1

HUMAN RIGHTS: NATURE AND CONSTITUENTS

Unit Structure

1.0 OBJECTIVES

After studying the unit you will be able

- To know the meaning and definition of Human Rights
- To be aware of the characteristics of Human Rights
- To learn about evolution and landmarks in the development of Human Rights
- To get acquainted with the classifications of Human Rights

1.1 INTRODUCTION

In the present chapter a brief introduction of the genesis of human

rights will be taken into consideration. The historical background, the definition of human rights, the characteristics and nature of human rights will be dealt briefly. The landmarks in the development of human rights will be traced so as to know about the evolution of such rights. Further the classification of human rights will also be studied briefly.

1.2 MEANING OF HUMAN RIGHTS

Human beings are born equal in dignity and rights. These are moral claims which are inalienable and inherent in all individuals by virtue of their humanity alone, irrespective of caste, colour, creed, and place of birth, sex, cultural difference or any other consideration. These claims are articulated and formulated in what is today known as human rights. Human rights are sometimes referred to as fundamental rights, basic rights, inherent rights, natural rights and birth rights.

1.3 DEFINITION OF HUMAN RIGHTS

Dr. Justice Durga Das Basu defines “Human rights are those minimal rights, which every individual must have against the State, or other public authority, by virtue of his being a ‘member of human family’ irrespective of any consideration. Durga Das Basu’s definition brings out the essence of human rights.

The Universal Declaration of Human Rights (UDHR), 1948, defines human rights as “rights derived from the inherent dignity of the human person.” Human rights when they are guaranteed by a written constitution are known as “Fundamental Rights” because a written constitution is the fundamental law of the state.

1.4 CHARACTERISTICS AND NATURE OF HUMAN RIGHTS

Following are the characteristics of human rights:

1. Human Rights are Inalienable - Human rights are conferred on an individual due to the very nature of his existence. They are inherent in all individuals irrespective of their caste, creed, religion, sex and nationality. Human rights are conferred to an individual even after his death. The different rituals in different religions bear testimony to this fact.

2. Human Rights are Essential and Necessary - In the absence of human rights, the moral, physical, social and spiritual welfare of an individual is impossible. Human rights are also essential as they provide suitable conditions for material and moral upliftment of the people.

3. Human Rights are in connection with human dignity - To treat another individual with dignity irrespective of the fact that the person is a male or female, rich or poor etc. is concerned with human dignity. For eg. In 1993, India has enacted a law that forbids the practice of carrying human excreta. This law is called Employment of Manual Scavengers and Dry Latrines (Prohibition) Act.

4. Human Rights are Irrevocable: Human rights are irrevocable. They cannot be taken away by any power or authority because these rights originate with the social nature of man in the society of human beings and they belong to a person simply because he is a human being. As such human rights have similarities to moral rights.

5. Human Rights are Necessary for the fulfillment of purpose of life: Human life has a purpose. The term "human right" is applied to those conditions which are essential for the fulfillment of this purpose. No government has the power to curtail or take away the rights which are sacrosanct, inviolable and immutable.

6. Human Rights are Universal – Human rights are not a monopoly of any privileged class of people. Human rights are universal in nature, without consideration and without exception. The values such as divinity, dignity and equality which form the basis of these rights are inherent in human nature.

7. Human Rights are never absolute – Man is a social animal and he lives in a civic society, which always put certain restrictions on the enjoyment of his rights and freedoms. Human rights as such are those limited powers or claims, which are contributory to the common good and which are recognized and guaranteed by the State, through its laws to the individuals. As such each right has certain limitations.

8. Human Rights are Dynamic - Human rights are not static, they are dynamic. Human rights go on expanding with socio-eco-cultural and political developments within the State. Judges have to interpret laws in such ways as are in tune with the changed social values. For eg. The right to be cared for in sickness has now been extended to include free medical treatment in public hospitals under the Public Health Scheme, free medical examinations in schools, and the provisions for especially equipped schools for the physically handicapped.

9. Rights as limits to state power - Human rights imply that every individual has legitimate claims upon his or her society for certain freedom and benefits. So human rights limit the state's power. These may be in the form of negative restrictions, on the powers of the State, from violating the inalienable freedoms of the individuals,

or in the nature of demands on the State, i.e. positive obligations of the State. For eg. Six freedoms that are enumerated under the right to liberty forbid the State from interfering with the individual.

1.5 CHECK YOUR PROGRESS

1. Define Human Rights.

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2. In what different ways are human rights referred to?

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3. Why is it said that human rights are dynamic?

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4. How does human right limit the state powers?

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1.6 THE EVOLUTION OF HUMAN RIGHTS

The evolutions of human rights have taken place over centuries. Man had to struggle hard in order to achieve the ultimate goal – living with dignity – which still has to be realized in various societies. India itself is an example where women, children, dalits, bonded labourers, etc, is trying hard to be a part of mainstream. Inspite of all these, the world recognized the U.N.Charter of 1945 which states that human rights are inalienable aspect of mankind. The origin of human rights may be traced to the theory of Natural Rights derived from the concept of Natural Law, as propounded by ancient Greek Stoic Philosophers and further developed by Thomas Hobbes and John Locke. The American and French Revolution gave further impetus to the struggle of human rights. The evolution and development of human rights in the international context can be traced to the Magna Carta and the English Bill of Rights followed by the French Declaration and the American Bill of Rights.

The twentieth century witnessed the crystallization of the philosophy of Human Rights when the United Nations adopted the UN Charter, 1945, The Universal Declaration of Human Rights, 1948 and the International Covenants on Human Rights with further emphasis to protection of rights of Women, Abolition of Slavery, Racial Discrimination, Civil and Political Rights, Economic, Social and Cultural Rights and most importantly the Rights of children.

In India the drafters of Constitution took care to incorporate Human Rights for its own citizens as well as for the aliens.

1.7 THE NATURAL RIGHTS THEORY

Though the expression 'human rights' had its origin in international law, which is not older than the World War II, the concept of an individual having certain basic, inalienable rights as against a sovereign State had its origin in the doctrines of natural law and natural rights. Thomas Hobbes (1588 – 1679), John Locke (1632 – 1704) and Jean-Jacques Rousseau (1712 – 1778) are the three main thinkers who developed the Natural Rights theory.

Thomas Hobbes was the first champion of the theory of 'natural rights'. In his celebrated book, 'Leviathan', he advocated that no individual could ever be deprived of the right to life, which he enjoyed in the state of nature. He asserted that all human beings are equal, without any consideration.

John Locke developed the idea further in his book, 'Two Treatises Government.' He argued that every human being has a natural right to life, personal liberty, and property, and that no governmental authority has power to deprive individuals of these rights because they had enjoyed them even before the creation of the civil or political society.

Rousseau is regarded as the greatest master of natural law school. In his celebrated book, 'The Social Contract', Rousseau states that "All men are born free but everywhere they are in chains." Rousseau proclaimed that men are bestowed with inalienable rights of liberty, equality and fraternity. These concepts became the basis for the French Declaration of the Rights of Man and of the Citizen.

Paine an American revolutionary thinker developed the doctrine of natural rights without linking it to the social contract theory. He held that rights are natural, because they were bestowed upon man by God himself. These rights exist independently of the legal code of any country.

1.8 CHECK YOUR PROGRESS

1. State the ultimate goal of human beings?

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2. Signify the importance of U.N.Charter of 1945.

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3. State the Natural Right according to Thomas Hobbes.

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4. Bring out the importance of Rousseau's theory of Natural Right

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5. What care did the drafters of Indian constitution take?

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1.9 LANDMARKS IN DEVELOPMENT OF HUMAN RIGHTS

The important landmarks in the progress of human rights are as follows:

1.9.1 The Magna Carta, 1215.

The Magna Carta, also known as the Great Charter, of 1215 is the most significant constitutional document of all human history. The main theme of it was protection against the arbitrary acts by the king. The 63 clauses of the Charter guaranteed basic civic and legal rights to citizens, and protected the barons from unjust taxes. The English Church too gained freedom from royal interferences. King John of England granted the Magna Carta to the English barons on 15th June 1215. The king was compelled to grant the Charter, because the barons refused to pay heavy taxes unless the king signed the Charter.

1.9.2 The English Bill of Rights, 1689.

The next source and avenue of the development of the philosophy of human rights is the English Bill of Rights, enacted on December 16, 1689, by the British Parliament. The British Parliament declared its supremacy over the Crown in clear terms. The English Bill of Rights declared that the king has no overriding authority. The Bill of Rights codified the customary laws, and clarified the rights and liberties of the citizens.

It lays down the twin foundations, viz., the supremacy of the law, and the sovereignty of the nation, upon which, the English constitution rests.

1.9.3. American Declaration of Independence, 1776.

The first colonies to revolt against England were the thirteen States of America. These states declared their independence from their mother country on 4th July 1776. The declaration charges the king

with tyranny and affirms the independence of the American colonies. The declaration of independence has great significance in the history of mankind as it justified the right to revolt against a government that no longer guaranteed the man's natural and inalienable rights.

1.9.4. The U.S. Bill of Rights, 1791.

The U.S. Constitution was enacted on 17th September 1787. The most conspicuous defect of the original constitution was the omission of a Bill of Rights concerning private rights and personal liberties. Madison, therefore proposed as many as twelve amendments in the form of Bill of Rights. Ten of these were ratified by the State legislatures. These ten constitutional amendments came to be known as the Bill of Rights. The overall theme of the Bill of Rights is that the citizen be protected against the abuse of power by the officials of the States.

1.9.5. The French Declaration of the Rights of Man and of the Citizen, 1789

The fall of Bastille and the abolition of feudalism, serfdom and class privileges by the National Assembly ushered France into a new era. On 4th August 1789, the National Assembly proclaimed the Rights of Man and of the Citizens. The Rights were formulated in 17 Articles.

The Declaration of the Rights of Man and of the Citizen has far reaching importance not only in the history of France but also in the history of Europe and mankind. The declaration served as the death warrant for the old regime and introduced a new social and political order, founded on the noble and glittering principles. Further the declaration served as the basis for many Constitutions, framed in different countries, where the framers gave top priority to human rights.

1.9.6. Declaration of International Rights of Man, 1929.

After World War I, questions about human rights and fundamental freedoms began to be raised. In 1929, the Institute of International Law adopted the Declaration of International rights of Man. The Declaration declared that fundamental rights of citizen, recognized and guaranteed by several domestic constitutions, especially those of the French and the U.S.A constitutions, were in reality meant not only for citizens of the states but for all men all over the world, without any consideration.

1.9.7. The UN Charter, 1945.

The United Nations Charter was drafted, approved and unanimously adopted by all the delegates of the 51 states, who attended the United Nations Conference at San Francisco. The UN Charter contains provisions for the promotion and protection of

human rights. The importance of the Charter lies in the fact that it is the first official document in which the use of 'human rights' is, for the first time traceable and which also recognized the respect for fundamental freedom.

1.9.8. The Universal Declaration of Human Rights, 1948.

The Universal Declaration of Human Rights was adopted by the General Assembly of the United Nations on 10th December, 1948. The Declaration consists of thirty Articles and covers civil, political, economic, social and cultural rights for all men, women and children. The declaration however is not a legally binding document. It is an ideal for all mankind.

1.9.9. International Covenants on Human Rights

The Universal Declaration of Human Rights, 1948 was not a legally binding document. It lacked enforcements. This deficiency was sought to be removed by the U.N. General Assembly by adopting in December, 1966, the two Covenants, viz,

1. International Covenant on Civil and Political Rights and
2. International Covenant on Economic, Social and Cultural Rights.

The two International Covenants, together with the Universal Declaration and the Optional Protocols, comprise the International Bill of Human Rights. The International Bill of Human Rights represents a milestone in the history of human rights. It is a modern Magna Carta of human rights.

1.9.10 CHECK YOUR PROGRESS

1. What is the Magna Charta also known as?

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2. How is the American Declaration of Independence, 1776 justified?

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3. State the importance of the French Declaration of the Rights of Man and of the Citizen, 1789.

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4. What is the importance of the UN Charter, 1945?

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5. Name the two covenants adopted by the U.N. General Assembly

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1.10 CLASSIFICATIONS OF RIGHTS

Human rights can be broadly classified on five bases. They are:

- Civil Human Rights
- Political Human Rights
- Economic Human Rights
- Social and Cultural Human Rights
- Development Oriented Human Rights

a. The seventeenth, eighteenth and nineteenth centuries contributed and strengthened the civil and political rights, which assured civil and political liberties. The Civil and Political Human Rights are collectively known as 'Liberty Oriented Human Rights' because they provide, protect and guarantee individual liberty to an individual against the State and its agencies. Liberty rights also referred to as Blue Rights are the First Generation of Human Rights.

b. The twentieth century contributed to the development and strengthening of economic, social and cultural rights and the rights of minorities as well. These rights aim at promotion of the economic and social security through economic and social upliftment of the weaker sections of the society. These rights are essential for dignity of personhood as well as for the full and free development of human personality in all possible directions. These rights ensure a minimum of economic welfare of the masses and their basic material needs, recognized by the society as essential to civilized living.

The economic, social and cultural rights, including the rights of the minorities are collectively known as the "Security Oriented Human Rights" because these rights collectively provide and guarantee the essential security in the life of an individual. In the absence of these rights, the very existence of human beings would be in danger. These are also known as the "Second Generation of Human Rights". They are also referred to as Red Rights or also as positive rights. These rights along with the Civil and Political Rights were declared by the Universal Declaration of Human Rights and later were recognized by (1) the Covenant on Civil and Political Rights and (2) the Covenant on Economic, Social and Cultural Rights in December 1966.

c. The Development Oriented Human Rights are of a very recent origin in the late twentieth century. These rights enable an individual to participate in the process of all round development and include environmental rights that enable an individual to enjoy the absolutely free gifts of nature, namely, air, water, food and natural resources, free from pollution and contamination. These are known as the Third Generation of Human Rights or Green Rights. They are also called as Solidarity Rights, because their implementation depends upon international cooperation.

Solidarity rights are of special importance to developing countries, because these countries want the creation of an international order that will guarantee to them the right to development, the right to disaster relief assistance, the right to peace and the right to good government.

Rights for Citizens and for all persons.

All human rights can be further classified into two distinct classes on the basis of the eligibility of individual, who can exercise them as under:

1. The rights for citizens and 2. The rights for all persons

Certain rights are conferred only on citizens. For eg. In the Indian constitution provisions in Articles 15, 16, 19 and 29 are limited to citizens. The remaining provisions in Part III of the Indian Constitution are applicable to citizens and aliens alike.

