs and trade secrets.

(c) Industrial property rights are defined and discussed below

(i) **Patents.** Patents cover inventions. It is an exclusive right awarded to an inventor of a product or process, which prevents others from making, selling, distributing, importing or

using the invention, without licence or authorization, for a fixed period of time. These can be utility patents, design patents, and plant patents. The process of filing for a patent can be time consuming, and somewhat costly.

(ii) **Trademarks.** Trademarks provide exclusive rights to use distinctive, visible signs, such as brands, symbols, colours, letters, shapes or names to identify the producer of a product. In order to be eligible for protection a mark must be distinctive of the proprietor so as to identify the origin of a proprietor's goods or services. The period of protection varies, but most countries provide for the renewal of registrations, so that, protection can be indefinite. Protection against trade mark counterfeiting and the consequent deception of consumers may also be provided through consumer protection. One area which falls under trademark is *trade names*. A company can own several trademarks in their business. However, they usually have one Trade Name, to distinguish themselves from their competitors. The name is independent of whatever the products are, which the company sells under a particular trademark. Trade Names can be long, and also need to indicate information about the type of enterprise. They need to include words e.g., corporation, or Company, or Ltd. for a limited company. Other areas under the umbrella concept of trademarks are franchises, such as Macdonald's, and famous character names, such as Tarzan, Mickey Mouse, and Charlie Chaplin. These can come from literature, pictorial matter or actual people, and are all used as recognizable figures in merchandising. However, there are protections for live people against unauthorized use of their names, images or other characteristics, which are above the rights to intellectual property. This is generally covered under such rights as those to privacy and protection against libel or defamation. Trade secrets often consist of information which could be patentable, such as the formula for Coca-Cola. However, patents expire, whereas a trade secret, if it is not discovered, can continue to be used exclusively by a company for an indeterminate length of time, so some companies make the decision that it is better for the company not to patent the information. Protection for trade secrets generally falls under the intellectual property rights for Protection Against Unfair Competition. Usually, if a trade secret is independently discovered, its intellectual property rights are lost.

(iii) **Industrial Designs Including Integrated Circuits.** In the United States, industrial design protection is covered under design patents, but other countries have made explicit provisions for protection of industrial design. The related protection of integrated circuits has been handled explicitly under the Treaty on Intellectual Property in Respect of Integrated Circuits (IPIC Treaty) which was passed at a meeting in Washington DC. The World Trade Organization also covers integrated circuits in the TRIPS agreement. The designs for specific circuits are covered, as it is considered that they are products of the mind, and often embody large investment of time, resources and money. Reverse engineering of the principle of the design is allowed, as long as the end result is a different design, even if it does the same thing.

(iv) **Geographical Indications.** Geographical Indications is probably the newest term covered by the intellectual property right definition used in international negotiation, and refers to the value of such names as Champagne, Chianti, and Darjeeling, which are actual place names, but are thought of generally in terms of the products they are associated with.

Geographical Indications is meant to embody the widest possible coverage of this sort of intellectual property. It differs from trademark because it is not associated with a single company's products, but with products of a particular nature that come from that geographic location. An earlier term, still used in WIPO documents, is appellation or origin, which is a geographical location used to designate a product from the region.

(v) **Protection Against Unfair Competition.** Protection Against Unfair Competition is another area of Intellectual property that is not as well known as copyright or patent. This area has been under some sorts of protection in treaties and agreements for over a century, but the reasoning for it being part of intellectual property is generally not as obvious to people as other types of intellectual property. However, an example which shows the reasoning behind this protection is in situations where companies sell products packaged exactly like those of another company, but the product is of inferior quality or actually does not work. Consumer can be hurt economically by the poor quality of products passed off as being manufactured by the well known company. Protection of intellectual property falls under main two areas: Piracy and counterfeiting. Counterfeiting is the illicit copying of products (fakes). Piracy refers to the illicit copying of material that is copyrighted.

SUMMARY

♦ Intellectual property is an idea, invention, or process derived from the work of one's intellect or its application providing right of intellectual property registration relating to it, for varying lengths of time. Ownership of intellectual property is usually expressed as 'intellectual property rights'. Intellectual property rights are subject to limitations in several ways and it relates to the fact that certain products of human intellect should be afforded the same protective rights that apply to physical property. Controller General of Patents, Designs and Trademark, in the Department of Industrial Policy and Promotion has been entrusted with the job of registration filed by the individuals and companies. Intellectual property is divided into two categories, i.e., (i) Industrial property, which includes inventions (patents), trademarks, industrial designs, and geographic indications of source ; and (ii) Copyright, which includes literary and artistic works.

Short Question Answers

1. Define the term "Intellectual Property Right" and write its categories.

Ans. Intellectual property is an idea, invention, or process derived from the work of one's intellect or its application providing right of registration relating to it. Intellectual property rights provide the exclusive rights to the holder/creator of the intellectual property for varying lengths of time. Intellectual property is divided into two categories, i.e., (i) Industrial property, which includes inventions (patents), trademarks, industrial designs, and geographic indications of source ; and (ii) Copyright, which includes literary and artistic works.

2. What are the dimensions and limitations of Intellectual Property Rights ?

Ans. Intellectual property rights are subject to limitations in several ways, i.e.,

- Rights exist for a limited period,
- Rights are restricted geographically,
- Rights are limited by subject matter and
- Rights are potentially limited by competition and free movement requirements.

3. Write the intellectual property rights agreed upon by world Intellectual Property organisation.

Ans. According to the World Intellectual Property Organization (WIPO), intellectual property shall include rights relating to :

- Literary, artistic and scientific works,
- Performance of performing artists, phonograms and broadcasts,
- Inventions in all fields of human endeavor,
- Scientific discoveries,
- Industrial designs,
- Trademarks, service marks and commercial names and designations, and
- Protection against unfair competition.

Exercise

- Explain in brief the right related to copyright.
- Write the main areas covered under industrial property.
- Define and discuss the Industrial Property Rights.

3.4 CORPORATE SOCIAL RESPONSIBILITY (CSR)

3.4.1 Definition

The term "corporate social responsibility" became popular in the 1960s. It can be defined as "corporate citizenship" and can involve incurring short-term costs that do not provide an immediate financial benefit to the company, but instead promote positive social and environmental change. Companies express the citizenship through their waste and pollution reduction processes, by contributing educational and social programs and by earning adequate returns on the employed resources.

CSR policy functions as a self-regulatory mechanism whereby a business monitors and ensures its active compliance with the spirit of the law, ethical standards and international norms. CSR is titled to aid an organization's mission as well as a guide to what the company stands for to its consumers.

Many large corporations have a lot of power in the community and in the national economy who devote real time and money to environmental sustainability programs, alternative energy/clean technology, and various social welfare initiatives to benefit employees, customers, and the community at large. The term generally applies to company efforts that go beyond what may be required by regulators or environmental protection groups.

CSR policy functions as a self-regulatory mechanism whereby a business monitors and ensures its active compliance with the spirit of the law, ethical standards and international norms. CSR is titled to aid an organization's mission as well as a guide to what the company stands for to its consumers.

Most consumers believe companies doing charity will receive a positive response. It has also been found that consumers are loyal and willing to spend more on retailers that support charity. Consumers also believe that retailers selling local products will gain loyalty. Some believe that marketing local products will gain consumer trust. All CSR activities do not become popular. Environmental efforts are receiving negative views on account of the belief that this would affect customer service.

Philanthropy is a very common approach to CSR in the corporate sector which includes monetary donations and other kind of aid given to non-profit/ government organizations e.g., in India donations are made by TATA group of industries in the areas such as the arts, education, housing, health, social welfare and the environment etc. Political contributions and commercial event sponsorship are not included in this approach to CSR.

Few companies have provided examples of the Link between Competitive Advantage and Corporate Social Responsibility by developing deep linkages between their business strategies and CSR. It acknowledges trade-offs between short-term profitability and social/environmental goals, but emphasizes the opportunities for competitive advantage from building a social value proposition into corporate strategy.

3.4.2 Concepts of CSR

- (i) **Environmental sustainability.** Recycling, waste management, water management, renewable energy, reusable materials, 'greener' supply chains and reducing paper use etc.
- (ii) **Community involvement.** This can include raising money for local charities, providing volunteers, sponsoring local events, employing local workers, supporting local economic growth, and engaging in fair trade practices, etc.
- (iii) **Ethical marketing.** Companies that ethically market to consumers are placing a higher value on their customers and respecting them as people who are end ethical that they do not manipulate and/or falsely advertise to potential consumers.

Strategy of big industrial houses to draw benefits by spending their resources in CSR and its Cost benefit analysis.

CSR activity	Action	Strategic Impact	Benefits
Corporate Philanthropy	Providing funds and skills	Less strategic and operational impact	<ul style="list-style-type: none"> ○ Corporate Philanthropy and sponsorships ○ Short-term benefits/not always sustainable ○ Limited funds available ○ Impact diluted because limited budget is allocated to many charities ○ Corporate competencies and other business assets not fully utilized ○ Misalignment between business and social responsibility strategies and functions ○ Results in minimal social and business impact on account of social programmes.
Value Creation	Innovation and promotion of sustainable business model	Fundamental strategic and operational impact	<ul style="list-style-type: none"> ○ Shares value (business- Institutions and communities ○ Promotes competitiveness and innovation ○ Promotes a sustainable business model ○ Integrates business into the community ○ Develops Human Capital (key in developing countries) ○ Incorporates into the Business Strategy
Risk Management	Compliance	Medium to high strategic and operational impact	<ul style="list-style-type: none"> ○ Mitigates operational impact ○ Mitigates operational risks ○ Supports external relationships

Various countries are actively engaged in CSR regulation and its related public policy development. CSR efforts and policies are different among countries, responding to the complexity and diversity of governmental, corporate and social roles.

The Companies Act, 2013 passed by the Indian Parliament in August, 2013 mandates companies of a particular size to invest 2% of their Net Profit in CSR activities. As per this Act, more than 22,000 companies were to spend about USD 3 billion annually on CSR activities, starting 1st April, 2014. The guidelines, which have replaced two existing separate guidelines on CSR and sustainable development, issued in 2010 and 2011 respectively, mentions the following :

"Since corporate social responsibility and sustainability are so closely entwined, it can be said that corporate social responsibility and sustainability is a company's commitment to its stakeholders to conduct business in an economically, socially and environmentally sustainable manner which appears transparent and ethical."

By requiring companies, with a minimum net profit of 5 crore INR, to spend on CSR activities, the Companies Act, 2013 is likely to bring in many self-managed companies into the CSR fold. This will usher in a fresh set of challenges to a sector that is increasingly being asked by its business customers to comply with environmental and social standards, while remaining competitive in terms of price and quality.

The industry has responded positively to the reform measures undertaken by the government with a wide interest across the Indian and multinational companies in the public and private sector.

3.4.2A Controversies

Industries such as tobacco, alcohol or munitions firms make products that damage their consumers and/or the environment. Such firms may engage in the same philanthropic activities as those in other industries. This duality complicates assessments of such firms with respect to CSR.

3.4.3 ISO 26000 (Social Responsibility)

It is the recognized international standard for CSR. This is a guidance tool provided by the International Standards organization (ISO) which enables the corporate sector to understand the meaning and significance of social responsibility. It is important to note that it is not a certification but only a guiding tool. Hence, organizations which comply with these standards are self-certified.

It covers six core areas of social responsibility, including :

- (i) Human rights
- (ii) Labour practices
- (iii) Environment

This ensures a holistic approach to the concept of social responsibility and sustainable development in the corporate sector.

SUMMARY

❖ The term "corporate social responsibility" can be defined as "corporate citizenship" and can involve incurring short-term costs that do not provide an immediate financial benefit to the company, but instead promote positive social and environmental change. CSR is titled to aid an organization's mission as well as a guide to what the company stands for to its consumers. The term generally applies to company efforts that go beyond what may be required by regulators or environmental protection groups. It has also been found that consumers are loyal and willing to spend more on retailers that support charity. Common CSR actions include :

- (i) Environmental sustainability,
- (ii) Community involvement, and
- (iii) Ethical marketing.