1.10.1 CHECK YOUR PROGRESS

1. Name the three generations of human rights.

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2. What is meant by civil and political rights.

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3. Bring out the meaning of development oriented right.

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4. Differentiate between rights of citizens and for all persons.

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1.11 SUMMARY

Human rights are sometimes referred to as fundamental rights, basic rights, inherent rights, natural rights and birth rights. They are essential for all individuals to protect themselves against the State or public authority or against members of its own class. Human rights are characterized as inalienable, connection with human dignity and necessary for the purpose of fulfillment of human life.

The evolutions of human rights have taken place over centuries. The twentieth century witnessed the crystallization of the philosophy of Human Rights when the United Nations adopted the UN Charter, 1945, The Universal Declaration of Human Rights, 1948 and the International Covenants on Human Rights with further emphasis to protection of rights of Women, Abolition of Slavery, Racial Discrimination, Civil and Political Rights, Economic, Social and Cultural Rights and most importantly the Rights of children.

Human rights have been classified in different bases. Each right signify the awareness and emancipation of a particular century. For eg. The development oriented rights belong to the twentieth century which is essential to maintain world peace as well as right to clean and wholesome environment along with environment protection and improvement.

1.12 KEYWORDS

Universal Declaration of Human Rights (UDHR), Inalienable, U.N.Charter, Magna Carta, Natural Rights International Covenants on Human Rights, Social and Cultural Human Rights, Development Oriented Human Rights, Solidarity rights.

1.13 UNIT END QUESTIONS

1. Define the term human rights. Bring out any six characteristics of human rights.

2. Who were the propagators of natural rights theory? What did they state in their theories?

3. State in detail the landmarks in the development of human rights.

4. Explain the theory of three generations of human rights.

5. Discuss in detail the different bases of classifying rights.

1.14 REFERENCE:

A Textbook on Foundation Course II prescribed syllabus by the following authors:

a. K.T.Basantani., *Human Rights, Science, Technological Development,* Sheth Publishers, 2008.

b. Prof. Manohar R. Wadhawani., *Some Aspects of Human Rights, Science and Technology and Ecology* – Chetana Publishers, 2008.

c. Prof. Manohar R. Wadhawani, *The Philoosphy and Practice of Human Rights* – Chetana Publishers,2003.

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2

FUNDAMENTAL RIGHTS IN INDIAN CONSTITUTION AND INTERNATIONAL COVENANT

Unit Structure

2.0 OBJECTIVES

After studying the unit you will be able

- To know about the scope of subject and Human Rights in India
- To be aware about the provisions and Classification of Fundamental Rights as enshrined in the Indian Constitution
- To obtain information about Specific and Unspecified Fundamental Rights
- To learn about the International Covenant on Civil and Political Right

2.1 INTRODUCTION

Human rights are essential for the overall development of individuals. The Constitution of India makes provisions for basic rights also known as Fundamental Rights for its citizens as well as for aliens. A distinction is made between Specific Fundamental Rights and Unspecified Fundamental Rights. The rights enshrined in the Constitution also at times are at par with the International

Covenant on Civil and Political Right (ICPPR) which is an international treaty. The ICCPR is applicable to States rather than to individual. Therefore, rights enshrined therein become the obligation of a state only when they have been incorporated in the State's internal law.

2.2 HUMAN RIGHTS IN INDIA

India got its independence in the year 1947, just a year before the UDHR was adopted. The founding fathers of Indian constitution were all aware that India's freedom struggle had taken place in the context of the demand for basic human rights. Yet economic backwardness of the country would make it impossible to immediately satisfy all the aspirations of people. So, they adopted a pragmatic approach. They described certain rights as "fundamental rights" and laid down certain other rights as fundamental duties of a citizen were also enumerated.

The Supreme Court of India is the guarantor of the rights according to the Constitution. The court takes into account fundamental duties while interpreting the constitutional right.

2.2.1 FUNDAMENTAL RIGHTS IN INDIAN CONSTITUTION

Rights are classified mainly in three broad categories: (a) Civil (b) Political (c) Economic and Social. Fundamental Rights in India recognize certain civil rights. Certain Political and Economic and Social rights are recognized by other provisions in the Constitution. In Part III, the Indian constitution provides a number of rights to individual. These rights have been called "Fundamental Right". The expression "Fundamental" shows that these rights are basic right.

The Supreme Court of India recognizes Fundamental Right as "natural right". Chief Justice Patanjali Shastri has referred to fundamental right as "those great and basic right which are recognized and guaranteed as the natural right inherent in the status of a citizen of a free country". Chief Justice Subha Rao states that "fundamental rights are the modern name for what has been traditionally known as natural right".

2.2.2. DESCRIPTION OF FUNDAMENTAL RIGHTS

Singh and Shukla describe the nature of Fundamental Right in the Indian Constitution, thus; "A fundamental right, as defined in the Constitution, differ from a non- fundamental right in one vital respect; a fundamental right (subject to the qualification defined in the Constitution itself) is inviolable in the sense that no law, ordinance, custom, usage or administrative order can abridge or take away a fundamental right. A law which violates any of the fundamental right is void. They are binding on the legislature as well as the Executive. A fundamental right cannot be taken away even by a constitution amendment if it forms the basic structure of

the Constitution.

Exhaustive enumeration of fundamental right: Part III, of the Indian Constitution exhaustively enumerates the fundamental right. Therefore, the Parliament cannot incorporate any additional fundamental Right. Any expansion of such rights must rest on judicial interpretation.

Fundamental rights are enshrined in Articles 12-35 of the Constitution. Brief overviews of the fundamental rights are made as follows.

2.2.3 FUNDAMENTAL RIGHTS

The various civil and political human rights and also the economic, social and cultural human rights have been guaranteed by the Constitution of India and re-christened as the "Fundamental Rights".

The provisions of Part III of the Constitution (Arts. 12 – 35) enshrine the Fundamental Rights, which are more elaborate than those of any other existing written constitutions dealing with Fundamental Rights. The constitution as amended by Forty fourth Amendment Act, 1979, classifies Fundamental Rights under the six categories. The fundamental rights are elaborated as follows:

Article 12 defines the "State" as "In this part, unless the context otherwise requires, "the State" includes the Government and Parliament of India and the Government and the Legislature of each of the States and all local or other authorities within the territory of India or under the control of the Government of India."

Article13 lays down certain restriction on violating fundamental right. The important significance of this provision lies in the fact that it makes explicit provision for judicial review of legislative enactments and executive actions as to their conformity with guaranteed fundamental rights.

Right to Equality (Articles 14 – 18)

The five articles that cover the right to equality are

a. Equality before law and equal protection of law – Article 14

Article 14 consists of two parts namely equality before law and equal protection of the laws. Equality before law means that no individual should be given any special privilege by the state.

Equal protection of the laws means the right to equal treatment in equal circumstances. Equality before the law also means treating unequal unequally. For example, the Supreme Court has recommended that the 'creamy layer' of the Other Backward Classes' (OBC) should not be given the benefit of reservation.

b. Prohibition of discrimination on ground of religion, race, caste, sex or place of birth - Article15
There are four aspects of this right mentioned in following Clauses of this Article.

i. Prohibition of discrimination - Article15, Clause (1): This article prohibits the state from discrimination against any individual or group of individuals. The principle of non – discrimination is based on equality and dignity.

ii. Access to public places - Article15, Clause (2): This right provides that no citizen can be denied access to public places, places of entertainment or the use of wells, tanks, and roads that are maintained out of State funds.

iii. Protective laws for women and children - Article15, Clause (3): A positive discrimination for women and children is made in the Indian context. Thus provision for reservation for women, free education for children etc. is provided.

iv. Reservation for backward classes – Article15, Clause (4): The constitution recognizes the Scheduled Caste, Scheduled Tribes and Other Backward Classes as weaker sections of the population. It authorizes the state to make special provisions for the advancement of these sections of the society.

c. Equality of opportunity in matters of public Employment - Article16:
The aim of article 16 of Indian Constitution is to provide equal opportunity to all citizens in employment offered by the state or its agencies. This article has five clauses

i. Equality of opportunity – Article 16, Clause (1)wherein it is stated that equality of opportunity should be given to all citizens in matters relating to employment or appointment to any office under the state.
ii. Prohibition of discrimination - Article 16, Clause (2)
This clause prohibits discrimination on grounds only of religion, race, caste, sex, descent, and place of birth, residence or any of them in respect of any employment of the state.

iii. Residential requirements - Article 16, Clause (3)
It allows the Parliament to make laws that require residential (domicile) requirements in a State for public employment or appointment.

iv. Protective laws - **Article 16, Clause (4)**
This Clause allows the Parliament to make protective laws for appointment of backward classes of citizens who are not adequately represented in the services of the state.

v. Preference to certain persons in religious institutions - Article 16, Clause (5)
This clause prescribes that the Parliament can make laws which require only a person professing a particular religion to be appointed in a body or institution of that religion. For example, a Hindu can only be appointed as a priest in a Hindu temple.

d. Abolition of Untouchability - Article17
This is a unique article that has been incorporated only in the Constitution of India. Article 17 declares that not only Untouchability has been abolished but it also makes any practice and propagation of Untouchability in any form punishable in accordance with the law.

e. Abolition of Titles - Article18
The Clause of the Article prohibits the State from conferring any title at all upon any person. However the State is not prevented from awarding military distinctions, such as Mahavir Chakra, Param Vir – Chakra etc. for honoring men for their acts of valour or academic distinctions.

II. Right to Freedom (Articles 19 – 22)

a. Six fundamental freedoms - Article19
Article 19 (1), as amended by the Constitution (Forty Fourth) Amendment Act, 1979, guarantees to all citizens the following six freedoms:

i. Freedom of speech and expression
ii. Freedom of peaceful assembly
iii. Freedom of forming associations or unions
iv. Freedom of movement throughout the territory of India
v. Freedom of residence and settlement in any part of the territory of India, and
vi. Freedom of profession, occupation, trade or business.

b. Protection in respect of conviction for offences - Article20
This right guarantees protection in respect of conviction for offences, to those accused of crimes. There are three clauses to this article.

(i) Protection against ex – post, facto legislation – It means that a person cannot be punished under such a law, for his actions which took place before the passage of the law.

(ii) Protection against double punishment – it says that no person shall be prosecuted for the same offence more than once.

(iii) Protection against self incrimination – this clause states that no person accused of an offence shall be compelled to be a witness against himself.

c. Protection of life and personal liberty - Article21
Article 21 of the Indian Constitution recognizes the right to life and personal liberty. It provides that “no person shall be deprived of his life or personal liberty except according to procedure established by law.”

d. Protection against arrest and detention in certain cases. - Article22
The provisions of Article 22 are complimentary to those of Article 21. Article 22 has two parts; the first part consisting of clauses (1) and (2), deals with persons, who are arrested under ordinary criminal law and the various rights, they are entitled to; and the second part consisting of the remaining clauses (3) to (7), is concerned with persons, who are detained under a law of preventive detention.

III. Right against Exploitation (Articles 23-24)
a. Prohibition of traffic in human beings and forced labour - Article23
The article prohibits traffic in human beings and ‘*begar*’ and other similar forms of forced labour.

b. Prohibition of employment of children - Article24
Article 24 of the constitution prohibits child labour. Children below fourteen years of age cannot be employed in any factory or mine or in any other hazardous employment.

IV. Right to Freedom of Religion (Articles 25 – 28)
a. Freedom of Conscience and Religion - Article25
Article25 reflects the spirit of secularism and recognized freedom of religion to everyone in India.

b. Freedom to manage religious affairs - Article26
It recognizes the right of every religious order to establish and maintain institutions for religious and charitable purposes and manage its own affairs in matters of religion.

c. Freedom as to payment of taxes for promotion of any particular religion - Article27
The state shall not compel any person to pay any taxes for the promotion of maintenance of any particular religion or religious denomination.

d. Freedom to attend religious instruction in education Institution - Article28
This article prohibits imposition of religious beliefs by educational institutions on those who are attending them.
Taken together the four Articles (25 to 28) establish the secular character of democracy.

V. Cultural and Educational Rights (Article 29)

a. Cultural right of the individual as well if minorities - Article29

This Article states that every section of the society has the right to conserve its distinct language, script or culture.

b. Right of minorities to establish and administer Educational institution - Article30

The State cannot discriminate in granting aid to any educational institution on the ground that it is under the management of a religious or linguistic minority.

VI. Right to constitutional Remedies (Article 32)

Article 32 provides for the Constitutional Remedies, under which, one can move the Supreme Court for the enforcement of the Fundamental Rights and this provision itself is made one of the Fundamental rights. This is something unique. Dr. Babasaheb Ambedkar considered it as the very heart and soul of the constitution.

The other rights that are guaranteed in the Indian Constitution are as follows.

r. Right of property - Article31

t. Power of Parliament to modify the right - Article33

u. Restriction on right while martial law is in force- Article34

v. Parliament empowered to make to enforce certain Fundamental Right - Article35

By the 44th Amendment Act, 1978, the right to property was eliminated from the list of Fundamental Right. However though it is not a fundamental right, it is still a constitution at right. It is also a human right. This was recent ruling by the Supreme Court, while dismissing an appeal filed by the Karnataka Financial Corporation Challenged a State High Court order.

2.2.4 CLASSIFICATION OF FUNDAMENTAL RIGHT

Right enumerated in Arts 14-15 of part 3 have been classified in several ways.

1. **Topic-wise classification:** The Constitution itself classified the Fundamental Right under seven groups. These are:

a) Right to equality-Article14-18
b) Right particular freedom-Article19-22
C) Right against exploition-Article23-24
d) Right to freedom of religion-Article25-28
e) Cultural and educational right-Article29-30
f) Right to property (Article31)
g) Right to constitutional remedies-Article32-35

Of these, the Right to property has been eliminated by the 44th Constitution Amendment Act.

2. **Right of citizens vs. those of all persons:** Some of the Fundamental right can be enjoyed by citizens alone. Right enumerated in Article15, 16, 19 and 30 belong to this category. Other fundamental rights are granted to any person-citizen or foreigner.

3. **Prohibition vs. benefits:** Some of the Fundamental Rights are prohibition on the state. So, they are negatively expressed. For instance, Article14 says, "The State shall not any person equality before the law……" Other rights confer some benefits upon the individual. That is why they are positively worded. The right to religious freedom (under Article25), for instant, is a positive right.

4. **Classification on the basis of extent of limitation**: Some of the Fundamental Right imposes limitations on the Executive. Other curbs the legislative power. Fundamental Right under Article21 lay down limitation on the Executive. But they do not curtail legislative power. On the other hand, right guaranteed by Arts.15, 17, 18, 20, and 24 impose absolute limitation. Even the Legislature is powerless to regulate such right.