❖ The Companies Act, 2013 passed by the Indian Parliament in August, 2013 mandates companies of a particular size to invest 2% of their Net Profit in CSR activities. In order to draw benefits the industrial houses indulge in CSR activities like ; corporate Philanthropy, Value creation and Risk Management. ISO 26000 provides guidance by the International Standards organization (ISO) to enable the corporate sector to understand the meaning and significance of social responsibility.

Short question answers

1. Explain the term "corporate Social Responsibility".

Ans. The term "corporate social responsibility" defined as "corporate citizenship" can involve incurring short-term costs that do not provide an immediate financial benefit to the company, but instead promote positive social and environmental change. CSR policy functions as a self-regulatory mechanism whereby a business monitors and ensures active compliance with the spirit of the law, ethical standards and international norms. Many large corporations have a lot of power in the community and in the national economy who devote real time and money to environmental sustainability programs, alternative energy/clean technology, and various social welfare initiatives to benefit employees, customers, and the community at large. Philanthropy is a very common approach to CSR in the corporate sector which includes monetary donations and other kind of aid given to non-profit/government organizations.

2. *Describe the common CSR actions.*

Ans. Common CSR actions include :

- (i) Environmental sustainability i.e., recycling, waste management, water management, renewable energy, reusable materials, 'greener' supply chains and reducing paper use etc.,
- (ii) Community involvement i.e., this can include raising money for local charities, providing volunteers, sponsoring local events, employing local workers, supporting local economic growth, and engaging in fair trade practices, etc.
- (iii) Ethical marketing i.e., Companies that ethically market to consumers are placing a higher value on their customers and respecting them as people who are end consumers. It is important for the companies who want to be viewed as ethical that they do not manipulate and/or falsely advertise to potential consumers.

3. *Explain the companies act 2013 passed by the Indian parliament as a mandate for companies.*

Ans. The Companies Act, 2013 passed by the Indian Parliament in August, 2013 mandates companies of a particular size to invest 2% of their Net Profit in CSR activities. The guidelines mention, "Since corporate social responsibility and sustainability are so closely entwined, it can be said that corporate social responsibility and sustainability is a company's commitment to its stakeholders to conduct business in an economically, socially and environmentally sustainable manner which appears transparent and ethical".

Exercise

1. Explain the actions of industrial houses benefits and strategic impact in public.
2. State and explain the international standards organization (ISO 26000) as a guidance tool for corporate sector.
3. Explain the guidance tool provided for social responsibility in ISO 26000.

3.5 ENVIRONMENTAL ETHICS

Environmental Ethics are related to those aspects of human health including quality of life that are determined by physical, biological, social and psychological factors in the environment. The relationship between the environment and its impact on human health is highly complex. Each of the effects is associated with a variety of aspects of economic and social development. Moreover, there is no single best way of organizing and viewing the development-environment-health relationship that reveals all important interactions and possible entry points for public health interventions. Human beings are exposed to a variety of chemicals including industrial chemicals, pesticides, air pollutants, natural and man-made toxicants etc. in the environment through the skin, respiratory system and gastrointestinal tract that can affect vital body systems such as pulmonary, reproductive and nervous and immune system. Dysfunction of these systems could have far-reaching consequences, which affect individuals and even their progeny from serious health ailments.

To investigate possible effects of environmental pollutants on human health it is of prime importance that accurate exposure assessment techniques and validated biomarkers are available. It is, therefore, essential to have full fledged and accurate Environmental Health Impact Assessment procedures in place, undertake application-oriented research such as occupational and environmental cohort studies to define single or mixture of pollutants and their impacts on health. This would help the implementing agencies to revise the environmental and industry specific actions. It is also very important to have collaborative approach among the industries and various technical/research centers together with the implementing agencies of the pollution control so as to deal with the Environment and Health issues properly.

In the year 1986, the Govt. of India enacted the Environment Protection Act with an objective to plan, promote, coordinate and oversee the implementation of environmental and forestry programmes in order to protect the environment and maintain a balance between conservation and development activities.

3.5.1 Sustainable Development

Sustainable development ties together concern for the carrying capacity of natural systems with the social, political and economic challenges faced by humanity. It is the organizing principle for sustaining finite resources necessary to provide for the needs of future generations of life on the planet. It is a process that envisions a desirable future state for human societies in which living conditions and resource-use continue to meet human needs without undermining the "integrity, stability and beauty" of natural biotic systems. The concept of "sustainable development" has its roots in forest management. Sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable development also contains within it two key concepts :

- (i) The concept of "needs", in particular, the essential needs of the world's poor, to which overriding priority should be given ; and
- (ii) The idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

UN Conference on Environment and Development in 1992, published the Earth Charter, which outlines the building of a just, sustainable, and peaceful global society in the 21st century. Sustainable development identifies information, integration, and participation as key building blocks to help countries achieve development. It emphasizes that in sustainable development everyone is a user and provider of information. It stresses the need to change from old sector-centered ways of doing business to new approaches that involve cross-sectorial co-ordination and integration of environmental and social concerns into all development processes. Different domains have been identified for research and analysis of sustainable development. Broadly defined, these include ecology, economics, politics and culture.

The ecological sustainability of human settlements is part of the relationship between humans and their natural, social and built environments. Also termed human ecology, this broadens the focus of sustainable development to include the domain of human health. Fundamental human needs such as the availability and quality of air, water, food and shelter are also the ecological foundations for sustainable development. Addressing public health risk through investments in ecosystem services can be a powerful and transformative force for sustainable development which, in this sense, extends to all species. Ecological sustainability is affected by man due to his activities in farming, energy production, environment and transportation etc discussed in brief below.

Farming

Environmental-friendly methods of farming are those which allow the production of crops or livestock without damage to human or natural systems. More specifically, it might be said to include preventing of adverse effects on soil, water, biodiversity, surrounding or downstream resources, as well as, to those working or living on the farm or in the neighbouring areas.

Energy

The Provision of energy which is clean and lasts for a longer period of time is sustainable energy. Unlike the fossil fuel that most of the countries are using, renewable sources of energy i.e., solar energy, wind energy, water energy and nuclear energy produce little or even no pollution. Dirty energy projects (e.g., coal based energy) poison the air and harm the area. These toxins are major contributors to significant health problems in the communities. Due to this reason the renewable energy is becoming more common now with

GLOBALIZATION AND MNCs | 91
the Government. At present solar energy is commonly installed and used on street lights and the roofs of buildings. On the other hand, wind energy is also expanding quickly in recent years.

Environment

Since Natural resources are derived from the environment, the state of air, water, and the climate are of particular concern to us. Environmental sustainability requires society to design activities to meet human needs while preserving the life support systems of the planet. For example, this entails using water sustainably, utilizing renewable energy, and sustainable material supplies. Sustainability requires that human activity only uses nature's resources at a rate at which they can be replenished naturally. An unsustainable situation occurs when the sum total of nature's resources are used up faster than it can be replenished by the nature.

Transportation

Transportation is a large contributor to greenhouse gases. It is said that one-third of all harmful gasses produced are due to transportation. To lower greenhouse gases emission, the government is considering some plans to reduce the total number of vehicle trips, by ;

- (i) Improving public transit and covering larger area by providing more mobility and accessibility to general public, e.g., Delhi Metro Rail.
- (ii) Providing wider bike and pedestrian pathways to encourage walking and biking.
- (iii) Increasing the cost of car ownership and related taxes to discourage use of vehicles.

A United Nations conference on Sustainable Development (UNCSD), also known as Rio 2012, Rio+20, or Earth Summit 2012, was held to discuss the sustainable development, which aimed at reconciling the economic and environment goals of the global community.

SUMMARY

- ❖ Environmental Ethics are related to those aspects of human health including quality of life that are determined by physical, biological, social and psychological factors in the environment. Human beings are exposed to a variety of chemicals including industrial chemicals, pesticides, air pollutants, natural and man-made toxicants affect vital body systems. It is essential to have full-fledged and accurate Environmental Health Impact Assessment procedures in place. Environmental-friendly methods of farming may be included to prevent adverse effects on soil, water, biodiversity and surrounding. We should encourage use of renewable sources of energy i.e., solar energy, wind energy, water energy and nuclear energy produce little or even no pollution. We can lower greenhouse gases emission, by reducing the total number of vehicle trips.

Short question answers**1. Explain the relationship between the environment and the human health.**

Ans. Human health and quality of life are determined by physical, biological, social and psychological factors in the environment. Human beings are exposed to a variety of chemicals including industrial chemicals, pesticides, air pollutants, natural and man-made toxicants etc. in the environment through the skin, respiratory system and gastrointestinal tract that can affect vital body systems.

2. How is sustainable development important for humanity, explain its concepts ?

Ans. Sustainable development is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Sustainable development identifies information, integration, and participation as key building blocks to help countries achieve development.

3. Explain how is ecological sustainability affected by farming, energy and environment ?

Ans. Ecological sustainability is affected by man due to his activities in farming, energy production, environment and transportation. Environmental-friendly methods of farming may be said to include prevention of adverse effects on soil, water, biodiversity and surrounding. Dirty energy projects (e.g., coal based energy) poison the air. We should encourage use of renewable sources of energy i.e., solar energy, wind energy, water energy and nuclear energy produce little or even no pollution. Natural resources are derived from the environment. Sustainability requires that human activity only uses nature's resources at a rate at which they can be replenished naturally. An unsustainable situation occurs when the sum total of nature's resources are used up faster than it can be replenished by the nature. Transportation is a large contributor to greenhouse gases. To lower greenhouse gases emission, we should reduce the total number of vehicle trips by, i) Improving public transit and covering larger area, ii) encouraging walking and biking, and iii) discouraging use of vehicles.

Exercise**1. What are the possible points for toxicants to enter in human body ?****2. Describe the relation between the ecological sustainability and human settlements.****3. What steps are being taken by the Government to reduce the greenhouse gases released by transport ?****3.5.2 The Eco-System**

The eco-system is a core concept in Biology and Ecology, serving as the biological organization in which organisms interact simultaneously with each other and with their environment. As such, ecosystems are a level above that of the ecological community (organisms of different species interacting with each other) but are at a level below, or equal to, biomes and the biosphere. Essentially, biomes are regional ecosystem, and the biosphere is the largest of all possible ecosystems. An ecosystem in a given area includes all of the living things (plants, animals and organisms) interacting with each other, and also with their non-living environments (weather, earth, sun, soil, climate, atmosphere). In an ecosystem, each organism has its' own niche, or role to play.

Every living organism on earth needs some basic things to survive. The amount, way, form or kind of these needs vary from organism to organism. For example, water is a basic need for survival. The amount of water a frog needs to survive is not the same as the amount of water a desert cactus plant needs to survive. They all need water, but because they are different living organisms, their water needs will be different, even though they both need water to live.

There are six basic needs/factors of all living things.

- Sunlight.** This is probably the most important need for all living organisms, because it is the source of all energy. It also provides heat to plants and animals.
- Water.** Water is the medium in which living cells and tissue work. Water is also a living environment for many plants and animals.
- Air.** Air is made up of several gases, but the two most important gases are Oxygen and Carbon dioxide. Without oxygen, animals will die, and without carbon dioxide, plants cannot survive.
- Food (nutrients).** Living things need energy for function. Energy is needed to grow, reproduce, move, and to work. Think of what will happen if you stayed for few days without food.
- A Habitat with the Right Temperature.** Whether too cold or too hot, every living organism needs the ideal temperature to survive either on land or in water.
- Limiting Factors.** Certain factors in a living organism's environment can prevent it from surviving there. Those factors are called 'limiting factors'. They include soils, temperature, water, sunlight and physical barriers. Physical barriers may include landforms and water bodies. They often prevent a living organism from moving to another place when conditions get bad in their regular habitat.