5. **Rights against State action vs. rights of private individuals**: Most of the Fundamental Rights are guarantees against State action. For instance, the right guaranteed by Article 19 and 21 are available against state action. However, part 3 of the Constitution does include certain rights which can be invoked against the State as well as against private individuals. Prohibition of untouchability (Article17) and prohibition of traffic in human being (Article23) are examples of such right.

2.2.4 CHECK YOUR PROGRESS

1. Define 'Human Rights'.

   _____

   _____

2. List the broad categories of rights as guaranteed by the Indian constitution.

   _____

   _____

3. Enumerate the types of Fundamental rights as given in the Indian Constitution.

   _____

   _____

4. What is meant by Freedom of Religion?

   _____

   _____

5. State the different classification of Fundamental Rights.

_____

_____

2.3 SPECIFIED FUNDAMENTAL RIGHT AND THE COVENANT

Many right specifically mentioned in the Indian Constitution (called specified Fundamental Right) are also laid down in the Covenant on Civil and Political Right. **Table 2.3.1** shows the Article of the Indian Constitution and those of the Covenant where similar rights have been enshrined.

Table 2.3.1

Right	Indian constitution	Covenant on Civil & Political Right
Equality before Law	Article14	Article14(1)
Prohibition of discrimination	Article15	Article26
Equality of opportunity to public service	Article16(1)	Article25(a)
Freedom of speech and expression	Article19(1) (a)	Article19(1)&(2)
Right for peaceful assembly	Article19 (1) (b)	Article21
Right to freedom of association	Article19 (1) (a)	Article22(1)
Right to move freely within the territory of a state	Article19.(d)& (e)	Article22(1)
Protection in respect of conviction for offences	Article 20(1)	Article15 (1)
Protection from prosecution and punishment	Article20(2)	Art .14(7)
Not to be compelled to testify against himself	Article20(3)	Article14(3) (g)
Right to life and liberty	Article21	Article6(1) & 9 (1)

Protection against arrest and detention in certain cases	Article22	Article19 (2) (3)& (4)
Forced labour	Article23	Article8(3)
Freedom of conscience and religion	Article25	Article18(1)
Right to effective and remedies	Article32	Article3

The Constitution of India came into force before the International Covenant on Civil and Political Right. So, Fundamental Rights were available to Indian citizen much before India ratified the Covenant.

With regard to specified Fundamental Right certain observation that are made are as follows:

1. **Right to life and personal liberty:** The right to life (Article21) does not mean mere animal existence. It means right to live with full human dignity, without humiliation and deprivation, of denial of any sort. There are various aspect of right to life and personal liberty. Through its interpretation of Article 21 of the Constitution, the Supreme Court has included the following main right:
   - Right to live with human dignity
   - Right against torture, cruel, inhuman or degrading treatment or punishment
   - Right against arbitrary arrest, detention or exile
   - Right to speed trail
   - Right to free legal assistance
   - Right to compensation for wrongful arrest, detention and torture
   - Right to reputation
   - Right to privacy
   - Right to shelter
   - Right to clean and wholesome environment
   - Right to safe and healthy condition of work
   - Right to health
   - Right to emergency medical assistant
   - Right to education till the age of 14
   - Freedom to go abroad

While making a comparison with right enumerated in the Covenant on Civil and Political Right, these rights shall be referred as unspecified fundamental right.

2. **Right against self-incrimination:** One of the implications of this right (Article20 (3) of the Constitution) is that the accused is offered protection against the tyranny of the State.

3. **Freedom of speech and expression:** There are two aspect of

the right to freedom of speech and expression. There are :

Freedom of expression concerning public affairs

Freedom of expression as private right

The Freedom of expression concerning public affairs is indispensable to the operation of democracy. In Bennet Coleman case, Justice Mathew observed, "…… the freedom of expression…. is indispensable to the operation of democratic System. In a democracy the basic premises is governors and the governed. In order that governed may form intelligent and wise judgment, it is necessary that they must be apprised of all the aspect of a question……"

4. Right to assemble peacefully: Democracy loses its meaning if people do not have a right to assemble. Article 21 of the ICCPR states that there is a close relationship between freedom of expression and freedom of assembly. However freedom of peaceful assembly can be restricted if public policy so requires but the limitations on this freedom must be just and necessary in order with a democratic society.

5. Freedom of conscience and religion: The Indian Constitution (under Articles 25 and 26) confers this right subject to some limitation. The right to freedom of religion finds recognition in Article 18 of the ICCPR and Article 18 of the UDHR, which provides: 'Everyone has the right to freedom of thought and religion". Unfortunately, some countries, which have ratified the Covenant on Civil Political Right, do not allow genuine freedom of religion. Pakistan, Iran and Afghanistan are example. In these countries, Islam is the State religion; and the citizen does not enjoy genuine freedom to convert to any other religion. Further, several restriction are imposed on those citizens who do not practice Islam.

6. **Equal access to public services:** Article 16(1) of the Indian Constitution lays down that "there shall be equality of opportunity for all citizens in matters relating to employment or appointment to any office under the State". This Article confers a positive right. Article 16(2) project the negative aspect of the same guarantee. It lays down that no citizen shall be held ineligible to any office under the State on ground of religion, race, caste, sex, etc. only.

7. **Right to effective remedies :** Effective remedies, by itself, are not a right. But under Article 32, the Indian Constitution provides this right for enforcement of fundamental right.

The importance of rights enumerated in Article 32 was underlined by Dr. Ambedkar. He called these rights as the "very soul and heart" of the Constitution. This Article confers a right

on a person to move the Supreme Court directly.

2.3.2 CHECK YOUR PROGRESS

1. State the specified Fundamental Right.

_____

_____

2. What is meant by Right to Effective Remedies?

_____

_____

3. In which article of ICCPR and UDHR, does Freedom of conscience and religion find mention?

_____

_____

2.4 UNSPECIFIED FUNDAMENTAL RIGHT

The Covenant on Civil and Political Right is an international treaty. So it is applicable to States rather than to individual. Therefore, rights enshrined therein become the obligation of a state only when they have been incorporated in the State's internal law. Several judgments of Indian Court have held this.

However, even though several rights are not specified in Part III of the Constitution as Fundamental Right, they have been regarded as fundamental by Supreme Court. This has been done by emanation.

We list here those rights which are incorporated in the Covenant on Civil and Political Right and which are available to the citizens of India, even though they are not specifically mentioned in the Constitution.

1. Right to privacy: This right is incorporated in the Covenant on Civil and Political Right (ICCPR) under Article 21. This right covers a number of other rights. No person shall be subjected to arbitrary interference with his privacy, family, home or correspondence.

2. Right to travel abroad: The right to travel abroad is laid down under Article 12(2) of the Covenant. But this right finds no place in part 3 of the Constitution. However, in Maneka Gandhi v. Union of India, it was held that the expression "personal liberty" was of the widest possible amplitude. The Court held that no person can be deprived of his right to go abroad unless there is a law made by the state prescribing a procedure which cannot be arbitrary, unfair or

unreasonable.

3. Right to speedy trial: Article 9(3) of the Covenant on Civil and Political Rights lays down that anyone arrested or detained on a criminal charge is entitled to trail within a reasonable time or to release.

There is no specific mention of the right to speedy trail in the India Constitution. However, the Supreme Court has held that this right is covered by Article 21.

4. Right to free legal aid: Article 14(3) of the Covenant provides for the right to free legal assistance. But Indian Constitution does not provide this right. However, in M.H.Hoskat v. State of Maharashtra, the Supreme Court held that free legal aid to poor and deserving is a part of personal liberty under Article 21. The court went even further in Sukh Das v. Arunachal Pradesh case. It said that right of a poor person to legal aid exists even if it is not demanded by him.

5. Right of prisoners to be treated with humanity: Article 10(1) of the Covenant on Civil and Political Right lays down that all persons deprived of their liberty should be treated with humanity and with respect for the inherent dignity of the human person. But in part 3 of the Indian Constitution there is no such provision.
Under Article 21, the Supreme Court has developed a whole charter of dignity. The court has held that the dignity belongs to all human beings, both inside and outside the prison.

6. Right not to be imprisoned for inability to fulfill a contractual obligation: Article 11 of the Covenant on Civil and Political Right lays down that no one shall be imprisoned merely on the ground of inability to fulfil a contractual obligation. But in part 3 of the Constitution this right is not specifically provided.

7. **Right to compensation:** Article 9(5) of the Covenant on Civil and Political Right provides for enforceable right to compensation to the victim of unlawful arrest or detention. But the Indian Constitution has no such provision. However, the Supreme Court has held that Compensatory justice comes into play in case of (a) wrongful arrest, detention and torture and (b) custodial death.

8. Right to Information: Article 19(2) of Covenant on Civil and Political Right provided for the right to Covenant on Civil and Political Right provides for the right to seek, receive and impart information. The Indian Constitution guarantees the freedom of speech and expression as fundamental right under Article 19(1) (a); but the right to information is not specifically mentioned. The Right to Information Act was passed in 2005 by the Parliament. It is proving to be a great weapon against corrupt and inefficient

government officials.

2.4.1 CHECK YOUR PROGRESS

1. What is meant by the Covenant on Civil and Political Right

_____

_____

2. State the meaning to Right to privacy and how it is unspecified Fundamental right.

_____

_____

3.Do prisoners have right to be treated with humanity

_____

_____

4. What is the importance of Right to Information?

_____

_____

2. 5. RESERVATION TO RIGHT IN THE COVENANT

While acceding to the Covenant on Civil and Political Right, India has made certain reservation. These reservations, called "Declaration", restrict the application of the Covenant in our country. The following are the declaration with regard to the Covenant on Civil and Political Right:

1. **Right on Self-Determination**: Our country cannot allow the right of self-determination to its people. This is because doing so would result in secession of parts of the country from the Union of India.

2. **Right to freedom:** Various rights to freedom have been provided by Article 19(1) of the Indian Constitution. These right are subject to restriction laid down in paras (2), (3), (4) and (5) of the same Article. Similar right has also been recognized in the Covenant; and the Covenant too lays down restriction in the Covenant are different from those laid down in the Indian Constitution.

3. **Protection against arbitrary arrest and detention**: With regard to this right, provisions of Article 9 of the Covenant are slightly different from those laid down by Article 22 of the Indian

Constitution. For example, in India, this right is not available to an enemy alien or to a person arrested or detained under a preventive detention law.

Further, by Article 9(5), the Covenant provides enforceable right to compensation to person who claims to be victims of unlawful arrest or detention. But in the Indian Constitution there is no provision for enforceable compensation. However, as we have stated in Section 6, Indian courts have held that the suit for compensation against the State is maintainable in such cases. In view of this, this reservation is irrelevant.

4. Right of aliens: Article 13 of the Covenant lays down several safeguard with regard to expelling an alien from the territory of India. Part 3 of the Declaration by India provides that the Government of India reserves its right to apply its laws relating to foreigners.

2.5.1 EMERGENCY PROVISION IN INDIA AND IN THE COVENANT:

The Covenant on Civil and Political Right provides certain safeguards when emergency has been declared by a State. In the Indian Constitution no such safeguard have been explicitly laid down. After the declaration of Emergency declared in India, the 44th Amendment Act, 1978 has significantly changed the position. This amendment has made the following main changes:

Article 19 would be suspended only in case of war or external aggression.

The right to life and personal liberty would not be suspended during emergency.

Of course, the above changes were made to prevent the abuse of the fundamental right of people by the executive. But these changes have also made the provision of the Constitution consistent with the Covenant.

2.5.2 CHECK YOUR PROGRESS

1. What are reservations also known as?

   _____

   _____

2. State the different declaration with regard to the Covenant on Civil and Political Right

   _____

   _____

3. State the declaration by India with regard to the rights of aliens.

_____

_____

2.6 SUMMARY

Fundamental rights have been bestowed to the citizens of India by the founding fathers of the Indian Constitution. Fundamental rights also known as the basic rights are recognized and guaranteed as the natural rights. There are certain rights which are enjoyed by Indian citizens due to wide interpretation of the Fundamental Rights. Such rights are called as unspecified fundamental rights. Several rights in the international Covenant on Civil and Political Rights are similar to the specified Fundamental Rights in Part III of the Indian Constitution. Certain unspecified rights enjoyed by the Indian citizens are similar to those laid down in the Covenant on Civil and Political Rights.

2.7 KEYWORDS

Specific Fundamental Rights, Unspecified Fundamental Rights, Fundamental Freedoms, Protective laws, Covenant Declaration, Aliens

2.8 UNIT END QUESTIONS

1. Why rights embodied in Part III of the Constitution, are called Fundamental Rights?

2. Define Fundamental Rights. State the six major rights as guaranteed by the Indian Constitution.

3. How is Freedom of Speech and expression guaranteed by the Indian Constitution?

4. Analyze and discuss the Fundamental Rights relating to Freedom of Religion.

5. Describe and illustrate any three unspecified fundamental rights that are included in the Covenant on Civil and Political Rights.

6. Write short notes on
   a. Right against exploitation.
   b. Right to Information
   c. Emergency provisions in the Indian Constitution and those in the International Covenant on Civil and Political Rights.

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3

FUNDAMENTAL RIGHTS AS PROTECTIVE LAWS

Unit Structure

3.0 OBJECTIVES

After reading the unit you will be able to

- Understand that Fundamental Rights are protective.
- Know that protective laws are made for the betterment of weaker section of the society.

3.1 INTRODUCTION

Laws are made in the country with the view to give protection to its citizen's. The laws which are made should be able to provide a shield or surety against any kind of encroachment on people's rights. The Parliament as well as the State Legislatures have enacted protective and also repressive rights from time to time. Some of the protective rights are discussed below.

3.2 FUNDAMENTAL RIGHTS AS PROTECTIVE LAWS

Provision of the Constitution as law: vide art. 367(1), the Indian constitution makes the following clear:

1. Fundamental rights enshrined in Part III of the constitutions are laws.
2. Unenumerated fundamental rights (rights that emanate from the Fundamental Rights) are also laws.

The Directive Principal are non-justifiable. But the state is commanded to apply them as laws.

The Constitution vide article 13 provides constitutional safeguards against laws which are inconsistent with fundamental rights. The Article takes into consideration and declares that all laws in force

before the commencement of the Constitution shall be invalid if they are inconsistent with the provisions of Part III of the Constitution and it prohibits the state from enacting any law which takes away or abridges the rights conferred by the Part III of the Constitution.