Consider a small puddle at the back of your home. In it, you may find all sorts of living things, from microorganisms, to insects and plants. These may depend on non-living things like water, sunlight, turbulence in the puddle, temperature, atmospheric pressure and even

nutrients in the water for life. This very complex, wonderful interaction of living things and their environment, has been the foundation of energy flow and recycling of carbon and nitrogen. Anytime a 'stranger' (living things or an external factor such as rise in temperature) is introduced to an ecosystem, it can be disastrous to that ecosystem. This is because the new organism (or factor) can distort the natural balance of the interaction and potentially harm or destroy the ecosystem. Usually, biotic members of an ecosystem, together with their abiotic factors depend on each other. This means the absence of one member, or one abiotic factor can affect all parties of the ecosystem. Unfortunately ecosystems have been disrupted, and even destroyed by natural disasters such as fires, floods, storms and volcanic eruptions. Human activities have also contributed to the disturbance of many ecosystem and biomes.

Ecosystems come in indefinite sizes. It can exist in a small area such as underneath a rock, a decaying tree-trunk, or a pond in a village, or it can exist in large forms such as an entire rain forest. Technically, the Earth can be called a huge ecosystem. To make things simple, let us classify ecosystems into three main scales.

- (i) **Micro.** A small scale ecosystem such as a pond, puddle, tree trunk, under a rock etc.
- (ii) **Messo.** A medium scale ecosystem such as a forest or a large lake.
- (iii) **Biome.** A very large ecosystem or collection of ecosystems with similar biotic and abiotic factors such as, an entire Rain forest with millions of animals and trees, with many different water bodies running through them.

Ecosystem boundaries are not separated by any rigid lines. They are often separated by geographical barriers such as deserts, mountains, oceans, lakes and rivers. Ecosystems can be put into 2 groups. If the ecosystem exists in a water body, like an ocean, freshwater or puddle, it is called an *aquatic ecosystem* whereas those which exist outside of water bodies are called *terrestrial ecosystems*.

3.5.2A Carbon Cycle in the Ecosystem

The carbon cycle is very important to all ecosystems, and ultimately life on earth. The carbon cycle is critical to the food chain. Living tissues contain carbon, because they contain proteins, fats and carbohydrates. The carbon in these (living or dead) tissues is recycled in various processes. Human activities like heating homes and cars burning fuels (combustion) give off carbon into the atmosphere. During respiration, animals also introduce carbon into the atmosphere in the form of carbon dioxide. The Carbon dioxide in the atmosphere is absorbed by green plants (producers) to make food by photosynthesis process.

When animals feed on green plants, they pass on carbon compounds into other animals in the upper levels of their food chains. Animals give off carbon dioxide into the atmosphere during respiration. Carbon dioxide is also given off when plant and animals die. This occurs when decomposers (bacteria and fungi) break down dead plants and animals (decomposition) and release the carbon compounds stored in them.

3.5.2B The Nitrogen Cycle in the Ecosystem

Nitrogen is also a key factor in the existence of ecosystems and food chains. Nitrogen forms about 78% of the air on earth. But plants do not use nitrogen directly from the air. This is because nitrogen itself is unreactive, and cannot be used by green plants to make protein. Nitrogen gas therefore needs to be converted into nitrate compound in the soil by nitrogen-fixing bacteria in soil, root nodules or lightning.

SUMMARY

- ❖ **Eco-System** in a given area includes all living things (plants, animals and organisms) in the area. There are six basic needs/factors of all living things for survival i.e., Sunlight, Water, Air, Food (nutrients), a Habitat with the Right Temperature and other Limiting Factors. Technically, the Earth can be called a huge ecosystem. We can classify ecosystems into three main scales i.e.,
 - (i) **Micro.** A small scale ecosystem,
 - (ii) **Messo.** A medium scale ecosystem, and
 - (iii) **Biome.** A very large ecosystem or collection of ecosystems.
- ❖ If the ecosystem exists in a water body, it is called an *aquatic ecosystem* whereas those which exist outside of water bodies are called *terrestrial ecosystems*. For existence of an eco-system carbon and nitrogen cycles are very important. The carbon cycle is critical to the food chain. Living tissues contain carbon, because they contain proteins, fats and carbohydrates. The carbon in these (living or dead) tissues is recycled in various processes. Nitrogen gas cycle is also a key factor in the existence of ecosystems and food chains. Nitrogen forms about 78% of the air on earth.

Short Question Answers

1. Explain eco-system concept vis-a-vis all of living things.

Ans. Every living organism on earth needs some basic things to survive. The amount, way, form or kind of these needs vary from organism to organism. For example, water is a basic need for survival.

Exercise

1. Explain the basic needs/ factors of all living things.
2. Describe the nitrogen cycle and carbon cycle in the eco-system.

3.5.3 Depletion of Ozone in the Environment

Ozone layer depletion, is simply the wearing out (reduction) of the amount of ozone in the stratosphere. Unlike pollution, which has many types and causes, ozone depletion has been pinned down to human activity i.e., industries that manufacture things like insulating foams, solvents, soaps, cooling equipments like Air Conditioners and Refrigerators which use substances called chlorofluorocarbons (CFCs). These substances are heavier than air, but over time, (2-5 years) they are carried high into the stratosphere by wind action. But let us first study what is Ozone ?

Ozone is a natural gas composed of three atoms of oxygen. Its chemical symbol is O_3 . It is blue in colour and has a strong odour. Normal oxygen (O_2), which we breathe, has two oxygen atoms and is colourless and odourless. Environmental scientists have classified O_3 into two categories : *Good Ozone* and *Bad Ozone*.

Good Ozone (also called Stratospheric Ozone) occurs naturally in the upper Stratosphere. The stratosphere is the layer of space 6 to 30 miles above the earth's surface. The air is full of gases reacting with each other, even though our eyes do not see. When UV light strikes (Oxygen) O_2 molecules, they are split into two individual O atoms - O and O. When one of the O atoms combine with O_2 molecule, ozone (O_3) is created. Even though Ozone is only a small part of the gases in this layer, it plays a vital role because it shields us from the sun's harmful UV rays. It is called Good Ozone, because it protects humans, life and animals on earth.

Bad Ozone is also known as Tropospheric Ozone, or ground level ozone. This gas is found in the troposphere, the first layer about 10 Km from earth's surface forms the immediate atmosphere. Bad Ozone does not exist naturally. Human actions cause chemical reactions between oxides of nitrogen (NOX) and volatile organic compounds (VOC). Each time there is a reaction of chemicals such as those found in cars, power plants and factory emissions, in the presence of sunlight (UV light), Bad Ozone is created. Bad ozone contaminates (dirty) the air and contributes to what we typically experience as "smog" or haze. Smog from bad ozone is usually caused by the action of sunlight on a mixture of hydrocarbons and oxides of nitrogen. It is also known as Photochemical.

The earth's atmosphere is divided into several layers, and each layer plays an important role. The first region extending about 10 km upwards from the earth's surface is called the troposphere. Many human activities like mountain climbing, gas balloons and smaller aircrafts operate within this region. The next layer, extending about 15-60 km is called the stratosphere. The ozone layer is mainly found in the lower portion of the stratosphere from approximately 20 to 30 kilometres above earth, though the thickness varies seasonally and geographically. The ozone layer protects the earth from the sun's UV Rays. If the ozone layer is depleted by human action, the effects on the planet could be catastrophic.

3.5.3A Factors Responsible for Ozone Depletion

(i) Depletion begins when CFC's get into the stratosphere. Ultra violet radiation from the sun breaks up these CFCs. The breaking up action releases Chlorine atoms. Chlorine atoms react with ozone, starting a chemical cycle that destroys the good ozone in that area. One chlorine atom can break apart more than 100,000 ozone molecules.

(ii) There are other Ozone Depleting Substance (ODS) such as methyl bromide used in pesticides, halons used in fire extinguishers, and methyl chloroform used in making industrial solvents. Other chemicals that naturally destroy Ozone are Nox, Hox, Clx, which belong to the Nitrogen, Hydrogen and Chlorine families. Measurements of CFCs in the stratosphere are made from gas balloons, aircraft and satellites. Sadly, there isn't much which humans can do to replenish the depleted Ozone, as it tends to recover slowly by itself. All we can do is to be more responsible with our manufacturing needs so that we do not introduce more CFCs into the air.

(iii) Eruption of volcanoes is also responsible for depletion of Ozone. When volcanoes erupt, they produce massive clouds of ashes into the troposphere, and then they drift upward into the stratosphere (the upper atmosphere layer where ozone gas protects humans from UV radiation). These ashes contain high concentration of bromine and chlorine. Ashes can stay in the stratosphere for about two to five years, and within this period, there are chemical reactions that destroy the stratospheric ozone molecules.

(iv) Human activities like pollution and emissions already send lots of halogen gases into the stratosphere. Scientists have noted that halogens from volcanoes contain twice to thrice as much halogens that human activities can even produce. This means the potential of depleting the ozone layer is higher with volcanic 'smoke'. All in all, it is known that volcanoes contribute about 18%-20% of Chlorine entering the atmosphere, and human activities contribute about 80%-82%.

3.5.3B Effects of Ozone Depletion

Depletion of the ozone layer has consequences on humans, animals and plants. This typically results from higher UV rays reaching us on earth.

(i) *Humans*. Research confirms that high levels of UV Rays cause non-melanoma skin cancer. Additionally, it plays a major role in malignant melanoma development. UV is also linked to cataracts (a disease of the eye which clouds the eye's lens).

(ii) *Plants*. The damage that extreme UV levels have on plants is one that our eyes do not see much, but humans can feel the impact. Plant growth, as well as its physiological and developmental processes are all affected negatively. These include the way plants form, timing of development and growth, distribution of plant nutrients and metabolism, etc. These changes can have important implications for plant competitive balance, animals that feed on these plants, plant diseases, and biogeochemical cycles.

(iii) *Marine (or water) Ecosystems*. Phytoplankton form the foundation of aquatic food webs. These usually grow closer to the surface of water, where there is enough sunlight. Change in UV levels is known to affect the development and growth of phytoplankton, and naturally, the fish that feed on them. UV radiation is also known to affect the development stages of fish, shrimp, crab, amphibians and other animals. When this happens, animals in the upper food chain that feed on these tiny fishes are all affected.

- (iv) **Effects on Biogeochemical Cycles.** The power of higher UV levels affect the natural balance of gasses (and greenhouse gases) in the biosphere : i.e., carbon dioxide (CO_2), carbon monoxide (CO), carbonyl sulphide (COS) and ozone. Changes in UV levels can cause biosphere-atmosphere feedback resulting from the atmospheric buildup of these gases.
- (v) Top atmospheric researchers confirm that Ozone levels vary by season and latitude. Sometime in 1979, it was observed that there was considerable Ozone depletion in the upper latitudes in Arctic and Antarctic. This massive stretch of ozone depletion (hole) is estimated to be about the size of America. Particularly in the antarctic, satellite images were released showing a disturbing thinning of the ozone layer. The phenomenon is what we usually call the Ozone hole, and it was most observed over Australia (Antarctic) every year during the spring. In the winter, temperature drops below -78°C (-109°F) in the Poles (Antarctic). Thin clouds form a mixture of ice, nitric acid, and sulphuric acid. Chemical reactions on the surface of ice crystals in the clouds releases active forms of CFCs. This sets the ozone depletion and by the spring season, a lot of depletion occurs.

3.5.3C How can we Reduce Ozone Depletion ?

Ozone is a natural gas and is naturally replenished over time. This means if we can do something to balance the natural production with its depletion, there should not be a problem. Unfortunately, it does not quiet work like that. People ask if we cannot produce our own ozone gas to replenish what is lost in the stratosphere. The sun naturally produces ozone with immense energy during a long period of time. To do the same, we will be looking at using immense energy too, i.e., approximately equal to the energy used in the world which is practically not possible.

The only way out with us is, to remove the excess chlorine and bromine from the stratosphere. And the only way to do that is to stop making CFCs and several other afore said chemicals. That's why in the 1990s, during a meeting of the world's big nations in the Montreal Protocol, it was agreed to reduce the usage of CFCs and also to encourage other nations to do the same.

SUMMARY

Ozone layer depletion, is simply the wearing out (reduction) of the amount of ozone in the stratosphere. Good Ozone plays a vital role because it shields humans, life and animals from the sun's harmful UV rays. Bad ozone produced by reaction of gases and chemicals in the presence of sunlight (UV light), contaminates (dirty) the air and contributes to formation of "smog" or haze. Several factors responsible for depletion of Ozone are :

- (i) Chlorine atoms released from CFCs react with ozone molecule, starting a chemical cycle that destroys the good ozone in that area,
- (ii) Chemicals that naturally destroy Ozone are NO_x , HO_x , Cl_x , which belong to the Nitrogen, Hydrogen and Chlorine families,

GLOBALIZATION AND MNC

- (iii) Eruption of volcanoes produces massive clouds of ashes, containing high concentration of bromine and chlorine, they are also responsible for depletion of Ozone, and
- (iv) Human activities like pollution and emissions send lots of halogen gases into the stratosphere to break up Ozone. Depletion of the ozone layer has consequences on reaching us on earth. Apart from it also affects the marine ecosystem and biogeochemical cycles. The only way out with us to reduce depletion of Ozone is to CFCs and several other afore said chemicals.

Short question answers

1. Explain the depletion of Ozone gas.

Ans. When UV light strikes (Oxygen) O_2 molecules, they are split into two individual O atoms i.e., O and O. When one of the O atoms combines with O_2 molecule, ozone (O_3) is created. Ozone layer depletion, is simply the wearing out (reduction) of the amount of ozone in the stratosphere on account of human activities i.e., industries that manufacture things like insulating foams, solvents, soaps and the cooling equipments like Air Conditioners and Refrigerators which use substances called chlorofluorocarbons (CFCs). These substances react with Ozone and break it up in the stratosphere.

2. Write down the classified categories of ozone gas.

Ans. Ozone has been classified into two categories i.e.,

- (i) Good Ozone, because it protects the life of humans and animals on earth, and
- (ii) Bad Ozone, because it contaminates (dirty) the air and contributes to what we typically experience as "smog" or haze.

3. How can we reduce ozone depletion ?

Ans. The only way out with us to reduce depletion of Ozone is to remove the excess chlorine and bromine from the stratosphere and stop making CFCs and several other chemicals like NO_x , HO_x , Cl_x , which belong to the Nitrogen, Hydrogen and Chlorine families.

Exercise

1. Describe the functions of various layers of earth's atmosphere.

2. Describe factors responsible for ozone depletion.

3. What are effects of ozone depletion ?



100 | HUMAN VALUES & PROFESSIONAL ETHICS-II

3.5.4 Pollution

There are several kinds of pollutions in our lives ; namely

- (i) Air pollution,
- (ii) Water pollution, and
- (iii) Soil/Land pollution.

We will discuss them one by one below :

3.5.4A Air Pollution

The Earth is surrounded by a blanket of air (made up of various gases) called the atmosphere. The atmosphere helps protect the Earth and allows life to exist. Without it, we would be burned by the intense heat of the sun during the day or frozen by the very low temperatures at night.

Air pollution occurs when gases, dust particles, fumes (or smoke) or odour are introduced in such a way that by reducing quantity of oxygen in the atmosphere that it becomes harmful to humans, animals and plant. This is because the air becomes dirty (contaminated or unclean). When pollution occurs in the air, it can easily travel and spread, and because we breathe in air, we cannot easily avoid it. Any additional gas, particles or odours that are introduced into the air (either by nature or human activity) to distort this natural balance and cause harm to living things can be called air pollution. Things that pollute the air are called pollutants. Examples of pollutants include nitrogen oxides, carbon monoxides, hydrocarbons, sulphur oxides (usually from factories), sand or dust particles, and organic compounds that can evaporate and enter the atmosphere.

There are two types of pollutants :

- (i) **Primary pollutants** are those gases or particles that are pumped into the air to make it unclean. They include carbon monoxide from automobile (cars) exhausts and sulphur dioxide from the combustion of coal.
- (ii) **Secondary pollutants**. when pollutants in the air mix up during a chemical reaction, they form an even more dangerous chemical. Photochemical smog is an example of this, and is a secondary pollutant.

Causes of air pollution

Air pollution can result from both human and natural actions. Natural events that pollute the air include forest fires, volcanic eruptions, wind erosion, pollen dispersal, evaporation or organic compounds and natural radioactivity. Pollution from natural occurrences are not very often.

Human activities that result in air pollution include :

- (i) **Emissions from Industries and Manufacturing activities.** Consider a typical manufacturing plant : You will notice that there are long tubes (called chimneys) erected high into the air, with lots of smoke and fumes coming out of it. Waste incinerators, manufacturing

GLOBALIZATION AND MNCs | 101
industries and power plants emit high levels of carbon monoxide, organic compounds, and chemicals into the air. This happens almost everywhere people live. Petroleum refineries also release lots of hydrocarbons into the air.

(ii) **Burning of Fossil Fuels.** After the industrial age, transportation has become a key part of our lives. Cars and heavy duty trucks, trains, shipping vessels and airplanes all burn lots of fossil fuels to work. Emissions from automobile engines contain both primary and secondary pollutants. This is a major cause of pollution, and the one that is very difficult to manage. This is because humans rely heavily on vehicles and engines for transporting people, monoxide, oxides of nitrogen, hydrocarbons and particulates. On their own, they cause great harm to people who breath them. Additionally, they react with environmental gases to create further toxic gases.

(iii) **Household and Farming Chemicals.** Crop dusting, fumigating homes, household cleaning or painting products, over the counter insect/pest killers and fertilizer dust emit harmful chemicals into the air and cause pollution. In many cases, when we use these chemicals at home or offices with no or little ventilation, we may fall ill if we breathe them.

Effects of Air Pollutants on Humans

(i) **Carbon Monoxide (CO).** Fuel combustion from vehicles and engines:- Reduces the amount of oxygen reaching the body's organs and tissues ; aggravates heart disease, resulting in chest pain and other symptoms.

(ii) **Ground-level Ozone (O_3).** Secondary pollutant formed by chemical reaction of volatile organic compounds (VOCs) and NO (Nitrous oxide) in the presence of sunlight. Decreases lung function and causes respiratory symptoms, such as coughing and shortness of breath, and also makes asthma and other lung diseases get worse.

(iii) **Lead (Pb).** Smelters (metal refineries) and other metal industries ; combustion of leaded gasoline in piston engine aircraft, waste incinerators (waste burners) and battery manufacturing - Damages the developing nervous system, resulting in IQ loss and impacts on learning, memory, and behavior in children. Cardiovascular and renal effects in adults and early effects related to anaemia.

(iv) **Nitrogen Dioxide (NO_2).** Fuel combustion (electric utilities, big industrial boilers, vehicles) and wood burning:- Worsens lung diseases leading to respiratory symptoms, increased susceptibility to respiratory infection.

(v) **Particulate matter (PM).** Air pollutants can be in the form of particulate matter which can be very harmful to our health. The level of effect usually depends on the length of time of exposure, as well the kind and concentration of chemicals and particles exposed to. Short-term effects include irritation to the eyes, nose and throat, and upper respiratory infections such as bronchitis and pneumonia. Others include headaches, nausea, and allergic reactions. Short-term air pollution can aggravate the medical conditions of individuals with

asthma and emphysema. Long-term health effects can include chronic respiratory disease, lung cancer, heart disease, and even damage to the brain, nerves, liver, or kidneys. Continual exposure to air pollution affects the lungs of growing children and may aggravate or complicate medical conditions in the elderly.

(vi) **Sulphur Dioxide (SO_2)**. SO_2 comes from fuel combustion (especially high-sulphur coal); electric utilities and industrial processes as well as natural occurrences like volcanoes. Aggravates asthma and makes breathing difficult. It also contributes to particle formation with associated health effects.

Effects of Air Pollution on environment

(i) **Acidification**. Chemical reactions involving air pollutants can create acidic compounds and rain which can cause harm to vegetation and buildings. Sometimes, when an air pollutant, such as sulphuric acid combines with the water droplets that make up clouds, the water droplets become acidic, forming acid rain. When acid rain falls over an area, it can kill trees and harm animals, fish, and other wildlife. Acid rain destroys the leaves of plants. When acid rain infiltrates into soils, it changes the chemistry of the soil, making it unfit for many living things that rely on soil as a habitat or for nutrition. Acid rain also changes the chemistry of the lakes and streams that the rainwater flows into, harming fish and other aquatic life.

(ii) **Eutrophication**. Rain can carry and deposit the Nitrogen in some pollutants on rivers and soils. This will adversely affect the nutrients in the soil and water bodies. This can result in algae growth in lakes and water bodies, and make conditions for other living organisms harmful.

(iii) **Ground-level ozone**. Chemical reactions involving air pollutants create a poisonous gas (bad) ozone (O_3). Gas Ozone can affect people's health and can damage vegetation types and some animal life too.

Prevention, monitoring and solution for air pollution

Solution efforts on pollution are always a big problem, that is why preventions/interventions are always a better way of controlling air pollution. These preventive methods can either come from government (laws) or by individual actions. In many big cities, monitoring equipments have been installed at many points. Authorities read them regularly to check the quality of air. Let's see more below :

(i) Government (or community) level prevention :

- Governments throughout the world have already taken action against air pollution by introducing green energy. Some governments are investing in wind energy and solar energy, as well as other renewable energy sources, to minimize burning of fossil fuels which cause heavy air pollution.
- Governments are also forcing companies to be more responsible with their manufacturing processes, so that even though they will still cause pollution, yet will be a lot controlled.

GLOBALIZATION AND MNCs
(c) Companies are also building more energy efficient cars (e.g., Euro V and VI), which pollute less than before.

(ii) Individual Level Prevention :

- Encourage your family to use the bus, train or bike while commuting. If we all do this, there will be less cars on road and less fumes.
- Use energy (light, water, boiler, kettle and fire woods) wisely. Lots of fossil fuels are burned to generate electricity, and if we can cut down the use, we will also cut down the amount of pollution created.
- Recycle and re-use things. This will minimize the production process of new things. Remember manufacturing industries create a lot of pollution, so if we can re-use things like shopping plastic bags, clothing, paper and bottles, it can help.

SUMMARY

- ◆ Any additional gas, particles or odours that are introduced into the air (either by nature or human activity) to reduce the natural balance of Oxygen and making it harmful for living things can be called air pollution. Things like nitrogen oxides, carbon monoxides, hydrocarbons, sulphur oxides, sand or dust particles which pollute the air are called pollutants. Human industrial activities like Waste incinerators, manufacturing industries and power plants emit high levels of carbon monoxide, organic compounds, and chemicals into the air. Emissions from automobile engines contain both primary and secondary pollutants. This is a major cause of pollution, and the one that is very difficult to manage. Crop dusting, fumigating homes, household cleaning or painting products, over the counter insect/pest killers and fertilizer dust emit harmful chemicals into the air and cause pollution. Air pollution affects humans in many ways i.e.,
 - (i) Carbon Monoxide aggravates heart disease,
 - (ii) Ground-level Ozone decreases lung function and causes respiratory symptoms,
 - (iii) Combustion of leaded damages the developing nervous system, resulting in IQ loss,
 - (iv) Wood burning worsens lung diseases,
 - (v) exposure to particulate matter can cause heart or lung disease and sometimes premature deaths, and
 - (vi) Sulphur dioxide, aggravates asthma and makes breathing difficult.
- ◆ Air pollution affects environment badly in the ways like,
 - (i) Chemical reactions involving air pollutants can create acidic compounds and rain which can cause harm to vegetation and buildings,
 - (ii) Rain can result in algae growth in lakes and water bodies, and make conditions for other living organism harmful, and
 - (iii) Chemical reactions involving air pollutants create a poisonous gas (bad) ozone.
- ◆ Air Pollution can be prevented/controlled at the govt. level or at the individual level by
 - (i) using in wind energy and solar energy, as well as other renewable energy sources,
 - (ii) companies building more energy efficient cars,

- (iii) less use of cars on road,
- (iv) recycle and re-use things and
- (v) less Use of electrical energy.