Fundamental rights act as Protective laws though they differ from one another. The main differences among them are as follows:

1. Some fundamental rights are prohibition on the State, while other confers benefits. Those that are prohibitions are expressed negatively. For instance, Art. 14 says “they shall not deny to any person equality before the law”. On the other hand, those fundamental rights that confer some benefits are positively worded. Thus, right to religious freedom is a positive right.

2. Some of the fundamental rights impose limitations on the Executive. Others curb the Legislative power.

3. Most of the fundamental rights are guarantees against state actions. For instance, the rights guaranteed by the Art. 19 and 21 are available against state actions. In case such rights are violated by private individuals, the person cannot invoke constitutional remedies.

4. Some of the fundamental rights can be enjoyed by the citizens alone. Rights enumerated in the Art. 15, 16, 19 and 30 belong to this category. Other fundamental Rights are granted to other person, citizen or foreigner. Rights in Art 14, 20, 21,23,25,27 and 28 can be enjoyed by all persons on the soils of India.

5. Some of the fundamental rights provide protection to vulnerable groups. Examples of these rights are enumerated in Art 17, 23, 24,25,28,29 and 30.

6. Article 32 of the constitution is the guardian of the fundamental rights. This article enshrines the remedial fundamental rights.

   Legislation for enforcing Fundamental Rights: article 35 of the constitution empowers the Parliament to make laws to enforce certain Fundamental rights. Such power has been denied to the states.

3.3 PROTECTIVE ASPECT OF DIRECTIVE PRINCIPLE

Though, Directive Principle is not enforceable, courts have

attempted to strike a harmonious balance between fundamental rights and directive principles. This has been done in the following ways:

1. The courts have regarded Directive Principles as the dependable index of restriction on fundamental rights.
2. In determining the scope and ambit of the Fundamental Rights, the courts have not ignored the Directive Principles.
3. The court has regarded Directive Principle as a dependable index of the public purpose.
4. The judiciary has enforced the directive principles under the garb of wider interpretation of Fundamental Rights in several cases.

Implementation of Directive Principles: Over the period of 58 years, the government the union and the states have implemented large number of Directives. For eg. The abolition of zamindari system, free legal aid to the poor and the weaker section of the society, the promotion of cottage industries, laws for compulsory primary education, launching of different schemes with the intention to raise the standard of living of people, particularly of the rural population, the equal remuneration act and many such laws.

Check your Progress

1. Do you agree that all Fundamental Rights are protective? Give reason for your answer.

   _____

   _____

2. State how the courts have tried to strike a balance between fundamental rights and Directive Principles.

   _____

   _____

3. Give three examples of implementation of Directive Principles.

   _____

   _____

3.4 LAWS PROTECTING WOMEN'S RIGHT

Social reform legislation recognizing women rights has been introduced in India since the British rule. After independence too the

legislatures have enacted several laws for protecting women's rights and making provisions for the violation of their rights punishable.

Progress towards gender equality:

The recognition of women's right as human right became international law when the U.N. General Assembly adopted the CEDAW

(Convention on the Elimination of All Forms of Discrimination Against Women) on 19th December 1979.

With reference to India, the Indian Constitution prohibits discrimination on the basis of sex. Yet, it recognizes that women need special attention. The latter point is brought out by Articles 23 and 42. Article 23 prohibits traffic in human beings. By implication, this means that women, children, etc. cannot be disposed of for immoral purposes. Article 42 lays down that the State shall make provision for securing just and humane conditions of work and maternity relief. The Directive Principles of State Policy recognise the right to Maternity benefits in Article 42 of the Constitution. The Indian Parliament passed the Maternity Benefits Act in 1961. The Maternity Benefits Act aims to regulate the employment of women employees in certain establishments for certain periods before and after child birth and provides for maternity and certain benefits. The Domestic violence Act, 2005 provide protection to the wife or female live - in partner from domestic violence at the hands of the husband or male live-in partner or his relatives. Domestic violence under the Act includes actual abuse or the threat of abuse whether physical, sexual, verbal, emotional or economic. Harassment by way of unlawful dowry demands to the woman or her relatives would also be covered under this definition.

Among other things, Articles 14, 15, 16 and 39 guarantee equality among the sexes.

- Art.14 lays down equality before the law and equal protection of the law.
- Art.15 prohibits discrimination against any citizen on grounds of religion, race, sex, etc.
- Art.16 guarantees equality of opportunity in matters of public employment. It says that no citizen shall be discriminated against on ground of religion, race, caste, sex, etc.
- Art. 39 guarantees equal pay for equal work for both men and women.

3.5 LAWS PROTECTING CHILDREN'S RIGHT

The children of our country are the most underprivileged in our society. The poverty in our country is of such great magnitude that children from underprivileged section of the society are forced to work resulting in child labour. According to National Sample Survey, the number of child workers have increased manifold in the society. Further the condition in which a child is forced to work is no better than that of slavery. The government of India have enacted the following thirteen Acts to provide legal protection to all children.

1. The Child Marriage Restraints Act, 1929.
2. The Children Act, 1933.
3. The Employment of Children Act, 1938.
4. The Minimum Wages Act, 1948.
5. The Factories Act, 1951.
6.. The Plantation Labour Act, 1951.
7. The Indian Factories Act and Mines Act, 1952.
8. The Merchant Shipping Act, 1958.
9. The Apprentices Act, 1961.
10. The Atomic Energy Act, 1962.
11. The Beedi and Cigar Workers (Condition of Employment) Act, 1966.
12. The Shops and Establishments Acts, 1969 (Statewise)
13. The Child Labour (Prohibition and Regulations) Act, 1986.

Of these, the 1986 law is the most important one, wherein the Act lists occupations and processes in which employment of children is prohibited. Few of the hazardous occupations where a child cannot be employed are as domestic servants, workers in dhabas, restaurants, hotels, motels, teashops, resorts, spas or other recreational centres. Further the working hours for a child to work is also specified. It states that a child can work to six hours, including an interval of at least one hour and chidren are not permitted to work between 7 p.m. to 8 p.m.

3.6 THE RIGHTS OF SCHEDULED CASTES (SC) AND SCHEDULED TRIBES (ST)

Definition of Scheduled Castes and Scheduled Tribes

It means those castes and tribes which have been declared by the President's order as being Scheduled Castes and Scheduled Tribes. Untouchable castes, as they were earlier called are declared as 'Scheduled Castes'. Groups of people who have been primarily living in forests are declared as 'Scheduled tribes'. The constitution declares in several Articles that these sections should

be provided with special protection and special privileges. The aim of such provisions is to put an end to the hardship caused to them due to discrimination and exploitation.

Several laws have been passed by the Parliament and State legislatures to protect the rights of the Scheduled Castes and the Scheduled Tribes.

- Article 17 of the Constitution abolishes untouchability and declares it as punishable by law. Since the age old custom continued even after independence, the Parliament made a more stringent law in 1989 which is called The Scheduled Castes and Scheduled Tribes(Prevention of Atrocities) Act.

- As per Clause (4) of Article 15 permit's the State to make special provisions for the advancement of the Scheduled Castes, Scheduled Tribes and other Backward Classes in educational and technical institutions.

- Reservations in Public services in made by Article 16(4) for posts or appointments in favour of any backward class of citizens which is not adequately represented in the Services under the State. However, if there is only one post in a cadre, reservation cannot be made.

- Reservation of seats in Lok Sabha and State Assemblies is made vide Articles 330, 332 and 334 of the Constitution of India.

- Special laws are made to protect the tribal land which forbids the sale or transfer of land to non-tribals.

- Special provisions are laid down in the Fifth and Sixth Schedules of the Constitution. The Fifth schedule empowers the Governor to enact special legislation for protecting the Scheduled Tribes from exploitation by moneylenders, regulating allotment of land and prohibiting or restricting the transfer of land in the Scheduled Areas. The Sixth Schedule deals with the administration of Tribal areas in Assam, Meghalaya and Mizoram.

3.7 SUMMARY

The Fundamental Rights enshrined in Part III are protective, though they may be positively or negatively worded. Several protective laws are made to take care of the weaker sections of the society. Women, children, Scheduled Castes and Scheduled Tribes are covered under protective laws. In fact these laws have played an important role in empowering the weaker sections of the society

and bringing them into mainstream. The judiciary too have taken care to see that judgements delivered by them should be in favor of the weaker section.

3.8 UNIT END QUESTIONS

1. State how the Fundamental Rights and unenumerated rights are protective.

2. State the Constitutional provisions made for the protection of women.

3 Enumerate the rights made by the Constitution for the protection of children.

4. State the protective rights made for the Scheduled Castes and Scheduled Tribes.

4

REPRESSIVE LAWS

Unit structures

4.0 OBJECTIVES

After reading this unit you will be able to-

- Understand the relationship between environment & community health
- The various types of diseases.
- Recognize some of the symptoms of diseases

4.1 INTRODUCTION

India has the lengthiest constitution in the world, with a section on fundamental rights. It has supreme courts which has made some landmark decisions in the protection of rights, which have been admired by the other jurists of the world

In any democratic setup of society human freedom is given utmost importance but sometimes this freedom is curtailed of .Their rights are taken away by the so-called protector of the laws. Framers of the Indian Constitution included provision for preventive detention. History has shown that government has used repressive powers and legislations to maintain its rule. Some laws are really oppressive. They are termed as Black laws or repressive laws, because law itself violates the human rights.

One of the first such law was the Madras Suppression of Disturbance Act 1948, that authorized the use of military violence against the peasants in Telangana, During the time 1947-1948 under the guise of fighting communalism and in the name of upholding public order other laws were passed like Punjab Disturbed Areas Act, Bihar Maintenance of Public order act, Bombay Public Safety. These laws have given power to the security forces detaining and arresting anyone. The provision for preventive

detention Act is made to tackle the emergency situation caused by war, external aggression and sometimes internal disturbance. The rise of the Naxalite (Left wing extremists) movement prompted the West Bengal Government to pass the West Bengal (Prevention) of Violent Activities Act 1970. These laws are misused by the authorities.

Today the problem of terrorism is creating an alarming situation. It has to be tackled efficiently for which strict laws are required. The Terrorist & Disruptive Activities (Prevention) Act (POTA), 2002, are the acts which may be regarded as anti-terrorism laws.

4.2 PREVENTIVE DETENTION ACT, 1950

The Preventive Detention Act was passed in 1950. It was meant only for one year, but it was renewed every year & expired on December 31, 1969.

Main Features of this act are as follows:-

a. Preventive detention in permissible for a period of less than two months.
b. The period of Preventive detention can be extended with the approval of the Advisory Board.
c. Before detaining the person, the authority should clarify that the detainee in likely to endanger the maintenance of public order.

Under this Act- preventive detention were to be referred to an Advisory Board, within thirty days term the date of detention placing before it the ground of detention, the representation made by detainue etc.

4.3 MISA & COFEPOSA

MISA- (Maintenance of Internal Security Act, 1971) – Parliament passed a new Act, called the Maintenance of Internal Security Act known as MISA in 1971. This Act empowered the Union & the State Governments to detain without trial any person, so as to prevent him from doing anything that will endanger the security of India or defence of India or the relation of India with foreign powers. A person could be detained under MISA, for minimum period of one year, again after expiration of this period new detention order can be issued.

During the period of national Emergency (1975-1977), MISA was used ruthlessly; thousands of people have been arbitrarily arrested. Some notable political leaders like Lalu Prasad Yadav, L.K. Advani, Atal Bihari Vajpayee, and Chandra Shekhar were imprisoned under MISA. Finally in April 1978, the MISA was repealed by the Parliament, the 42nd amendment Act of 1978 removed MISA.

COFEPOSA – Conservation of Foreign Exchange & Prevention of Smuggling Activities Act, 1974.

This act aimed at anti-social activities such as smuggling, racketing in foreign exchange etc. (FERA) - Foreign Exchange Regulation Act 1974 & (COFEPOSA)-Conservation of Foreign Exchange & Prevention of Smuggling Activities Act 1974 – both acts provided for preventive detention.

4.4 ARMED FORCES (SPECIAL POWERS) ACT 1958 (AFSPA) :

The Armed forces (Special Powers) Act 1958 was passed on September, 11 1958 by the Parliament of India. It is considered as the most repressive legislation in the history of India's Parliament. In the beginning the Armed forces (Assam & Manipur) special Powers Ordinance , 1958- empowered the Governor of Assam & the chief Commission of Manipur to declare the whole or any part of Assam or the Union Territory of Manipur, as the case may be to be a disturbed area. It was amended in 1972 to extend to all the seven states in the north eastern region of India-viz. Assam, Manipur, Tripura, Meghalaya, Arunachal Pradesh, Mizoram & Nagaland. Now it applies to Jammu & Kashmir.

The enforcement of the AFSPA has resulted in also innumerable incidents of arbitrary detention, torture, rape & looting by security personnel. The following sections will help us to understand AFSPA

- Section-4 of the Act states about the powers granted to commissioned officer only. Jawan does not have these powers. Section 4(a) states that officer can fire upon or otherwise use force, even to causing death against any person who is acting in contravention of any law or order for the time being enforced in the disturbed area.
  - Prohibiting the assembly of five or more persons
  - The carrying of weapons or of things capable of being used as means or of fire arm, ammunition or explosive substances.

- The army can destroy property under section 4(b) if it is an arms dump, a fortified position or shelter from where armed attacks are made or are suspected of being made, if the structure is used as training camp or as a hide out by armed gangs or absconders. The armed forces personal can arrest anyone without warrant, & enter or search premises without a warrant.

- Section 5 states that after the military has arrested someone under AFSPA, they must hand over the person to the nearest police station.

- Section 6 - of this act gives special privileges for the army personal, in the sense that it states no legal proceeding can be brought against any member of the armed forces acting under the AFSPA without the permission of the Central Government. This provision rather reduces the accountability of the armed personal and the

Check your progress

Q.1 The first repressive law passed in India was the ……..
Q.2 A person could be detained under MISA, for minimum period of ……..year
Q.3 The Armed forces (Special Powers) Act was passed on ……..
Q.4 What were the main provision of the Preventive Detention Act, 1950?
Q.5 When was MISA repealed and by which act?

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4.5 NATIONAL SECURITY ACT, 1980

Like the preventive detention act of 1950 & the MISA, the national security act is also about the preventive detention. This is extended to the whole of India except Jammu & Kashmir.

This act empowers the central Government or the State Government to undertake preventive detention of certain person:

- If satisfied from preventing any person from acting in any manner prejudicial to the defense of India, the relation of India with foreign powers or the security of India or

- If satisfied with respect to any foreigner with a view to regulating his continued presence in India or with a view to making arrangements for his expulsions from India.

- It is necessary so to make an order directing that such person be detained.
- As per the section 3 both the Central and State Government can issue detention order for the Security of India or for the security of a state.

- Section 3(3) states that period of detention shall not exceed 3 months. However detention can be extended but again it shall not be more than 3 months at a time.

Whenever State Government issues the detention order it shall report the fact of detention to the Central Government within 7 days. They also have to report the grounds on which the order has been made and also other details with regard to the necessity for the order.

The detaining authority (Officer) is obliged to communicate to detune, the grounds of the preventive detention as soon as possible, but ordinarily not later than 5 days. However in exceptional cases this period can be exceeded but not later than 15 days and in this situation the officer is required to record reasons for exceeding the limitation of 5 days.

4. Execution of detention orders. A detention order may be executed at any place in India in the manner provided for the execution of warrants of arrest under the Code of Criminal Procedure, 1973 (2 of 1974).

5. Power to regulate place and conditions of detention. Every person in respect of whom a detention order has been made shall be liable-- (a) to be detained in such place and under such conditions, including conditions as to maintenance, discipline and punishment for breaches of discipline, as the appropriate Government may, by general or special order, specify; and (b) to be removed from one place of detention to another place of detention, whether within the same State or in another State, by order of the appropriate Government: Provided that no order shall be made by a State Government under clause (b) for the removal of a person from one State to another State except with the consent of the Government of that other State.

7. Powers in relation to absconding persons. (1) If the Central Government or the State Government or an officer mentioned in sub- section (3) of section 3, as the case may be, has reason to believe that a person in respect of whom a detention order has been made has absconded or is concealing himself so that the order cannot be executed, that Government or officer may-- (a) make a report in writing of the fact to a Metropolitan Magistrate or a Judicial Magistrate of the first class having jurisdiction in the place

where the said person ordinarily resides; (b) by order notified in the Official Gazette direct the said person to appear before such officer, at such place and within such period as may be specified in the order.

Once a report under Section 7(1)(a) has been made. Several provisions of the Criminal Procedure shall apply in respect of such person and his property, (3) If any person fails to comply with an order issued under clause (b) of sub-section (1), he shall, unless he has suitable explanation for non compliance and that he had, within the period specified in the order, informed the officer mentioned in the order of the reason which rendered compliance therewith impossible and of his whereabouts, be punishable with imprisonment for a term which may extend to one year, or with fine, or with both.

(4) Notwithstanding anything contained in the Code of Criminal Procedure, 1973 (2 of 1974), every offence under sub-section (3) shall be cognizable. Grounds of order of detention to be disclosed to persons affected by the order section 8. affected by the order.
(1) When a person is detained in pursuance of a detention order, the authority making the order shall, as soon as may be, but ordinarily not later than five days and in exceptional circumstances and for reasons to be recorded in writing, not later than ten days from the date of detention, communicate to him the grounds on which the order has been made and shall afford him the earliest opportunity of making a representation against the order to the appropriate Government.

(2) Nothing in sub-section (1) shall require the authority to disclose facts which it considers to be against the public interest to disclose.
Constitution of Advisory Boards. (Sec. 9)

The Central Government and each State Government shall, whenever necessary, constitute one or more Advisory Boards for the purposes of this Act.

(2) Every such Board shall consist of three persons who are, or have been, or are qualified to be appointed as, Judges of a High Court

Reference to Advisory Boards. Sec, 10, the appropriate Government shall, within three weeks from the date of detention of a person under the order, place before the Advisory Board constituted by it under section 9, the grounds on which the order has been made and the representation, if any, made by the person affected by the order, and in case where the order has been made by an officer mentioned in sub-section (3) of section 3, also the report by such officer under sub-section (4) of that section.

Sec 11 deals with the role of Advisory board, the Advisory board review the case placed before them and after hearing the concerned person makes a report to the appropriate Government within six weeks of detention of concerned person.

Action upon the report of the Advisory Board .Sec 12
(1) In any case where the Advisory Board has reported that there is, in its opinion, sufficient cause for the detention of a person, the appropriate Government may confirm the detention order and continue the detention of the person concerned for such period as it thinks fit.

(2) In any case where the Advisory Board has reported that there is, in its opinion, no sufficient cause for the detention of a person, the appropriate Government shall revoke the detention order and cause the person concerned to be released forthwith.

Maximum period of detention. Sec13.
The maximum period for which any person may be detained in pursuance of any detention order which has been confirmed under section 12 shall be twelve months from the date of detention: provided that nothing contained in this section shall affect the power of the appropriate Government to revoke or modify the detention order at any earlier time.

Protection of Action Taken in Good Faith-Sec-16
This section provides protection to the concerned authority which took action in good faith. No suit or other legal proceeding shall be against the Central or State Government or any person for anything done or intended to be done in pursuance of this Act. Also , no compensation is provided for anyone who happened to be wrongly victimized under the Act.

4.6 TERRORIST AND DISRUPTIVE ACTIVITIES (PREVENTION) ACT

The **Terrorist and Disruptive Activities (Prevention) Act**, commonly known as **TADA**, was a law active between 1985 and 1995 (modified in 1987) for the prevention of terrorist activities in Punjab. The TADA was meant to be a temporary provision with a life of two years but it was extended every year .It was renewed in 1989, 1991 and 1993 before being allowed to lapse in 1995 due to increasing unpopularity. This act was the first and the only legislative effort by the Union Government to define and counter terrorist activities. The Act's third paragraph gives a very thorough definition of "terrorism":

"Whoever with intent to overawe the Government as by law established or to strike terror in the people or any section of the people or to alienate any section of the people or to adversely affect

the harmony amongst different sections of the people does any act or thing by using bombs, dynamite or other explosive substances or inflammable substances or lethal weapons or poisons or noxious gases or other chemicals or by any other substances (whether biological or otherwise) of a hazardous nature in such a manner as to cause, or as is likely to cause, death of, or injuries to, any person or persons or loss of, or damage to, or destruction of, property or disruption of any supplies or services essential to the life of the community, or detains any person and threatens to kill or injure such person in order to compel the Government or any other person to do or abstain from doing any act, commits a terrorist act."
The Act established special courts or “designated courts” to try those arrested for terrorist acts and disruptive activities. It conferred broad discretion upon the authorities to arrest persons and to try them. A special court known as TADA court was set up to hear the cases and deliver judgements pertaining to 1993 Bombay bombings.

TADA is not a preventive detention but it is a substantive criminal law. The main difference between TADA and ordinary law is that under ordinary law a detainee may be held in police custody for a maximum period of 15 days before being transferred to judicial custody whereas under TADA this period is up to 60 days. The TADA has curtailed the provision of anticipatory bail contained in Section 438 of the Criminal Procedure Code

It extends to the whole of India, and it applies also, -

a. to citizens of India outside India;
b. to persons in the service of the Government, wherever they may be; and
c. to persons on ships and aircraft registered in India, wherever they may be.

The main provisions of the TADA are as follows.
Whoever commits a terrorist act, shall, -

(i) if such act has resulted in the death of any person, be punishable with death or imprisonment for life and shall also be liable to fine;

(ii) in any other case, be punishable with imprisonment for a term which shall not be less than five years but which may extend to imprisonment for life and shall also be liable to fine.

Whoever conspires or attempts to commit, or advocates, abets, advises or incites or knowingly facilitates the commission of, a terrorist act or any act preparatory to a terrorist act, shall be punishable with imprisonment for a term which shall not be less than five years but which may extend to imprisonment for life and shall also be liable to fine.

Section 4 Punishment for disruptive activities**. -** Whoever commits or conspires or attempts to commit or abets, advocates, advises, or knowingly facilitates the commission of, any disruptive activity or any act preparatory to a disruptive activity shall be punishable with imprisonment for a term which shall not be less than five years but which may extend to imprisonment for life and shall also be liable to fine.

Section 5- Possession of certain unauthorised arms, etc. in specified areas – Where any person is in possession of any arms and ammunition specified in Columns 2 and 3 of Category I or Category III (a) of Schedule I to the Arms Rules, 1962, or bombs, dynamite or other explosive substances unauthorisedly in a notified area, he shall, notwithstanding anything contained in any other law for the time being in force, be punishable with imprisonment for a term which shall not be less than five years but which may extend to imprisonment for life and shall also be liable to fine.

Where any shares in a company stand forfeited to the Government under this sub-section, then, the company shall, notwithstanding anything contained in the Companies Act, 1956, or the articles of association the company, forthwith register the Government as the transferee of such shares.

Where a person has been convicted to any offence punishable under this Act or any rule made there under, the Designated Court may, in addition to awarding any punishment, by order in writing, declare that any property, movable or immovable or both, belonging to the accused and specified in the order, shall stand forfeited to the Government free from all encumbrances.

Section 15 of the article states that confession made by a person before a police officer not below the rank of Superintendent of Police is considered as admissible evidence.

The legislation was ultimately succeeded by the controversial Prevention of Terrorist Activities Act (2002-04). The majority of those detained under TADA were released on bail on the orders of the Supreme Court and cases were reviewed by the "Review Committees" which often recommended release. According to official figures, as of December 1999 TADA charges against almost 24,000 people had been dropped as a result of such reviews.

Although TADA lapsed in May 1995 after immense international pressure from the organs of the United Nations and non-governmental organisations, it has been given retroactive effect and people are still being charged and held according to its provisions. People in Punjab and other States of India continue to be charged under TADA retrospectively and continue to be harassed under it. In addition, the position is that those wanted in connection with

offences committed whilst TADA was in operation are subject to its provisions.

4.7 THE PREVENTION OF TERRORIST ACTIVITIES ACT (POTA)

POTA was an anti-terrorism legislation enacted by the Parliament of India in 2002. The act replaced the Prevention of Terrorism Ordinance (POTO) of 2001 and the Terrorist and Disruptive Activities (Prevention) Act (1985-95) and was supported by the governing National Democratic Alliance.

The act provided the legal framework to strengthen administrative rights to fight terrorism within the country of India and was to be applied against any persons and acts covered by the provisions within the act. It was not meant as a substitute for action under ordinary criminal laws.

The act defined what a terrorist act and a terrorist is and grants special powers to the investigating authorities described under the act. To ensure certain powers were not misused and human rights violations would not take place, specific safeguards were built into the act. The prominent of them are:

- Investigation of an accused can be done by an officer of the rank of Deputy Superintendent of police or higher.
- Confessions made to the police must be recorded within 48 hours before a magistrate, who will send the accused for a medical examination if there is a complaint of torture.

Under the new law detention of a suspect for up to 180 days without the filing of charges in court was permitted. It also allowed law enforcement agencies to withhold the identities of witnesses and treat a confession made to the police as an admission of guilt. Under regular Indian law, a person can deny such confessions in court, but not under POTA.

The act was repealed in 2004 by the United Progressive Alliance coalition

Prominent POTA cases

- Vaiko, a prominent Tamil politician, was controversially arrested under the POTA for his support to the Liberation Tigers of Tamil Eelam.
- After the Mumbai Blasts of August 2003, three suspects were arrested under the POTA act.[1]. The act was repealed the following year in 2004. In July 2006, a series of train bombings occurred in Mumbai. In late November 2008, Mumbai was hit with the worst terrorist attack in recent Indian

history. This has led some people to question the wisdom of repealing POTA, as there has been an escalation of terrorist attacks of worsening magnitudes.

S.A.R. Geelani, a lecturer at Delhi University, was sentenced to death by a special POTA court for his alleged role in the 2001 attack on the Indian Parliament. He was later acquitted on appeal by the Delhi Bench of the High Court on a legal technicality.

Syed Ali Shah Geelani, the leader of the Jamaat-e-Islami group, arrested under POTA.

Raghuraj Pratap Singh, a.k.a Raja Bhaiya, a mobster and Member of the Legislative Assembly of Kunda, India was arrested on the orders of then Chief Minister, Mayawati Kumari. He was sent to jail under POTA.

Check your progress

Q. 1 National Security Act, 1980 is extended to the whole of India except …….

Q.2 According to the National Security Act, 1980 the maximum period for which any person may be detained in pursuance of any detention order shall be …….

Q. 3 Under the POTA investigation of an accused can be done by an officer of the rank of …….

Q.4 When was the Armed forces (Special Powers) Act Passed?

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4.8 SUMMARY

Our Parliament has enacted several protective laws. However it has also passed such laws which violates the human rights. These laws are called as black laws. But our country is not the only exception. The developed countries including U.S.A and Britain have a past in terms of human violations. The main laws which have been discussed in this chapter are Preventive Detention Act, 1950, MISA & COFEPOSA, Armed Forces (Special Powers) Act 1958 (AFSPA), National Security Act, 1980, Terrorist and Disruptive Activities (Prevention) Act.

The Preventive Detention Act was passed in 1950. Under this Act- preventive detention were to be referred to an Advisory Board, within thirty days term the date of detention placing before it the ground of detention, the representation made by detainue etc.

During the period of national Emergency (1975-1977), MISA was

used ruthlessly. This Act empowered the Union & the State Governments to detain without trial any person, so as to prevent him from doing anything that will endanger the security of India or defense of India or the relation of India with foreign powers.

The Armed forces (Special Powers) Act 1958 was passed on September, 11 1958 by the Parliament of India. It is considered as the most repressive legislation in the history of India's Parliament. The enforcement of the AFSPA has resulted in also innumerable incidents of arbitrary detention, torture, rape & looting by security personnel.

Like the preventive detention act of 1950 & the MISA, the national security act is also about the preventive detention. It is necessary so to do make an order directing that such person be detained

The Terrorist and Disruptive Activities (Prevention) Act, commonly known as TADA, was a law active between 1985 and 1995 (modified in 1987) for the prevention of terrorist activities in Punjab. TADA is not a preventive detention but it is a substantive criminal law. The Act established special courts or "designated courts" to try those arrested for terrorist acts and disruptive activities. The Act's third paragraph gives a very thorough definition of "terrorism".

Prevention of Terrorist Activities Act (POTA) was an anti-terrorism legislation enacted by the Parliament of India in 2002 It was not meant as a substitute for action under ordinary criminal laws. The act defined what a terrorist act and a terrorist is and grants special powers to the investigating authorities described under the act. To ensure certain powers were not misused and human rights violations would not take place, specific safeguards were built into the act. The act was repealed in 2004 by the United Progressive Alliance coalition.