Short question answers

1. How does air pollution occur ?

Ans. Air pollution can result from both human and natural actions. Natural events that pollute the air include forest fires, volcanic eruptions, wind erosion, pollen dispersal, evaporation or organic compounds and natural radioactivity. Pollution from natural occurrences are not very often.

2. Write the types of air pollutants.

Ans. There are two types of air pollutants i.e.,

- (i) Primary pollutants are those gases or particles that are pumped into the air to make it unclean. They include carbon monoxide from automobile (cars) exhausts and sulphur dioxide from the combustion of coal.
- (ii) Secondary pollutants: when pollutants in the air mix up during a chemical reaction, they form an even more dangerous chemical. Photochemical smog is an example of this, and is a secondary pollutant.

3. How can we prevent air pollution ?

Ans. These preventive methods can either come from government (laws) or by individual actions. Governments are

- (i) investing in wind energy and solar energy, as well as other renewable energy sources, to minimize burning of fossil fuels which cause heavy air pollution,
- (ii) forcing companies to be more responsible with their manufacturing processes and,
- (iii) forcing companies to build more energy efficient cars.

At the individual level by,

- (i) Using less cars on road and release less fumes,
- (ii) Using energy (light, water, boiler, kettle and fire woods) wisely and
- (iii) Recycle and re-use of things.

Exercise

1. How is air pollution increased by human activities ?

2. Explain the effects of air pollution on humans.

3. Describe the effects of air pollution on environment.

3.5.4B Water Pollution

Any change or modification in the physical, chemical and biological properties of water that will have a detrimental consequence on living things is called water pollution. Water pollution occurs when pollutants (particles, chemicals or substances that make water contaminated) are discharged directly or indirectly into water bodies without enough treatment to get rid of harmful compounds. Pollutants get into water mainly by human causes or factors. Water pollution can be a point-source, Non Point-source, or Trans-boundary in nature.

Usually, if pollutants come from one source into that water body, (such as a factory disposal) it is called point source pollution. If the pollution comes from many sources, it is called non-point-sources pollution. Pollution can also affect only one area in which the pollution happened. But in many cases, especially for flowing water, the contamination spreads to many other places. This is called trans-boundary pollution.

Non-point source of pollution can include :

- (i) Excess fertilizers, herbicides and insecticides from agricultural lands and residential areas.
- (ii) Oil, grease and toxic chemicals from urban runoff and energy production.
- (iii) Sediment from improperly managed construction sites, crops and forest lands and eroding stream banks.
- (iv) Salt from irrigation practices and acid drainage from abandoned mines.
- (v) Bacteria and nutrients from livestock, pet wastes and faulty septic systems.
- (vi) Atmospheric deposition and hydro-modification.

Types of water pollution :

There are many types of water pollution because water comes from many sources. Here are a few types of water pollution :

(i) **Nutrients Pollution.** Some wastewater, fertilizers and sewage contain high levels of nutrients. If they end up in water bodies, they encourage algae and weed growth in the water. This makes the water undrinkable, and even clogs filters. Too much algae will also use up all the oxygen in the water, as a result all other water organisms in the water will die out of oxygen starvation.

(ii) **Surface Water Pollution.** Surface water includes natural water found on the earth's surface, like rivers, lakes, lagoons and oceans. Hazardous substances coming into contact with this surface water and dissolving or mixing physically with the water can be called surface water pollution.

(iii) **Oxygen Depleting.** Water bodies have micro-organisms. These include aerobic and anaerobic organisms. When too much biodegradable matter (things that easily decay) ends up

in water, it encourages more microorganism growth, and they use up more oxygen in the water. If oxygen is depleted, aerobic organisms die, and anaerobic organism grow more to produce harmful toxins such as ammonia and sulphides.

(iv) **Ground Water Pollution.** When humans apply pesticides and chemicals to soils, they are washed deep into the ground by rain water. This reaches underground water, causing pollution underground. This means that when ever we dig wells and bore holes to get water from underground, it needs to be checked for ground water pollution.

(v) **Microbiological.** In many communities in the world, people drink untreated water (straight from a river or stream). Sometimes there is natural pollution caused by micro-organisms like viruses, bacteria and protozoa. This natural pollution can cause fishes and other water life to die. They can also cause serious illness to humans who drink from such waters.

(vi) **Suspended Matter.** Some pollutants (substances, particles and chemicals) do not easily dissolve in water. This kind of material is called particulate matter. Some suspended pollutants later on settle under the water body. This can harm and even kill aquatic life that live at the floor of water bodies.

(vii) **Chemical Water Pollution.** Many industries and farmers work with chemicals that end up in water. This is common with Point-source Pollution. These include chemicals that are used to control weeds, insects and pests. Metals and solvents from industries can pollute water bodies. These are poisonous to many forms of aquatic life and may slow their development, make them infertile and kill them.

(viii) **Oil Spillage.** Oil spills usually have only a localized effect on wildlife but can spread for miles. The oil can cause the death to many fish and get stuck to the feathers of seabirds causing them to lose their ability to fly.

Causes of Water Pollution

Industrial Waste. Industries cause huge water pollution with their activities. These come mainly from :

(i) **Sulphur.** This is a non-metallic substance that is harmful for marine life.

(ii) **Asbestos.** This pollutant has cancer-causing properties. When inhaled, it can cause illnesses such as asbestosis and some types of cancer.

(iii) **Lead and Mercury.** These are metallic elements and can cause environmental and health problems for humans and animals. It is also poisonous. It is usually very hard to clean up from the environment once it gets into it, because it is non-biodegradable.

(iv) **Nitrates and Phosphates.** These are found in fertilizers, and are often washed from the soils to nearby water bodies. They can cause eutrophication, which can be very problematic to marine environments.

(v) **Oils.** Oils form a thick layer on the water surface because they do not dissolve in water. This can stop marine plants receiving enough light for photosynthesis. It is also harmful for fish and marine birds. A classic example is the BP oil spill in 2012 which killed thousands of animal species.

(vi) **Oil Pollution by Oil Industries.** Routine shipping, run-offs and dumping of oils on the ocean surfaces happen everyday. Oil spills make up about 12% of the oil that enters the ocean. Oil spills cause major problems, and can be extremely harmful to local marine wildlife such as fish, birds and sea otters and other aquatic life. Because oil does not dissolve, it stays on the water surface and suffocates fish. Oil also gets caught in the feathers of sea birds, making it difficult for them to fly, as a result some animals die.

(vii) **Septic Tanks.** Every day, we cook, do laundry, flush the toilet, wash our cars, shower and do many things which use water. Think about how we use water in schools, hospitals and public places. Where does all the water, liquid waste, toilet and urine end up? In many developed countries, this waste water and soluble waste (called sewage) is treated, cleaned and dumped into the sea or river. Even though it is treated, but is never the same as fresh water. In some not-so-developed countries, the sewage is not treated, but is dumped into the sea or water bodies. This is VERY dangerous because they contaminate the environment and water bodies and bring many deadly diseases to humans.

(viii) **Septic Tanks.** In many cases, domestic (home) toilet is connected to septic tank usually located outside the house. Each time poop is flushed down the toilet, it goes into this tank, where the solid part is separated from the liquid part. Biological processes are used to break down the solids and the liquid is usually drained out into a land drainage system. From this stage, it can escape into the soil and nearby water bodies to create pollution.

(ix) **Ocean and Marine Dumping.** Again, think of the rubbish we all make each day. Paper waste, food waste, plastic, rubber, metallic and aluminum waste. In some countries, they are dumped into the sea. All these waste types take time to decompose. For example, it is known that paper takes about 6 weeks, aluminium takes about 200 years and glass takes even more years. When these end up in the sea, they harm sea animals and cause a lot of water animal deaths.

(x) **Underground Storage and Tube Leakages.** Many liquid products (petroleum products) are stored in metal and steel tubes underground. Other sewage systems run in underground tubes. Overtime, they rust and begin to leak. If that happens, they contaminate the soils, and the liquids in them end up in many nearby water bodies.

(xi) **Atmospheric.** Atmospheric deposition is the pollution of water bodies caused by air pollution. Each time the air is polluted with sulphur dioxide and nitrogen oxide, they mix with water particles in the air and form a toxic substance. This falls on the earth as acid rain and gets washed into water bodies. As a result of that, water bodies also get contaminated which affects animals and water organisms.

108

HUMAN VALUES & PROFESSIONAL ETHICS-II

Prevention of Water Pollution

Many state governments have very strict laws that help minimize water pollution. These laws are usually directed at industries, hospitals, schools and market areas on how to dispose, treat and manage sewage. In many developed countries, waste or sewage treatment is very efficient, and designed to minimize pollution of water bodies. Dealing with water pollution is something that everyone (including governments and local councils) needs to get involved with. Here are a few things we can do to help.

- (i) Never throw rubbish away anywhere. Always look for the correct waste bin. If there is none around, please take it home and put it in your trash can. This includes even places like the beach, riverside and water bodies.
- (ii) Use water wisely. Do not keep the tap running when not in use. Also, you can reduce the amount of water you use in washing and bathing. If we all do this, we can significantly prevent water shortages and reduce the amount of dirty water that needs treatment.
- (iii) Do not throw chemicals, oils, paints and medicines down the sink drain, or the toilet. Check with your local authorities if there is a chemical disposal plan for local residents.
- (iv) Buy more environmentally safe cleaning liquids for use at home and other public places. They are less dangerous to the environment.
- (v) If you use chemicals and pesticides for your gardens and farms, be mindful not to overuse pesticides and fertilizers. This will reduce runoffs of the chemicals into nearby water sources. Start looking at options of composting and using organic manure instead.
- (vi) If you live close to a water body, try to plant lots of trees and flowers around your home, so that when it rains, chemicals from your home do not easily drain into the water.

SUMMARY

- Any change or modification in the physical, chemical and biological properties of water that will have a detrimental consequence on living things is called water pollution. The types of water pollution are :
- (i) containing high levels of harmful nutrients,
 - (ii) hazardous substances coming into contact with this surface water,
 - (iii) Oxygen Depleted,
 - (iv) Ground water pollution,
 - (v) caused by micro-organisms like viruses and bacteria,
 - (vi) suspended particulate matter,
 - (vii) Chemical Water Pollution, and
 - (viii) Oil Spillage.

GLOBALIZATION AND MNCs

109

- Water pollution is caused mainly by the untreated domestic waste and that of the industries. The industrial waste can be in the form of : (i) Sulphur, (ii) Asbestos, (iii) Lead and mercury, (iv) Nitrates and phosphates, and (v) Oils.
- Other sources can be, (i) domestic sewage, (ii) septic tanks, (iii) underground leakages and atmospheric deposition of pollutants in water bodies. For preventing water pollution state governments have very strict laws that help minimize water pollution. These laws are usually directed at industries, hospitals, schools and market areas on how to dispose, treat and manage sewage.

Short question answers**1. Define the term water pollution.**

Ans. Water pollution occurs when pollutants (particles, chemicals or substances that make water contaminated) are discharged directly or indirectly into water bodies, which change or modify the physical, chemical and biological properties of water.

2. Differentiate between point source pollution and non-point source pollution.

Ans. If pollutants come from one source into that water body, (such as a factory disposal) it is called point source pollution. If the pollution comes from many sources, it is called non-point-sources pollution.

3. How can we prevent water pollution ?

Ans. Dealing with water pollution is something that everyone (including governments and local councils) needs to get involved with. Few steps required to be taken by everybody are :

- (i) Always throw rubbish away in the correct waste bin,
- (ii) Do not waste water by keeping the tap running when not in use,
- (iii) Do not throw chemicals, oils, paints and medicines down the drain,
- (iv) Use environmentally safe cleaning liquids for use,
- (v) Do not to overuse pesticides and fertilizers, and vi) Plant lots of trees and flowers around your home.