4.9 UNIT END QUESTIONS

1. Bring out the main provisions of the Armed Forces Special Powers Act. Give an assessment of this act in the context of Indian and International laws.
2. Explain the main features of the National Security Act.
3. Describe briefly 'TADA' as a repressive law.
4. Write short notes on:

a. POTA 2002
b. Armed Forces Special Powers Act1958
c. The National Security Act 1980

5

PROTECTION AND PROMOTION OF HUMAN RIGHTS IN INDIA.

Unit structure

5.0. OBJECTIVES

After studying this lesson you will get the information about:

- The various commissions that are working for the protection of human rights.
- Powers and functioning of these commissions
- The provision for safeguarding the rights of scheduled castes and scheduled tribes
- The commissions working for protecting the rights of women

5.1 INTRODUCTION

Being human we are entitled to certain rights which are called as human rights. These rights belong to everyone irrespective of one's cast, class, race, age, gender, religion etc. In democratic societies fundamental human rights and freedom are put under the guarantee of law and therefore, their protection becomes an obligation of government authorities. It is the responsibility of every state that the people living there should be able to enjoy their freedom, they should not be deprived of their basic human rights These rights are broadly classified into civil and political rights on the one hand and economic, social and cultural rights on the other. If these rights are protected then only the progress and development will become possible. All these human rights are meaningless if they are not protected. There protection requires certain mechanism which will promote these rights. In this chapter we are going to study the prescribed mechanism for protection and promotion of human rights in India. For this purpose various commissions have been established in our country which we are going to study. According to Justice T.K Thommen, the National Human Rights Commission was meant to highlight the pressing

problem that endangers human rights. Its main function is to be the watchdog of human rights.

The object of both sets of rights is, to make an individual an effective participant in the affairs of the society. Universal Declaration of Human Rights adopted by the General Assembly on 10th December, 1948, was followed by two Covenants – International Convention on Economic, Social and Cultural Rights (ICESCR) and International Convention on Civil and Political Rights (ICCPR) in 1966. India signed both these International Conventions in 1979.

5.2 NATIONAL HUMAN RIGHTS COMMISSION-NHRC

The National Human Rights Commission was established on 12th October, 1993 under the legislative mandate of the Protection of Human Rights Act, 1993. This act also recommended for the setting up of State Human Right Commission at State level and Human Right courts along with NHRC.

Constitution of a National Human Rights Commission
The Commission consists of

- Chairperson, who has been a Chief Justice of India.;
- One member who is or has been, a Judge of Supreme Court;
- One member who, is or has been, the Chief Justice of High Court;
- Two members being from among people having the knowledge of human right and have practical experience
- The chairperson of the National Commission for minorities, the National Commission for Scheduled Castes and Scheduled Tribes and the National Commission for Women shall be deemed to be members of the commission for the discharge of functions specified in clauses (b) to (j) of section 12

All these appointments are made by the President after getting the recommendation from a committee which is headed by the Prime Minister.

The terms and condition meant for all the members
1. A member who is appointed as chairman will cease to be a member after the period of five years from the date of his appointment or the attainment of the age of 75 years of age whichever is earlier.
2. A member after the completion of five years can be reappointed again unless and until he is less than 75 years of age.
3. When a person is not reappointed as a member he/she will not be eligible to be employed for any post under the central

govt. or the state govt.

Action against chairman/Member

1. Any member or chairman can be removed only after the order of president in conditions such as misbehavior or incompetence, only after reference is made to the Supreme Court. There are some further conditions on which the chairman/ member can be removed.

- if it is found that they are insolvent.
- Engaged in an office as a paid employee
- Not able to do his work because of infirmity of mind or body.
- He/she is a person of unsound mind.
- If any one is convinced and sentenced for any offence that involves moral turpitude.

Procedure adopted and regulated by the commission

a) The chairman shall decide the venue and date of the meetings.
b) The commission is free to adopt its own procedures.'

All the decisions of the commission in all events will be authorized by the Secretary general or any other officer of the chairperson

Functions of the commission

The commission will perform all or any of the following functions under Sec. 12 of the act namely

Enquiry: the commission shall inquire, suo motu or on a petition presented to it by a victim or any person on his behalf

The commission may intervene in any proceeding involving any allegation of violation of human rights pending before a court.

The Commission is allowed to visit any jail or other institution under the control of the State Government, where persons are detained or lodged for purposes of treatment, reformation or protection, for the study of the living conditions of the inmates and make recommendations

The commission may review the safeguards provided by or under the Constitution or any law for the time being in force for the protection of human rights and recommend measures for their effective implementation

The Commission shall review the factors, including acts of terrorism that inhibit the enjoyment of human rights and recommend appropriate remedial measures

The Commission shall study treaties and other international instruments on human rights and make recommendations for their effective implementation

The Commission shall undertake and promote research in the field of human rights

The Commission shall spread literacy among various sections of society and promote awareness of the safeguards available

for the protection of these rights through publications, the media, seminars and other available means

The Commission shall encourage the efforts of NGOs and institutions working in the field of human rights

The commission may perform any such other functions as it may consider necessary for the protection of human rights.

Powers of NHRC

(1) The Commission shall, while inquiring into complaints under this Act, have all the powers of a civil court trying a suit under the Code of Civil Procedure, 1908, and in particular in respect of the following matters, namely :

(a) Summoning and enforcing the attendance of witnesses and examining them on oath;
(b) Discovery and production of any document;
(c) Receiving evidence on affidavits;
(d) Requisitioning any public record or copy thereof from any court or office;
(e) Issuing commissions for the examination of witnesses or documents;
(f) Any other matter which may be prescribed.

(2) The Commission shall have power to require any person, subject to any privilege which may be claimed by that person under any law for the time being in force, to furnish information on such points or matters as, in the opinion of the Commission, may be useful for, or relevant to, the subject matter of the inquiry and any person so required shall be deemed to be legally bound to furnish such information within the meaning of section 176 and section 177 of the Indian Penal Code.

(3) The Commission or any other officer, not below the rank of a Gazetted Officer, specially authorised in this behalf by the Commission may enter any building or place where the Commission has reason to believe that any document relating to the subject matter of the inquiry may be found, and may seize any such document or take extracts or copies there from subject to the provisions of section 100 of the Code of Criminal Procedure, 1973, in so far as it may be applicable.

(4) The Commission shall be deemed to be a civil court and when any offence as is described in section 175, section 178, section 179, section 180 or section 228 of the Indian Penal Code is committed in the view or presence of the Commission, the Commission may, after recording the facts constituting the offence and the statement of the accused as provided for in the Code of Criminal Procedure, 1973, forward the case to a Magistrate having jurisdiction to try the same and the Magistrate to whom any such case is forwarded shall proceed to hear the complaint against the

accused as if the case has been forwarded to him under section 346 of the Code of Criminal Procedure, 1973.

(5) Every proceeding before the Commission shall be deemed to be a judicial proceeding within the meaning of sections 193 and 228, and for the purposes of section 196, of the Indian Penal Code, and the Commission shall be deemed to be a civil court for all the purposes of section 195 and Chapter XXVI of the Code of Criminal Procedure, 1973.

(6) Where the Commission considers it necessary or expedient so to do, it may, by order, transfer any complaint filed or pending before it to the State Commission of the State from which the complaint arises, for disposal in accordance with the provisions of this Act; Provided that no such complaint shall be transferred unless the same is one respecting which the State Commission has jurisdiction to entertain the same.

(7) Every complaint transferred under sub-section (6) shall be dealt with and disposed of by the State Commission as if it were a complaint initially filed before it.

Procedure for the enquiry

The Commission while inquiring into the complaints of violations of human rights may–

(i) call for information or report from the Central Government or any State Government or any other authority or organisation subordinate thereto within such time as may be specified by it:-
Provided that–

(a) if the information or report is not received within the time stipulated by the Commission, it may proceed to inquire into the complaint on its own;

(b) if, on receipt of information or report, the Commission is satisfied either that no further inquiry is required or that the required action has been initiated or taken by the concerned Government or authority, it may not proceed with the complaint and inform the complainant accordingly;

(ii) without prejudice to anything contained in clause (i), if it considers necessary, having regard to the nature of the complaint, initiate an inquiry.

Annual and special reports of the Commission

(1) The Commission shall submit an annual report to the Central Government and to the State Government concerned and may at

any time submit special reports on any matter which, in its opinion, is of such urgency or importance that it should not be deferred till submission of the annual report.

(2) The Central Government and the State Government, as the case may be, shall cause the annual and special reports of the Commission to be laid before each House of Parliament or the State Legislature respectively, as the case may be, along with a memorandum of action taken or proposed to be taken on the recommendations of the Commission and the reasons for non-acceptance of the recommendations, if any.

According to G..P.Joshi there has been a definite increase in the number of complaints received by the Commission. From 6,987 in 1994-95, the number increased to 10,195 in 1995-96 and to 20,514 complaints in 1996-97. The Commission feels happy on this account, as it signifies, according to the Commission, an increase in awareness of human rights and a "reflection of the increasing confidence of people in the Commission.

The following data shows that there is great disparity in the cases registered and the cases disposed by the commission

According to the database of The National Human Rights Institution Forum Number of cases registered by the Commission:
2000-2001: 71.555
2001-2002: 69.083
2002-2003: 68.779
Number of cases disposed of by the Commission
2000-2001: 44.383
2001-2002: 50.108
2002-2003: 82.231

Over the past fifteen years the Commission has endeavoured to give a positive meaning and a content to the objectives set out in the Protection of Human Rights Act, 1993. It has moved vigorously and effectively to use the opportunities provided to it by the Act to promote and protect human rights in the country. However the commission faces some difficulties. Some of them are there is insufficient workforce, the commission doesn’t have full-fledged investigative machinery and there is heavy backlog of cases.

5.3 STATE HUMAN RIGHTS COMMISSION –SHRC

As mentioned earlier the Protection of Human Rights Act, 1993 recommends the constitution of National Human Rights Commission along with State Human Rights Commission in States for better protection of human rights.

Constitution of State Human Rights Commissions

(1) A State Government may constitute a body to be known as them (name of the State) Human Rights Commission (e.g. Maharashtra Human rights Commission) to exercise the powers conferred upon, and to perform the functions assigned to, a State Commission under this chapter.

(2) The State Commission shall, with effect from such date as the State Government may by notification specify, consist of—
(a) A Chairperson who has been a Chief Justice of a High Court;
(b) one Member who is, or has been, a Judge of a High Court or District Judge in the State with a minimum of seven years experience as District Judge;
(c) one Member to be appointed from amongst persons having knowledge of, or practical experience in, matters relating to human rights.

(3) There shall be a Secretary who shall be the Chief Executive Officer of the State Commission and shall exercise such powers and discharge such functions of the State Commission as it may delegate to him.

(4) The headquarters of the State Commission shall be at such place as the State Government may, by notification, specify.

(5) A State Commission may inquire into violation of human rights only in respect of matters relatable to any of the entries enumerated in List II and List lll in the Seventh Schedule to the Constitution: Provided that if any such matter is already being inquired into by the commission or any other Commission duly constituted under any law for the time being in force, the State Commission shall not inquire into the said matter:
Provided further that in relation to the Jammu and Kashmir Human Rights Commission, this sub-section shall have effect as if for the words and figures “List ll and List lll in the Seventh Schedule to the Constitution”, the words and figures “List lll in the Seventh Schedule to the Constitution as applicable to the State of Jammu and Kashmir and in respect of matters in relation to which the Legislature of that State has power to make laws” had been substituted.

(6) Two or more State Governments may, with the consent of a Chairperson or Member of a State Commission, appoint such Chairperson or, as the case may be, such Member of another State Commission simultaneously if such Chairperson or Member consents to such appointment:

Provided that every appointment made under this sub-section shall be made after obtaining the recommendations of the Committee

referred to in sub-section(1) of section 22 in respect of the State for which a common Chairperson or Member, or both, as the case may be, is to be appointed.

Appointment of Chairperson and Members of State Commission

(1) The Chairperson and Members shall be appointed by the Governor by warrant under his hand and seal:

Provided that every appointment under this sub-section shall be made after obtaining the recommendation of a Committee consisting of

(a) The Chief Minister — Chairperson
(b) Speaker of the Legislative Assembly — Member
(c) Home Minister of the State
(d) Leader of the opposition in the Legislative Assembly

Term of office of Chairperson and Members of the State Commission

(1) A person appointed as Chairperson shall hold office for a term of five years from the date on which he enters upon his office or until he attains the age of seventy years, whichever is earlier;

(2) A person appointed as a Member shall hold office for a term of five years from the date on which he enters upon his office and shall be eligible for re-appointment for another term of five years; Provided that no Member shall hold office after he has attained the age of seventy years.

(3) On ceasing to hold office, a Chairperson or a Member shall be ineligible for further employment under the Government of a State or under the Government of India.

Functions and powers of the SHRC

The functions and powers of the state commission are similar to those of National Human Rights Commission. The only difference is that the State commission cannot make a study of treaties. The state commission is empowered to study only those cases which are related to their particular state only. If a matter is with the State Commission then NHRC shall not deal with these matters.

The present state commissions

So far 18 states have set up their respective State Human Rights Commissions. These are: Jammu & Kashmir, Andhra Pradesh, Madhya Pradesh, Tamil Nadu, Chhattisgarh, Assam, Orissa, Kerala, Maharashtra, Punjab, Uttar Pradesh, Gujarat, Himachal Pradesh, Karnataka, Manipur, Rajasthan, West Bengal, Bihar.

Check your progress

1. A State Commission may inquire into violation of human rights only in respect of matters relatable to any of the entries enumerated in List ___ and List ___ in the Seventh Schedule to the Constitution
2. _____ recommends the constitution of National Human Rights Commission along with State Human Rights Commission in States for better protection of human rights.
3. A member of NHRC who is appointed as chairman will cease to be a member after the period of ____ years or the age of ___ years whichever is earlier.
4. List some of the main functions of the NHRC.
5. What is the difference between the functioning of SHRC and NHRC?

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5.4 NATIONAL COMMISSION FOR SCHEDULED CASTES –NCSC

In our country due to some historical reasons i.e. the age old practice of untouchability some of the castes have been deprived of the opportunities for their development, they remained underprivileged and socially and economically backward. For many years these classes were exploited by others. As identified in a schedule to the constitution of India, these classes are known as scheduled castes, dalits or Harijans.

In our constitution certain safeguards are provided for the protection of their some of the rights, following are some of those articles provided for SC's &ST's

Article 15(4) – Educational & cultural safeguard.
Article 16(4) 4A 4B – Reservation in service.
Article 17 – Abolition of untouchability.
Article 19(5) – Prevention of sale or transfer of land of tribal to non-tribal.