Exercise**1. Describe non-point sources of water pollution.****2. Describe types of water pollution.****3. Explain the causes of water pollution.**

3.5.4C Soil/Land Pollution

Soil pollution is caused by the presence of man-made chemicals in the natural soil environment. It is typically caused by industrial activity, agricultural chemicals, or improper disposal of waste. The most common chemicals involved are petroleum hydrocarbons, polynuclear aromatic hydrocarbons, pesticides, lead and other heavy metals. Soil contamination is a health risk, from direct contact with the contaminated soil, vapours from the contaminants, and from secondary contamination of water supplies within and underlying the soil. Pollution remains a major challenge and opportunity for India. Environmental issues are one of the primary causes of disease, health issues and long term livelihood impact for India. In India major environmental issues are forest and agricultural degradation of land, resource depletion (water, mineral, forest, sand, rocks etc.), environmental degradation, public health, loss of biodiversity loss of resilience in ecosystems and livelihood security for the poor.

Soil pollution can lead to water pollution if toxic chemicals reach groundwater, or if contaminated runoff reaches streams, lakes, or oceans. Soil also naturally contributes to air pollution by releasing volatile compounds into the atmosphere. Nitrogen escapes through ammonia volatilization and denitrification. The decomposition of organic materials in soil can release sulphur dioxide and other sulphur compounds, causing acid rain. Heavy metals and other potentially toxic elements are the most serious soil pollutants in sewage. Sewage sludge contains heavy metals and, if applied repeatedly or in large amounts, the treated soil may accumulate heavy metals and consequently become unable to even support plant life.

Polluted soil directly affects human health through direct contact with soil or via inhalation of soil contaminants which have vapourised. Potentially greater threats are posed by the infiltration of soil contaminants into groundwater aquifers used for human consumption. Health consequences from exposure to soil contamination vary, depending greatly on pollutant type, pathway of attack and vulnerability of the exposed population. Chronic exposure to chromium, lead and other metals, petroleum, solvents, and many pesticide and herbicide formulations can be carcinogenic which cause congenital disorders, or can cause other chronic health conditions. Industrial or man-made concentrations of naturally occurring substances, such as nitrate and ammonia associated with livestock manure from agricultural operations, have also been identified as health hazards in soil and groundwater.

Soil pollution is caused by :

- (i) Accidental Spills,
- (ii) Acid rain,
- (iii) Intensive farming,
- (iv) Deforestation,
- (v) Genetically modified plants,
- (vi) Nuclear wastes,

- GLOBALIZATION AND MNCs | 111
- (vii) Industrial Accidents,
 - (viii) Landfill and illegal dumping,
 - (ix) Agricultural practices, such as application of pesticides, herbicides, and fertilizers,
 - (x) Mining and other industries,
 - (xi) Oil and fuel dumping,
 - (xii) Buried wastes,
 - (xiii) Disposal of coal,
 - (xiv) Disposal of munitions and agents of war,
 - (xv) Drainage of contaminated surface water into the soil, and
 - (xvi) Electronic waste.

The major sources of soil pollution in India include the rampant burning of fuel wood and biomass such as dried waste from livestock as the primary source of energy, lack of organised garbage and waste removal services, lack of sewage treatment operations, lack of flood control and monsoon water drainage system, diversion of consumer waste into rivers, and cremation practices near major rivers. Trash and garbage is a common sight in urban and rural areas of India. It is a major source of pollution. Indian cities alone generate more than 100 million tons of solid waste a year. Street corners are piled with trash. Public places and sidewalks are spoiled with filth and litter. Rivers and canals act as garbage dumps. India's garbage crisis is from rising consumption. India's waste problem also points to a stunning failure of governance. All Indian cities were asked by the supreme court of India to implement a comprehensive waste-management programme that would include household collection of segregated waste, recycling and composting. Forget waste segregation and recycling directive of the India's Supreme Court, the Organisation for Economic Cooperation and Development estimates that up to 40 per cent of municipal waste in India remains simply uncollected.

In 2011, several Indian cities embarked on waste-to-energy projects of the type in use in Germany, Switzerland and Japan. For example, New Delhi is implementing two incinerator projects aimed at turning the city's trash problem into electricity resource. These plants are being welcomed for addressing the city's chronic problems of excess untreated waste and a shortage of electric power. They are also being welcomed by those who seek to prevent water pollution, hygiene problems, and eliminate rotting trash that produces potent greenhouse gas methane.

Cleanup and remedial strategies :

- (i) Excavate soil and take it to a disposal site away from ready pathways for human or sensitive ecosystem contact. This technique also applies to dredging of bay muds containing toxins.

- (ii) Aeration of soils at the contaminated site (with attendant risk of creating air pollution).
- (iii) Thermal remediation by introduction of heat to raise subsurface temperatures sufficiently high to volatize chemical contaminants out of the soil for vapour extraction. Technologies include ISTD, electrical resistance heating (ERH), and ET-DSP.
- (iv) Bioremediation, involving microbial digestion of certain organic chemicals. Techniques used in bioremediation include land farming, bio-stimulation and bio-augmentating soil biota with commercially available micro flora.
- (v) Extraction of ground water or soil vapor with an active electromechanical system, with subsequent stripping of the contaminants from the extract.
- (vi) Containment of the soil contaminants (such as by capping or paving over in place).
- (vii) Phytoremediation, or using plants (such as willow) to extract heavy metals.
- (viii) Using fungus to metabolize contaminants and accumulate heavy metals.
- (ix) Microbes can also be used in soil cleanup.

SUMMARY

♦ Soil pollution is caused by the presence of man-made chemicals like petroleum hydrocarbons, poly-nuclear aromatic hydrocarbons, pesticides, lead and other heavy metals in the natural soil environment. In India major environmental issues are forest and agricultural degradation of land, resource depletion (water, mineral, forest, sand, rocks etc.), environmental degradation, public health, loss of biodiversity loss of resilience in ecosystems and livelihood security for the poor. Soil pollution can lead to water pollution if toxic chemicals reach groundwater. The decomposition of organic materials in soil can release sulphur dioxide and other sulphur compounds, causing acid rain. Polluted soil directly affects human health through direct contact with soil which is caused by ; Acid rain, Intensive farming, Deforestation, Nuclear wastes, Landfill and illegal dumping, application of pesticides, herbicides, and fertilizers, Mining , Oil and fuel dumping, Buried wastes, Drainage of contaminated surface water into the soil, and Electronic waste. Many Cleanup and remedial strategies have been suggested by the government in the year 2011 and it is being implemented by many cities in India.

Short question answers**1. What is soil pollution ?**

Ans. When chemicals like petroleum hydrocarbons, poly-nuclear aromatic hydrocarbons, pesticides, lead and other heavy metals soak in up to deep soil or get mixed up with the upper soil, reducing content of oxygen therein, it is called soil pollution.

2. Describe the effects of soil pollution on humans.

Ans. Polluted soil directly affects human health through direct contact with soil or via inhalation of soil contaminants which have vapourised. Potentially greater threats are posed by the infiltration of soil contaminants into groundwater aquifers used for human consumption.

3. What is the major source of soil pollution in India ?

Ans. The major sources of soil pollution in India include the rampant burning of fuel wood and biomass such as dried waste from livestock as the primary source of energy, lack of organised garbage and waste removal services, lack of sewage treatment operations, lack of flood control and monsoon water drainage system, diversion of consumer waste into rivers, and cremation practices near major rivers.

Exercise

1. How is soil pollution caused ?
2. Describe the effect of soil pollution on land.
3. Suggest the strategies to prevent and clean up the land pollution.



3.6 COMPUTER ETHICS

Computer ethics primarily enforce the ethical implementation and use of computing resource. It includes methods and procedures to avoid infringing copyrights, trademarks and the unauthorized distribution of digital content. Computer ethics also entails the behaviour and approach of a human operator, workplace ethics and compliance with the ethical standards that surround computer use. The following are the ten commandments of Computer Ethics created by the Computer Ethics Institute in 1992.

(i) ***Do not use a computer in ways that may harm other people.*** This commandment says that it is unethical to use a computer to harm another user. It is not limited to physical injury. It includes harming or corrupting other users' data or files. The commandment states that it is wrong to use a computer to steal someone's personal information. Manipulating or destroying files of other users is ethically wrong. It is unethical to write programs, which on execution lead to stealing, copying or gaining unauthorized access to other users' data. Being involved in practices like hacking, spamming, phishing or cyber bullying does not conform to computer ethic.

(ii) ***Do not use computer technology to cause interference in other users' work.*** Computer software can be misused in ways that disturb other users or disrupts their work. Viruses, for example, are programs meant to harm useful computer programs or interfere with the normal functioning of a computer. Malicious software can disrupt the functioning of computers in more ways than one. It may overload computer memory through excessive consumption of computer resources, thus slowing its functioning. It may cause a computer to function wrongly or even stop working. Using malicious software to attack a computer is unethical.

(iii) ***Do not spy on another person's computer data.*** We know it is wrong to read someone's personal letters. On the same lines, it is wrong to read someone else's email message or files. Obtaining data from another person's private files is nothing less than breaking into someone's room. Snooping around in another person's files or reading someone else's personal messages is the invasion of his privacy. There are exceptions to this i.e., spying is necessary and cannot be called unethical when it is done against illegitimate use of computers. In some cases intelligence agencies working on cybercrime cases need to spy on the internet activity of suspects.

(iv) ***Do not use computer technology to steal information.*** Stealing sensitive information or leaking confidential information is as good as robbery. It is wrong to acquire personal information of an employee from an employees' database or a patient's history from a hospital database or other such information that is meant to be confidential. Similarly, breaking into a bank account to collect information about the account or account holder is wrong. Illegal electronic transfer of funds is a type of fraud. With the use of technology, stealing of information has become much easier. Computer can also be used to store stolen information. Both of these actions are also unethical.

(v) ***Do not contribute to the spread of misinformation using computer technology.*** Because of the internet, spreading of information has become viral today. This also means that false news or rumors can spread speedily through social networking sites or emails. Being involved in the circulation of incorrect information is unethical and illegal. Mails and pop-ups are commonly used by terrorists to spread the wrong information or give false alerts with the only intent of spreading terror. Mails from untrusted sources advertising certain products or spreading some hard-to-believe information, are not uncommon. Direct or indirect involvement in the circulation of false information is ethically wrong.

(vi) ***Refrain from copying software or buying pirated copies.*** Pay for software unless it is free. Like any other artistic or literary work, software is copyrighted. A piece of code is the developer writing software for the organization he works for, the organization holds the copyright for it. Copyright holds true unless its creators announce it is not. Obtaining illegal copies of copyrighted software is unethical.

(vii) ***Do not use someone else's computer resources unless authorized to.*** Multi-user systems have user specific passwords. Breaking into some other user's password, thus intruding his private space is unethical. It is not ethical to hack passwords for gaining unauthorized access to a password-protected computer system. Accessing data that you are not authorized to access or gaining access to another user's computer without his permission is not ethical.

(viii) ***It is wrong to claim ownership on a work which is the output of someone else's intellect.*** Programs developed by a software developer are his/her property. If he is working with an organization, they are the organization's property. Copying them and propagating them in one's own name is unethical. This applies to any creative work, program or design. Establishing ownership on a work which is not yours is ethically wrong.

(ix) ***Before developing a software, think about the social impact it can have.*** Looking at the social consequences that a program can have, describes a broader perspective of looking at technology. A computer software on release, reaches millions. Software like video games and animations or educational software can have a social impact on their users. When working on animation films or designing video games, for example, it is the programmer's responsibility to understand his target audience/users and the effect it may have on them. For example, a computer game for kids should not have content that can influence them negatively. Similarly, writing malicious software is ethically wrong. A software developer/development firm should consider the influence their code can have on the society at large.

(x) ***In using computers for communication, be respectful and courteous with the fellow members.*** The communication etiquette we follow in the real world applies to communication over computers as well. While communicating over the internet, one should treat others with respect. One should not intrude others' private space, use abusive language, make false statements or pass irresponsible remarks about others. One should be courteous while communicating over the web and should respect others' time and resources. Also, one should be considerate with a novice computer user.



3.6.1 Cyber-Crimes

The term cyber-crime refers to criminal activities including computers, networks, or the internet. Computer crime is any crime that is committed with a computer over a network. The computer or network may be the target of the crime, or the computer may be the device utilized for carrying out other crimes.

Cyber-crime falls into two general categories : those which target computer networks or devices and those which merely use a computer network to target individuals.

The following are some types of computer crimes :

- (i) Hacking or unlawfully accessing a computer system or network.
- (ii) Changing, damaging, copying or stealing software or data.
- (iii) Placing malware or a virus on a computer system.
- (iv) Launching denial of service attacks.
- (v) Using a computer for fraud or identity theft.
- (vi) Blocking someone's computer or network access.
- (vii) Using encryption to carry out a crime.
- (viii) Faking email source information.
- (ix) Cyber stalking, or stalking someone over the internet.
- (x) Stealing services or information.
- (xi) Stealing personal information (phishing).

Cyber war is being waged, malware is the attack tool, and internet users are on the front-lines of the battlefield. Criminals are attacking via the Web, using social engineering tricks and the compromised websites to foist malware onto victims computers. The goal : to steal financial and intellectual property from individuals and companies across the globe.

3.6.2 Stealing Computer Data

The development of ever higher-capacity portable data storage devices, such as USB pen drives, has made it almost trivially easy to copy large quantities of data from almost any computer. We have also seen users use e-mail and web-mail to transfer key files from their computer systems often in large quantities, and most computers still have CD and DVD burners that provide another potential route for data to be stolen. Data theft is sufficiently common that, ideally, any organization should have some kind of incident response plan to deal with it. Most organization, however, do not have it. The following brief information for IT personnel or other managers who are faced with potential data theft or are thinking of preparing a plan for dealing with it. Though it is not a complete incident response plan, however, it is hoped that it will provide a useful guide to the key issues in dealing with data theft incidents and may help anyone faced suddenly with dealing with such an event. It deals with most of the main issues being faced by organizations who have encountered this kind of problem.

How is data generally stolen ?

In most of the common methods used to steal data is by using a USB "thumb drive" or a similar small data storage device. Indeed, any device with substantial amounts of on-board memory can be employed for data theft. A recent phenomenon, for example, is the use of portable digital players to remove data from computers, a practice referred to as "podding" by its practitioners. There are however other modes of data theft which we also see on an ever increasing basis :

Common modes of data theft :

USB "pen" or "thumb" drive devices are cheap, easy to hide, and have large storage capacities. This makes them a perfect device for data theft.

Portable hard drive :

While USB pens can store several gigabytes of data (i.e., hundreds of documents) it is possible to purchase small portable hard drives that can store hundreds of gigabytes (tens of thousands of documents). These devices are often not much larger than an iPod, and can be powered from the USB ports of the computers they are connected to.

MPS players, digital cameras, memory cards or PDAs :

Many modern devices now have substantial onboard memory capacities, all of which can be used for removing data. Some of these devices have the additional advantage that their use is more easily explainable by the data thief, and more difficult for an investigator to follow.

CD/ DVD :

Again, using a CD or DVD has the advantage to being more apparently legitimate. Also writable DVD's now have capacities of nearly 9 gigabytes, comparable to larger USB thumbs.

E-mails :

Some data thieves simply use e-mail to transfer files out. Often this is done over a long period of time, so organization IT staff do not notice large messages passing through their servers. It is also common to see such mails sent to private or web-based e-mail addresses, on the pretence that the sender is preparing to work on the data "at home".

Web-mail :

Data thieves use web-mail to send data from their organization. This has the advantage of greater apparent privacy than conventional e-mails, and often allows for larger attachments to be sent. Fortunately, web mail often leaves significant forensic traces that a skilled investigator can recover.

Printing :

Some careful data thieves will not make any electronic copies at all, but will print out key documents and steal them in hard-copy form. This, of course, limits the amount of

material that can be stolen, but it does not prevent the stolen material being quickly transferred back into electronic form later, through techniques like scanning and Optical Character Recognition.

Remote Access :

Some organizations make data theft even easier by allowing remote access to their systems from employee's private computers. This makes data theft difficult to trace, and makes it very difficult for investigators to identify the computers and other devices to which the stolen data has been transferred.

3.6.3 Hacking and Malware Attacks

Cybercriminals know that the best way to breach defences is to trick the user into doing something harmful. Their methods range from cleverly worded email, to fake websites, to even phone and snail mail. Everyone is a potential target and anyone who uses the Web risks social engineering attacks each time they open their email or browse to a website. To effectively defend yourself, you need to become aware of just how much personal information about you is publicly available via the web and learn to control the information so it cannot be used against you, your friends, or your family.

(i) Social Engineering Attacks

A social attack is one in which the intended victim is somehow tricked into doing the attacker's bidding. An example would be responding to a phishing email, following the link and entering your banking credentials on a fraudulent website. The stolen credentials are then used for everything from finance fraud to outright identity theft. An old adage comes to mind here, "*it pays to be suspicious*". With socially engineered attacks, the opposite is also true if aren't suspicious, you likely will end up paying. In addition to phishing, social engineering attacks can come in many forms email that masquerades as breaking news alerts, or greeting cards, or announcements of bogus lottery winnings. Pump and dump stock scams are also a form of social engineering, playing on the recipients' natural desire to take advantage of a good deal. It's important to remember that if something sounds too good to be true, it's probably a scam.

Social engineering attacks are also often used to tick users into infecting their own systems for example, by disguising the malware as a video codec or Flash update. An email is sent enticing the recipient to view a bogus video clip, the victim visits the link contained in the email and installs the "codec/ update" which turns out to be a backdoor Trojan or keystroke logger. Remember: with social engineering scams, the attacker is relying on you to make the wrong choice. Choose not to be a victim.

(ii) Targeted Attacks

Targeted attacks are on the increase. Some of the biggest targets are corporate executives in sensitive sectors such as energy, weapons research, and finance. In many cases,

the victim is enticed via email into opening a malicious email attachment or visiting a nefarious website. But these email messages aren't the badly written, easy to spot scams most of us are familiar with. Instead, attackers pinpoint a specific person and include personal and often (seemingly) confidential details in order to appear as if the email were legitimate correspondence from a business associate or government entity. So how do attackers gain the type of knowledge needed to pull this off?

Part of the answer may lie in social networking sites. Attackers can create an account, find a weak friend of the target's, and get that friend to add them as a friend. Once the attacker is a friend of a friend, they may be able to leverage that relationship to get added as a friend by the target. This, of course, allows the attacker access to the target's profile, discovers who their contacts are, and glean any other information provided as part of the service. It may seem far fetched, but the reality is that many people will add near (or perfect) strangers to their friend's list—either as an attempt to boost their own perceived popularity or because they don't want to risk hurting and feeling of someone. The easiest way to avoid this type of casual disclosure is to never add friends you don't absolutely, really know. You can further minimize the risk by adding only those friends you actually do know and whom you have a legitimate social or business need to remain in contact with. Search engines can also reveal many personal and business details. To see what type of information is publicly searchable about you, simply pull up your favorite search engine, type in your name, and read through the results. If you've ever written a letter to the editor of a newspaper, commented on a blog, or participated in a community forum or mailing list, chances are you'll find all of these in the search results. Highly placed executives are also often quoted in press releases or their comments carried in news articles, providing even more fodder for attackers. In the latter case, an attacker can simply subscribe to a newsfeed with the target's name as a keyword in order to keep a current and running tab.

Those in sensitive sectors should also monitor the type of information discoverable about their spouse and children. Attackers have been known to target family members as well. While there's not much that can be done about the information already available on the Web, forewarned is forearmed. Simply knowing the information out there can help you avoid being tricked by the inclusion of personal details in an email. It's a bit ironic that while the technology behind the Internet provides anonymity for would-be attackers, the Web itself can dissolve any semblance of privacy for would-be victims.

(iii) Online Games Attack

Blizzard, makers of the very popular World of Warcraft series of MMORPG, has been aggressively warning players to the risks of key loggers and other Trojans that can lead to compromise of their online gaming credentials. After ploughing through 12 pages of player comments in the Blizzard customer support forum, it is convincing that there's more than just a malware at play. For many of the impacted players, the cause could boil down to good old fashioned trickery, aka Social Engineering.



No one wants to believe or admit that they were the victim of a social engineering scam. At least with an outright malware infection, you can blame Windows or the failure of your antivirus (regardless of whether it's either of those at fault). But with a social engineering scam, we have only ourselves to blame. However, until we confess up to our own fallibility, we can't take the steps necessary to change our behaviour (and avoid getting fooled again and again). Many social engineering scams are done with extreme cleverness. Consider a phishing scam that masquerades as a password change notice from a website that you have an account with. The email advises you that a new password has been provided for the account and includes a link to visit in case the request wasn't initiated by you. Click that link and you get taken to what looks to be the site you know and trust. You're prompted to enter your username and the old password (pre-change) for confirmation. So you do. Problem is, the site is just a false front for the attacker. What you've really done is just sent the attacker your valid login ID and password. Chances are equally good that it's not even the website (or online game) credentials that have been compromised. Instead, chances are that the email you've specified in the account has been compromised. Consider that many folks use the same username and password for their email as they do for their IM. This is a bad practice, but still lots of folks do it. One popular (and for some reason, wildly successful) IM scam works as follows :

You get an IM from someone on your contact list. It has a link, perhaps claiming to be a video or something else. You click the link and it takes you to a website that tells you that you need to log in to your IM account (or Facebook, or MySpace, or whatever) in order to view the video. You 'log in' on the page provided, but once again it's just a false front and what you're really doing is sending the attackers your login credentials.

Let's say the attackers want to steal some WoW accounts. First, they'll probably work through the list of email credentials they've already stolen. For those who use the same account info in multiple places, they may be able to log in with just that. If not, they initiate a bunch of forgotten password requests. Those passwords will be sent to the respective email addresses on record for each of the respective accounts. All that the attackers have to do now is sit back and monitor the stolen email accounts and intercept any of these password change notices before they reach the legitimate email account holder. Now you can't log in, but the attacker can. This is a pretty pervasive scam - odds are that if you do actually receive a change notice from an account for which you have not just made a change, it's almost undoubtedly a phishing scam. On the other hand, if the attackers are making the change, you're almost certain not to get a change notification. To play it safe, if you ever do receive a change notification from an online account for which you did not initiate the change, do not click any links provided in the email. Instead, visit the site just as you normally would and check your account that way. And to prevent a scam on one account leading to the compromise of another, never use the same credentials across multiple accounts.

When account credentials for IM, email, Facebook, MySpace, etc. are stolen, they end up on big lists that get sold to other criminals. It can be weeks, months, even years, between

the original scam that led to the compromise of the credentials, to those credentials being used to steal your online game assets. So just because you don't remember getting scammed, it doesn't mean you weren't. Sadly, scammers may not even need to work that hard. Often all they need to do is persuade the gamer that they are a GM. Now I'm not sure why people are so willing to believe that X is a GM - maybe it's the cool factor. Two things about real GM's. One, if they want to play the game, they aren't going to advertise the fact that they are also a GM. Otherwise, players will never stop bothering them with questions. So if another player claims to be a GM, think twice. In any event, never and ever will a legitimate GM ask for your username and password. So if you supply your username and/or password to a GM, whether in-game or out, you've just been scammed.

(iv) The Web Attacks

There's an old acronym in the computing industry WYSIWYG. Pronounced "wizzy-wig", it stands for "What You See Is What You Get". While that used to be true with computers, today nothing could be further from the truth. Today, many of the websites we trust and visit routinely are being compromised and hidden code references are inserted. While you can't see any visible signs of the compromise, that hidden code reference is silently loading exploits and malware onto your computer. Here's what you need to know to defend yourself against hidden website compromises.

The web browser interprets the HTML, JavaScript, and other scripting language used on the web into readable form for you to view. But while everything might look fine on the page, it's what you can't see that can hurt you. Hidden frames and external JavaScript references can execute malicious code behind the scenes, silently infecting your computer while you browse perfectly legitimate website. You can reduce that risk by properly securing your browser.