Article 23 – Prohibition in human trafficking, forced labour.
Article 24 – Prohibition of child lobour in certain occupation.
Article 25(2)(b) – Throwing open Hindu religious institution.
Article 164(1) – Minister-in-charge of tribal welfare & welfare of schedule castes & backward castes in Bihar, MP & Orissa
Article 243-D – Reservation of seats in Panchayats/Municipality.
Article 330 – Reservation of seats for schedule caste & schedule Tribes in Parliament.
Article 332 - Reservation of seats for state Assemblies.
Articles 333 – Claims of schedule caste & schedule Tribes to services & posts.
Article 338 provided for the Appointment of commissioners for schedule caste & schedule Tribes by President. By the constitution's 65th amendment bill 1990 the commission was replaced with the commission for schedule caste & schedule Tribes commission. Later 89th amendment Act, 2003 separated this commission and now we have

National Commission for Scheduled Caste -NCSC
National Commission for Scheduled Tribes-NCST
Fakirbhai Vaghela was the first Chairperson of this commission.

Duties – Clause (5) Article 338 lays down the duties of the commission

(a) to investigate and monitor all matters relating to the safeguards provided for the Scheduled Castes under this Constitution or under any other law for the time being in force or under any order of the Government and to evaluate the working of such safeguards;

(b) to inquire into specific complaints with respect to the deprivation of rights and safeguards of the Scheduled Castes

(c) to participate and advise on the planning process of socioeconomic development of the Scheduled Castes and to evaluate the progress of their development under the Union and any State;

(d) to present to the President, annually and at such other times as the Commission may deem fit, reports upon the working of those safeguards;

(e) to discharge such other functions in relation to the protection, welfare and development and advancement of the Scheduled Castes as the President may, subject to the provisions of any law made by Parliament, by rule specify.

Powers---clause (8) of article 338 states The Commission shall, while investigating any matter referred to in sub-clause (a) or inquiring into any complaint referred to in sub-clause (b) of clause

(5), have all the powers of a civil court trying a suit and in particular in respect of the following matters, namely:-
(a) summoning and enforcing the attendance of any person from any part of India and examining him on oath;
(b) requiring the discovery and production of any document;
(c) receiving evidence on affidavits;
(d) requisitioning any public record or copy thereof from any court or office;
(e) issuing commissions for the examination of witnesses and documents;
(f) any other matter which the President may, by rule, determine.
338 -(9) states that Union and State government shall consult commission on all major policy matters affecting for schedule castes.

The Headquarters of the Commission is located at New Delhi.

MAIN WINGS –

Atrocities & protection of civil rights.- It deals with matters related to atrocities caused to scheduled castes. Whenever information is received in the commission about any incident of atrocity against a person belonging to Scheduled Castes, the commission would immediately get in touch with the law-enforcing and administrative machinery of the state and the district to ascertain the details of the incident and the action taken by the district administration.

Eco. Social development wing - this wing mainly deals with the plan, schemes of central/state government, some of its work is as follows

Special component plan for schedule castes.

N S C, FDC- (National schedule castes, Finance & development Corporation.)

Representations/complaints regarding grievance by for schedule castes.

Social Research Institute, other research bodies.

Land reforms Act & their implementation.

Education scheme for schedule castes.

NCSC also monitor & evaluate the impact of development schemes for the SC'S. It also conducts state level review meetings.

5.5 NATIONAL COMMISSION FOR SCHEDULED TRIBES –NCST

The National Commission for Scheduled Tribes came into force on 19th February 2004 The **Rules of the National Commission for Scheduled Tribes** were notified on 20 February 2004, by the Ministry of Tribal Affairs **(Annex-IV).** The tenure of Chairperson, Vice-Chairperson and Members of the Commission is three years

from the date of assumption of the charge by each of them. The C.P, V. CP & members shall be appointed from amongst persons of ability, integrity & standing who have had a record of selfless service to the cause of justice for STS. At least one member has to be lady.

The tenure of the first Commission constituted in February, 2004 was over in March, 2007. At present, Smt. Urmila Singh is the Chairperson of the Commission and Shri Tsering Samphel is Member of the Commission. Both of them joined in the month of June, 2007. The posts of Vice-Chairperson and two Members are vacant as on date.

The National Commission for Scheduled Tribes functions from its Headquarters at New Delhi and from the Regional Offices of the Commission located in six States.

There are following Six Units of NCST at the Headquarter which are as follows;
Administration
Coordination unit
Research unit I, II, III, IV

The main functional units are Research Unit-I, Research Unit-II, Research Unit-III, Research Unit-IV, which deal with all matters pertaining to socio-economic and educational development, service safeguards and atrocities in relation to STs as per distribution of the Ministries/ Departments (including CPSEs and other Organisation/ Offices under their administrative control) and the States and UTs among these four Research Units.

There are 6 Regional offices of the National Commission for Scheduled tribes located at Bhopal, Bhubaneshwar, Jaipur, Raipur, Ranchi, & Shillong which work as **'eyes and ears'** of the Commission. They keep a watch on the formulation of policy and issue of guidelines relating to the welfare of Scheduled Tribes in the States/Union territories, and keep the Commission's Headquarters informed about the developments periodically. Policy decisions taken by any State Government/UT Administration affecting the interests of the Scheduled Tribes are brought to the notice of the concerned authorities for necessary action.

FUNCTIONS

The **functions**, duties and power of the National Commission for Scheduled Tribes have been laid down in clauses(5), (8) and (9) of the Article 338A of the Constitution, as amended by Constitution [Eighty-ninth Amendment] Act, 2003. Clause(5) states that it shall be the duty of the Commission:

- to investigate and monitor all matters relating to the

safeguards provided for the Scheduled Tribes under this Constitution or under any other law for the time being in force or under any order of the Government and to evaluate the working of such safeguards.

- to inquire into specific complaints with respect to the deprivation of rights and safeguards of the Scheduled Tribes.

- to participate and advise on the planning process of socio-economic development of the Scheduled Tribes and to evaluate the progress of their development under the Union and any State.

- to present to the President, annually and at such other times as the Commission may deem fit, reports upon the working of those safeguards.

- to make in such reports recommendations as to the measures that should be taken by the Union or any State for the effective implementation of those safeguards and other measures for the protection, welfare and socio-economic development of the Scheduled Tribes

- to discharge such other **functions** in relation to the protection, welfare and development and advancement of the Scheduled Tribes as the President may, subject to the provisions of any law made by Parliament, by rule, specify.

Clause (8) states that the: Commission shall, while investigating any matter referred to in sub- clause (a) or inquiring into any complaint referred to in sub-clause (b) of clause (5), have all the powers of a civil court trying a suit and in particular in respect of the following matters, namely:-summoning and enforcing the attendance of any person from any part of India and examining him on oath.

- requiring the discovery and production of any documents; receiving evidence on affidavits.

- requisitioning any public record or copy thereof from any court or office.

- issuing commissions for the examination of witnesses and documents.

- any other matter which the President may by rule, determine.

Clause (9) provides that the Union and every State Government shall consult the Commission on all major policy matters affecting Scheduled Tribes.

The commission would also discharge the following other functions;

- Measures that need to be taken over conferring ownership rights in respect of minor forest produce to the ST's living in forest area.
- Measures to be taken safeguard rights to tribal communities over mineral resources water resources etc.
- Measures to be taken for the development of tribal & to work for more viable livelihood strategies.
- Measures to be taken to improve the efficiency of relief & rehabilitation measures for tribal groups displaced by development project.
- Measures to be taken to prevent alienation of tribal people from land & effectively rehabilitate such people in whose case alienation has already taken place.
- Measures to be taken to elicit maximum. Co-operation & involvement of tribal communities for protecting forests & undertaking social aforestation.
- Measures to be taken to ensure full implementation of the provisions of panchayats (extensions to the schedule areas act (40) of 1996.
- Measures to be taken to reduce and ultimately eliminate the practice of shifting cultivation by tribal that leads to their continuous disempowerment & degradation of land & the environment.

Powers –the power of this commission are as same as that of National Commission for SCS.

Check Your Progress

1) _____was the first Chairperson of NCSC.
2) Clause _____ provides that the Union and every State Government shall consult the Commission on all major policy matters affecting Scheduled Tribes.
3) There are _____ Regional offices of the National Commission for Scheduled tribes
4) List two main functions of the NCST
5) What are the main powers of the NCSC?

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5.6 NATIONAL COMMISSION FOR WOMEN (NCW)

In our country there is largely a patriarchal structure of a society. In this set up women have been considered as inferior and given a secondary status. They have been subject to various legal and social discriminations. There is a need to remove such inequalities and to make a provision for solving her problems. 'The need was felt for structure to uphold the rights and implement the provisions of beneficial legislations , in an organized and institutionalized manner'. So with this view National Commission for Women (NCW), was set up as statutory body in Jan. 1992 under new act 1990.

Purpose of the NCW is -

To review constitutional & legal safeguards for women
To recommend remedial legislative measures.
To facilitate redressal of grievances &
To advice government on all policy matter affecting women.

In keeping with its mandate, the Commission initiated various steps to improve the status of women and worked for their economic empowerment .During the visits to the states it received a large number of complaints. The commission acted suo-moto in several cases to provide speedy justice. It took up the issue of child marriage, sponsored legal awareness programmes, Parivarik Mahila Lok Adalats and reviewed laws such as Dowry Prohibition Act, 1961, PNDT Act 1994, Indian Penal Code 1860 and the National Commission for Women Act, 1990 It organized workshops/consultations, constituted expert committees on economic empowerment of women, for gender awareness and took up publicity campaign against female foeticide, violence against women, etc.

The commission shall consist of:

A Chairperson, committed to the cause of women, to be nominated by the Central Government.

b. Five Members to be nominated by the Central Government from amongst persons of ability, integrity and standing who have had experience in law or legislation, trade unionism, management of an industry potential of women, women's voluntary organisations (including women activist), administration, economic development, health, education or social welfare;

Provided that at least one Member each shall be from amongst persons belonging to the Scheduled Castes and

Scheduled Tribes respectively;

c A Member-Secretary to be nominated by the Central Government who shall be :-

an expert in the field of management, organisational structure or sociological movement, or

an officer who is a member of a civil service of the Union or of an all-India service or holds a civil post under the Union with appropriate experience.

Tenure-Section 4(1) of act says: The Chairperson and every member shall hold office for such period, not exceeding three years, as may be specified by the Central Government in this behalf.

1. The commission shall perform all or any of the following functions, namely :-

- Investigate and examine all matters relating to the safeguards provided for women under the Constitution and other laws;
- present to the Central Government, annually and at such other times as the Commission may deem fit, reports upon the working of those safeguard;
- make such reports recommendations for the effective implementation of those safeguards for improving the conditions of women by the Union or any state;
- review, from time to time, the exiting provisions of the Constitution and other laws affecting women and recommend amendments thereto so as to suggest remedial legislative measures to meet any lacunae, inadequacies or shortcomings in such legislations;
- take up cases of violation of the provisions of the Constitution and of other laws relating to women with the appropriate authorities;
- look into complaints and take suo moto notice of matters relating to:-

  deprivation of women's rights;

  non-implementation of laws enacted to provide protection to women and also to achieve the objective of equality and development;

  non-compliance of policy decisions, guidelines or instructions aimed at mitigating hardships and ensuring welfare and providing relief to women, and take up the issues arising out of such matters with appropriate authorities;
- call for special studies or investigations into specific problems or situations arising out of discrimination and atrocities against women and identify the constraints so as to recommend strategies for their removal;

- undertake promotional and educational research so as to suggest ways of ensuring due representation of women in all spheres and identify factors responsible for impeding their advancement
- participate and advice on the planning process of socio-economic development of women;
- evaluate the progress of the development of women under the Union and any State;
- inspect or cause to inspected a jail, remand home, women's institution or other place of custody where women are kept as prisoners or otherwise and take up with the concerned authorities for remedial action, if found necessary;
- fund litigation involving issues affecting a large body of women;
- make periodical reports to the Government on any matter pertaining to women and in particular various difficulties under which women toil;
- Any other matter which may be referred to it by Central Government.

Complaints & Counselling Cell

The Complaints and Counselling Cell of the commission processes the complaints received oral, written or suo moto under Section 10 of the NCW Act.

The complaints received relate to domestic violence, harassment, dowry, torture, desertion, bigamy, rape, refusal to register FIR, cruelty by husband, deprivation, gender discrimination and sexual harassment at work place.

The complaints are tackled as below:-

Investigations by the police are expedited and monitored.

Family disputes are resolved or compromised through counseling.

For serious crimes, the Commission constitutes an Inquiry Committee which makes spot enquiries, examines various witnesses, collects evidence and submits the report with recommendations. Such investigations help in providing immediate relief and justice to the victims of violence and atrocities. The implementation of the report is monitored by the NCW. There is a provision for having experts/lawyers on these committees.

The State Commission, the NGOs and other experts are involved in these efforts.

Besides Complaints & Counselling cell NCW also works through other units namely Legal Cell, Research Cell, P.R. Cell. These Cell mainly works to review the constitutional and legal safeguards

provided for women, recommend remedial legislative measures, felicitate redressal of grievances and advice the Government on all policy matters affecting women.

The Parivarik Mahila Lok Adalat (PMLA) is an innovative mechanism developed by the NCW, which has taken up 7500 cases so far. It deals with matters related to family law, and aims at speedy justice. It also aims at empowering women.

Success stories of NCW

The Commission held on the spot enquiries and investigations through duly constituted committees. The Committees comprised of persons with the expertise to handle the subject.

The Commission received a complaint from Smt. Shanti Devi, w/o Mangelal Rao, Village Kanana, District Barmer, Rajasthan, alleging that for the last 2 years widow pension, due to her, had been stopped. She had been declared dead. She represented to the concerned department for redressal but no action was taken by the concerned authorities. On the receipt of the complaint, the matter was taken up with the District Collector, Barmer and the Collector informed the Commission that the stand of Shanti Devi had been found to be correct and necessary instructions had been issued by the District Collector to the Treasury office, Barmer. Also the concerned Patwari had been proceeded against departmentally for stopping the pension on false grounds.

Ms. Rupali Jain had represented to the Commission that her services in a school run by a non-governmental organization were terminated without assigning any reason. She had taken leave for appearing in an examination. The Commission had taken up the matter with the District Collector, Ferozabad, who reported to the Commission that on the intervention of the Commission Ms. Rupali Jain had been allowed to join back as her grievance was found to be genuine.