3.6.4 Embezzlement and Scams

Scammers continue to exploit job seekers, but the "Shopper Needed" scam isn't just enlisting innocent folks into illegal money laundering activities. Scams are also exploiting good name of legitimate professional shopper services. Bear that in mind when reading the copy that though the scammers use the name of a company, it is not affiliated in any way with the real company. The shopper-needed scam sends the 'new hire' a bank cheque for a few thousand rupees, instructing them to encash the cheque and take their portion, then forward on the remaining funds to the "employer". Of course, the cheque is bogus, it will bounce eventually, and you the victim will be liable for the funds you spent from the cheque, plus the amount you forwarded on, plus any service fees or fines that result. Never assume that because a bank releases funds after 5 days, that the cheque has actually cleared. That grace period has no bearing on whether the cheque is good for payment or not.

Wire Transfer Scams

Small businesses in India are having their hard-earned funds stolen by cybercriminals and transferred overseas, all thanks to the willing gullibility of scam victims. The typical crime

begins with an infection of a data theft/backdoor Trojan which steals login credentials from key employees at the business. The stolen credentials enable the attackers to gain access to the business' bank account and initiate an ACH transfer of funds. But most banks will alert on an overseas transfer, and that's where the middleman - the gullible scam victim - comes into play.

To avoid sounding alarms at the bank, the criminals need someone in India to accept the initial transfer and then forward it to the overseas attackers. All they need is a person willing to turn a blind eye to the red flags. And with these tough economic times, there are unfortunately far too many willing to do just that.

The scam takes many forms, typically masquerading as solicitation for a mystery shopper, or some other bogus job offer. The scam may also claim to be a pay out for a lottery winnings. All the scams have one thing in common that they involve you in depositing funds into your bank account, then withdrawing and wiring a portion of those funds via Western Union or some other unrecoverable wire transfer method. By unrecoverable, we mean that once the scam is discovered, the scam victim will be 100% liable for the transferred/stolen funds. Now that the criminals have the cash in hand they will be untraceable.

Online Scams

The internet makes it easier to accomplish many things as banking, research, travel, and shopping are all at our virtual fingertips. Just as the internet makes it easier for legitimate pursuits, it also makes it easier for scammers, con artists, and other online miscreants to carry out their virtual crimes impacting our real life finances, security, and peace of mind. Online scams are constantly evolving, but here are the most common ones today.

(i) **Phishing scams.** Phishing email try to trick the intended victim into visiting a fraudulent website disguised to look like a valid eCommerce or banking site. The victim thinks they are logging into their real account, but instead everything they enter on the fake site is being sent to the scammers. Armed with this information, the scammer can wipe out the victim's accounts, run up their credit cards, or even steal their identity.

(ii) **Nigerian 419 scams.** Nigerian 419 scams (aka Advanced Fee Fraud) date back to the days when fax machines and snail were the primary business communication tools. Today, email is the preferred method of these scammers and there are more Nigerian 419 Advance Fee Fraud scams and victims than ever before.

(iii) **Greeting Card Scams.** Greeting card scams arrive in email pretending to be from a friend or family member. Clicking the link to view the card typically leads to a booby-trapped web page that downloads Trojans and other malicious software onto the systems of the unsuspecting victim.

(iv) **Shopper Needed Cheque Fraud Scam.** The shopper-needed scam sends the 'new hire' a cheque for a few thousand rupees, instructing them to cash the cheque and take their portion, then forward on the remaining funds to the "employer". Of course, the cheque is bogus, it will bounce eventually, and you the victim will be liable for the funds you spent from the cheque, plus the amount you forwarded on, plus any service fees or fines that result.

(v) **Reshipping and Payment Processing Fraud.** Normally for such a fraud an advertisement reads: Help Wanted to legally launder money on behalf of criminals. But it doesn't. Instead it couches the crime in soft terms like 'payment processing' and 'reshipping transactions'. Don't be fooled. Victims not only find themselves engaged in illegal activity, but they will also be on the legal hook for the entire amount transferred and any fees that result.

(vi) **Lottery Winning Scams.** Lottery winning scams attempt to trick recipients into believing that they have won large sums of cash, and then draws them out of their own dough in a similar fashion to the Nigerian 419 scam.

(vii) **Pump and Dump Stock Scams.** Pump and dump scams send large volumes of email that pretend to disclose confidential information about a particular stock in an attempt to inflate the price.

(viii) **Fraudulent Link Scams.** Scams, in general, are the new malware delivery method. Social engineering is the norm. Falsifying a link is the hallmark of phishing scams, seeded downloader Trojans, and other web-based malware. And it's all trivially easy to do, basic HTML.

(ix) **Killer Spam.** Imagine opening your email inbox and reading a message from an alleged claimer that you're the target. It sounds like something out of a horror movie, but it's been happening in real life to hundred of people. The gist of the email being to either pay the hit man thousands of rupees, or die.

(x) **Scare ware Scams.** Scare ware erroneously claims the system is infected and instructs the user to purchase a 'full version' in order to clean the bogus infections. Sometimes, fake antivirus software gets installed by the user who fell victim to an advertising scam. Other times, a rogue antispyware scanner may be installed by exploit, a so called 'drive-by install'. Regardless of how the rogue software gets installed, the user is often left a hijacked, crippled system. To avoid becoming a victim, before installing any software over the internet search on the name of the product using your favourite search engine. Don't skip this step and you'll go along ways towards a safer online experience.

SUMMARY

♦ Computer ethics primarily enforces the ethical implementation and use of computing resources. It includes methods and procedures to avoid infringing copyrights, trademarks and the unauthorized distribution of digital content. The Computer Ethics Institute has created the ten commandments for computer users i.e.,

- (i) Do not use a computer in ways that may harm other people,
- (ii) Do not use computer technology to cause interference in other users' work,
- (iii) Do not spy on another person's computer data,
- (iv) Do not use computer technology to steal information,
- (v) Do not contribute to the spread of misinformation using computer technology.

- (vi) Refrain from copying software or buying pirated copies. Pay for software unless it is free,
 - (vii) Do not use someone else's computer resources unless authorized,
 - (viii) It is wrong to claim ownership on a work which is the output of someone else's intellect,
 - (ix) Before developing a software, think about the social impact it can have, and
 - (x) In using computers for communication, be respectful and courteous with the fellow members.
- ❖ Computer crime (cyber-crime) is any crime that is committed with a computer over a network. The computer or network may be the target of the crime, or the computer may be the device utilized for carrying out other crimes. Cyber war is being waged, malware is the attack tool, and internet users are on the front-lines of the battlefield. Everyone, whether individual or a company, is a potential target and anyone who uses the Web risks social engineering attacks, Malware attacks, Web attacks and targeted attacks each time they open their email or browse to a website. Apart from embezzlement scam, wire transfer scam, online scam, the scammers also steal Computer Data through portable Hard Drive, MPS Players, DVD, E-Mails, Web-Mail, Printing and Remote Access.

Short Question Answers

1. Why are computer ethics important in use of computing resources ?

Ans. Computer ethics primarily enforces the ethical implementation and use of computing resource. It includes methods and procedures to avoid infringing copyrights, trademarks and the unauthorized distribution of digital content. Computer ethics also entails the behaviour and approach of a human operator, workplace ethics and compliance with the ethical standards that surround computer use.

2. What is cyber-crime and how does it affect the individuals and companies ?

Ans. Computer crime (cyber-crime) is any crime that is committed with a computer over a network. The computer or network may be the target of the crime, or the computer may be the device utilized for carrying out other crimes. Cyber-crime falls into two general categories: those which target computer networks or devices and those which merely use a computer network to target individuals. The goal: to steal financial and intellectual property from individuals and companies across the globe. Cybercriminals know that the best way to breach defences is to trick the user into doing something harmful. Their methods range from cleverly worded email, to fake websites, to even phone and snail mail. Everyone, whether individual or a company, is a potential target and anyone who uses the Web risks social engineering attacks, Malware attacks, Web attacks and targeted attacks each time they open their email or browse to a website. To effectively defend yourself, you need to become aware of just how much personal information about you is publicly available via the web and learn to control the information so it cannot be used against you, your friends, or your family.

3. Why and how the term "what you see in what you get" called to be an old acronym in the "Web attacks" ?

Ans. There's an old acronym in the computing industry WYSIWYG. Pronounced "wizzy-wig", it stands for "What You See Is What You Get". While that used to be true with computers, today nothing could be further from the truth. Today, many of the websites we trust and visit routinely are being compromised and hidden code references are inserted. The web browser interprets the HTML, JavaScript, and other scripting language used on the page, it's what you can't see that can hurt you. Hidden frames and external JavaScript references can execute malicious code behind the scenes, silently infecting your computer while you browse perfectly legitimate website. You can reduce that risk by properly securing your browser.

4. How are scammers exploiting job seekers ?

Ans. Scammers continue to exploit job seekers by enlisting innocent folks into illegal money laundering activities. Though the scammers use the name of a company, it is not affiliated in any way with the real company. The shopper-needed scam sends the 'new hire' a bank cheque for a few thousand rupees, instructing them to encash the cheque and take their portion, then forward on the remaining funds to the "employer". Of course, the cheque is bogus, it will bounce eventually, and the victim becomes liable for the funds spent from the cheque, plus the amount he forwarded on, plus any service fees or fines that result.

5. Explain the term "Wire Transfer Scams" which are affecting individuals and banking services.

Ans. The typical crime begins with an infection of a data theft/backdoor Trojan which steals login credentials from key employees at the business. The stolen credentials enable the attackers to gain access to the business' bank account and initiate an ACH transfer of funds. But most banks will alert on an overseas transfer, and that's where the scam victim comes into play. To avoid sounding alarms at the bank, the criminals need someone in India to accept the initial transfer and then forward it to the overseas attackers. The scam takes many forms, typically masquerading as solicitation for a mystery shopper, or some other bogus job offer. The scam may also claim to be a payout for lottery winnings. All the scams have one thing in common that they involve you in depositing funds into your bank account, then withdrawing and wiring a portion of those funds via Western Union or some other unrecoverable wire transfer method.

Exercise

1. Explain in brief the Ten Commandments created by the computer Ethics Institute.
2. How is social engineering attack used to trick users ?
3. Explain the term "Targeted Attacks". How is it used as a search engine to harm the social and business circles ?
4. Explain in brief the misuse of online games by the scammers with examples.
5. Describe in brief the most common online scams being used for framed and embezzlement of money.
6. Explain the various methods used by scammers to steal data from individuals and organizations.

CHAPTER

4

Engineer as a Role Model

4.1 INDUSTRIAL PRODUCTION

For boosting industrial production we have to exploit and make a maximum utilization of our production capacity by proper and efficient use of our resources related to man, machine and material. It also depends on other indirect supports i.e., quantity, quality and efficiency of manufacturing apart from capacity utilization, choice of product, available energy, process of manufacturing technique and raw material used. Utilization of capacity is a measure of performance indicators of an industry. Every industry is endlessly in a course of self-appraisal for measuring its own current performance vis-a-vis its various targets, past achievements and operative capacity. The main aim of any industry is to produce an item (or service) to sell at a profit. However, a well organised business will wish to make this profit making an ongoing process. Whilst a one-off sale will usually return a short-term profit, continuous and sustained income from profits is much more desirable.

In order to continue in business, any industry or company needs to make a continuous profit. This profit provides income that enables growth and development within the industry. It may be used to keep shareholders happy by paying them a dividend. It may be used to repair machinery, buy new equipment or to maintain current stock, or it may be directed to the owner's pay packet.

It is important to return a profit and in order to return a profit ; an industry needs to become efficient in whatever process it does. In becoming efficient, it will also produce more goods, which can be sold for a profit. This profit can then be re-invested in the company to help it become more efficient, and so on.

A century ago, industrial manufacturing was dominated by large-scale, energy-hungry processes such as smelting ores and machining metals. Today, the industrial landscape features an array of novel techniques operating on much smaller scales, making computer

(127)