Mrs. Sudha Bala (name changed) was allegedly gang-raped by BSF personnel in early 2002 at Gojhadanga at Indo-Bangladesh Border under the district of North 24 Parganas. Since then the victim along with her young daughter had been passing days in the Presidency Jail at Kolkata simply because of non-submission of charge-sheet by Police although a case under section 376 I.P.C. was duly registered against the BSF personnel. The matter was taken up by the Commission for the release of rape victim from the jail and arrangement for her rehabilitation. The joint efforts of the National Commission for Women and the West Bengal State Commission for Women resulted in the release of Mrs. Das

from jail, who was given into safe custody to her brother. The Commission was assisted by the Department of Social Welfare, Government of West Bengal, the SP of North 24 Parganas, advocates at Basirhat Court and the Presidency Jail authorities.

Check your Progress

1) A Chairperson, committed to the cause of women, is to be nominated by the _____
2) The Complaints and Counselling Cell of the commission processes the complaints received oral, written or suo moto under _____of the NCW Act.
3) List any three functions of the NCW.
4) The Chairperson and every member of NCW shall hold office for such period, not exceeding _____ years.

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5.7. SUMMARY

Being human we are entitled to certain rights which are called as human rights. These rights are essential for one's progress and development. These human rights must be protected. For this purpose various commissions have been established in our country. The National Human Rights Commission was established on 12th October, 1993 under the legislative mandate of the Protection of Human Rights Act, 1993. This act also recommended for the setting up of State Human Right Commission at State level and Human Right courts along with NHRC. The functions and powers of the state commission are similar to those of National Human Rights Commission. The only difference is that the State commission cannot make a study of treaties.

In our country some of the classes remained underprivileged and socially and economically backward. Article 338 provided for the Appointment of commissioners for schedule caste & schedule Tribes by President. By the constitution 65th amendment bill 1990 the commissioner was replaced with the commission for Schedule Caste & Schedule Tribes commission. Later 89th amendment Act, 2003 separated this commission and now we have a National Commission for Scheduled Caste –NCSC and a National Commission for Scheduled Tribes-NCST.

National Commission for Women (NCW), was set up as statutory body in Jan. 1992 under new act 1990 to uphold the rights of women and to look into the cases related to the deprivation of their rights. NCW also works for social and economical empowerment.

5.8. UNIT END QUESTIONS

Q.1 Describe the powers and functions of National Human Rights Commission.
Q.2 Briefly discuss the functions and powers of the State Human Rights Commission in the state.
Q.3 Briefly examine the powers and functions of the National Commission for Scheduled Castes.
Q.4 Write detailed note on the National Commission of Scheduled Tribes.
Q.5 Briefly review the role of the National Commission for Women.

6

THE ROLE OF NON-GOVERNMENT ORGANIZATIONS IN PROTECTING HUMAN RIGHTS.

Unit Structure

6.0. OBJECTIVES

After studying the unit you will be able

- To Know the various activities being done by NGO' s.
- To Understand the role of some NGO' s in India in protecting Human Rights.
- To learn new some renounced NGO' s working at international level for protecting Human Rights.

6.1. INTRODUCTION

Human Rights have to be claimed and exercised. This is essential for mans self respectful life. But in some situations Human Rights pertaining to liberty, security etc cannot be exercised. They are suppressed and violated. Of course there are constitutional safeguards for the exercise and protection of Human Rights. It is the constitutional duty of the government to protect the Human Rights of people. There are several national and state commissions for the purpose of protecting the Human Rights. But these commissions have certain limitations in the protection of Human Rights. Non – Government organizations (NGO'S) work for the welfare of people. These organizations also fight for the protection of Human Rights. There are hundreds of NGO' s working at the national and international level for the cause of the protection of Human Rights. We are mainly concerned with the study of some prominent NGO' s in India that work for the protection of Human Rights.

6.2. NON – GOVERNMENT ORGANIZATIONS

Non government Organizations (NGO's) are voluntary organizations. They are formed by people who want to work for the welfare of people in general and the less privilege and help less in particular. The Government, central or state has it limitations in providing welfare measures like means of livelihood, education and health services to people who need them. Lack of funds, lack of manpower, public protest and pressure from political parties are some of the problems faced by the government in providing welfare measures to people.

On the other hand, NGO's have better network of manpower. These organizations are financially supported by business organizations. And, above all, NGO' s have personal contact at the grass root level. Activists in these organizations have health relations or rapport with general public. And, therefore, they can serve people better than government officials in the fields like educations, protection of human rights, health, Child welfare, environment a protection, rehabilitation of displaced people etc.

6.2.1. What NGO' s can do for people?

NGO' s can do the following activities for the welfare of people –

1) NGO' s can run educational institutions for education of the masses. They can also provide professional training to people for producing experts and technicians by running training institutions.

2) The voluntary organizations fight for the protection of human rights of people. They can file petitions in law courts for

safeguarding the fundamental rights of people.

3) NGO' s can undertake various activities for protecting the physical environment. They can make people aware about environmental issues and the importance of environmental protection.

4) These voluntary movements can concentrate on bringing about rural development of the country. For this purpose they can plan and undertake different activities that will lead to development in agricultures and its allied fields.

5)NGO' s can provide medical assistance and health services to the needy people.

6) Activists of NGO' s can arrange child welfare activities especially for undernourished, physically handicapped, mentally disabled and street children.

NGO' s help the government to monitor the welfare activities undertaken by it. But when the government activities clash with the interests of people, NGO' s oppose the government and pressurize it to act in the interests of people. Thus, these organizations work for the cause of people, help them to form favorable opinion about life, health, environmental, social and political issues. Because NGO' s look towards everything from the point of common people they are, described as the eyes and ears of people.

6.2.2. Problems faced by NGO' s.

While offering selfless services to people NGO's face the following problems.

- NGO' s find it very difficult in collecting the realistic formation about the government plans policies and projects.

- Though these voluntary organizations are fully supported by Business organizations, financial institutions etc, the funds thus raised are inadequate for managing diverse welfare activities by them.

- Because of paucity of funds NGO' s find difficulty in getting the services of experts and technician.

- Adequate infrastructures are not available to these voluntarily organisation.

- Because of the in evolvement of people of diverse interests, NGO' s find it rather difficult to define their

objectives clearly.

- It is not easy for these organizations to coordinate various activities undertaken by them.

- NGO' s cannot withstand the political interference in their day to day functioning.

Inspite of all these difficulties NGO' s are working tirelessly for the cause of less privileged people. Here we are mainly concerned with knowing and evaluating the role of NGO' s in protecting Human rights such as civil, political, economic, Socio-Cultural rights, Rights of disadvantaged persons, Right to development and Environmental rights.

6.2.3. Check Your progress.

What are N GO'S?
What the NGO' s can do for people?
What are the problems faced by NGO' s?

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6.3. ROLE OF SOME PROMINENT NGO' s IN INDIA IN THE PROTECTION OF HUMAN RIGHTS :

The Constitution of India has given some fundamental rights to the people of India. These rights have to claimed and enjoyed by everyone. Again these basic human rights have to be protected against their violations. There are several national and state human rights commissions to protect the constitutional rights of people. The National Human Rights commission, The State Human Rights commission, The National commission for Scheduled castes as well as for scheduled Tribes and Commissions for women at National and State levels are the main government mechanisms for protecting the fundamental rights of people. We have already discussed the structure and functioning of these commissions in the previous chapter.

In this chapter let us concentrate on the study of the work of some prominent NGO' s in India at the national level. The Peoples Union for Civil Liberties, The Chipko movement and The Narmada Bachao Andolan are the most active NGO' s in India. Their role in the protection of human rights is as follows

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6.3.1. People's Union for Civil Liberties (PUCL)

This is a Delhi – based NGO. At the outset it is necessary to know the situation in which the PUCL was founded in 1976 by Jayaprakash Narayan, the great Gandhian leader. In the beginning he formed a national group named, Citizens for Democracy (CFD) in 1974 along with similar groups in Delhi, Madras, Mumbai and Calcutta for opposing the autocratic functioning of the government of India. Later on, emergency was declared by the government. During the emergency, fundamental rights and civil liberties of people were suppressed Again the National Security Act was passed in 1980. This is a repressive law which introduced preventive Detention of people under the pretext of national security. In a response to this act, the PUCL was revitalized in 1980. It insisted that the civil liberties of people must be protected at any cost. It also pledged to work against any type of discrimination that encroaches civil liberties of the weaker sections of society like children, women etc.

The PUCL organizes `The JP Memorial Lecture' on 23rd March every year. This is the day on which the emergency in India was lifted in 1977. The PUCL also presents `Journalism For Human Rights' Award' The award was instituted in 1980 to create awareness about civil liberties and human rights in the minds of journalists and common men.

Though the PUCL is a Delhi-based NGO, it works on the National level. It has branches in different cities in India. It publishes a monthly bulletin both in English and Hindi. It is known as the PUCL bulletin and enlightens people about the legal ways and means of claiming, exercising and also fighting for protecting their human rights.

People have Right to live. This also includes the Right to food and livelihood. On the basis of this, in 2001, the PUCL filed Public Interest Litigation (PIL) in the Supreme Court. The six states in India such as Orissa, Maharashtra, Gujarat, Rajasthan, Himachal Pradesh, and Chattisgarh were hit by acute drought. People in these states were starving. Still the state governments were not providing food to people. These drought hit people were not in a position to purchase food grains. On the basis of the PIL filed by the PUCL, the Supreme Court directed the respective state government to provide food to the drought affected people free of cost. Thus, the Right to life of people was protected. The Court also directed the state governments to devise a scheme so that no person will suffer from hunger.

The PUCL is working for highlighting the instances of the violation of human rights. It also sees that the violations pertaining to human rights get redressed, The activities of the PUCL make it clear that

weak democracy can be made strong only by protecting the civil liberties of people.

6.3.2. People's Union for Democratic Rights (PUDR)

There is another Delhi – based N GO. It is known as people's Union for Democratic Rights (PUDR). This organization positively states that the underprivileged people have Right to organize themselves and to agitate or revolt for bringing about total change in the socio economic and political system if it does not ensure solutions to their problems. This organization also filed a case in the Supreme Court for protecting the economic rights of Asiad workers. They were paid less than minimum wages. The court declared that it amounts to forced labour and it also violates the article 23 of the constitution of India. And thus the justice was done to the Asiad workers.

Thus both the PUCL and PUDR are fighting together for the protection of Human Rights of people. The former concentrates on the protection of civil liberties while the latter fights for giving socio-economic justice to people.

6.3.3 Check your progress.

1. Explain the role of PUCL in the protection of Human Rights.
2. What the PUDR is doing for the protection of Human Rights?

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6.4. NGO' s in India

6.4.1. The Chipko Movement.

This movement was started by Sunderlal Bahuguna and Chandiprasd Bhat in 1970. It spread in Garhwal region of Himalayas which is the source of great rivers like the Ganga and the Yamuna. The Uttar Khand faced environmental problems like soil erosion, drying up of the sources of water due to clearing of forests. People started cutting of trees for commercial purposes. This also caused soil degradation. And it became essential to protect the environment from its further degradation due to deforestation. The movement started for this purpose was named as the Chipko Movement. The term `Chipko' Literally means hugging or embracing trees. Shri Bahuguna started protecting the trees by embracing them. This is the mass movement of its kind

started solely for protecting the trees and forests.

6.4.2. Brief History of the Movement.

The origin of this chipko agitation can be traced to the movement started in Rajasthan some three hundred years ago. The ruler of Rajasthan allowed the cutting of Khejri trees for creating lime. A Bisnoi woman, Amrita Devi, opposed the kings decision very vehemently. Hundreds of women joined the movement spontaneously. Some would hug the trees by stretching their arms for preventing the felling of trees. The most unfortunate part was that these women were killed mercilessly by the ruler. But this event inspired people for protecting the trees and forests for centuries together. Taking inspiration from the agitation S. Bahugna started the tree protection movement when the timber contractors started felling the trees with commercial intentions. He opposed the wood cutters strongly. Local people supported Bahuguna a great environmentalist actively. They adopted the same technique of embracing the trees for preventing the cutting of trees. Because of the overwhelming response of the people the movement spread very widely.

Initially the Chipko Movement was started in a town named Dasohli. The woodcutters were clearing the forests recklessly. This resulted in the loss of forest wealth and natural resources in the area reduced radically. Gaura Bai opposed the cutting of trees and clearing of forests. Under her leadership tribal women actively participated in the movement that was solely started for the preservation of forests. Hundreds of hectres of forests were saved. This unique agitation was appreciated all over the world. At present, the organization has over 4000 groups working for the protection of forest and environment.

6.4.3. Protection of Human Rights.

The Chipko movement is also working for the protection of human rights. Tribal people living in forests as well as in hilly area earn their livelihood by extracting and selling forest products. They have Right to Life including the Right to Food, and livelihood. They also have Right to Unpolluted environment. And the Chipko agitation is consistently working for protecting mainly the economic and environmental rights of tribal people. Thus, the chipko movement that started as a campaign for environmental protection has been also protecting human rights of people.

6.4.4. Check your Progress.

1. What was the main purpose behind starting the Chipko movement?
2. Explain the meaning of the term Chipko.

3. State the Human Rights that are protected by the Chipko movement.

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6.5. NGO' s IN INDIA

6.5.1. The Narmada Bachao Andolan (NBA)

The Sardar Sarovar project is one of the mega development project in India. It is also a multi purpose project. It was undertaken in 1946 for providing drinking water to people, supplying water for irrigation and also for the generation of energy. The project involved the construction of hundreds of small and large dams. This project is so big that it caused the submergence of lakhs of hectares of agricultural and forest land and hundreds of villages also. It displaced over a million of people. Most of them are tribal people. And the most unfortunate part of the project was that these displaced people were not given adequate compensation for the loss of their land, employment and property. They were not provided alternative means of livelihood and employment opportunities. Their rehabilitation was totally neglected and the most fundamental human right of people such as Right to life that includes the Right to food and livelihood was violated. Their civil liberties were suppressed. And when people protested against the forced acquisition of land by the government, they were denied vivid liberties. Their rightful demands for compensation and rehabilitation were just neglected. The worst part is that several people were also killed.

6.5.2 The NBA : Protector of Human Rights.

It is on this background the NBA was started by Medha Patkar, a great social activist. She led the agitation and worked for the cause of people who were displaced by the project. She mobilized people for fighting against the violation of human rights of project affected people. In 1994 she moved the Supreme Court for opposing the rise in the height of Narmada dam. She opposed it mainly on the ground of environmental damage caused by the dam and the neglect of rehabilitation of tribal people. The Supreme Court asked the authorities of the project to get clearance from environmental and rehabilitation authority for the continuation of the construction of the Narmada dam. Because the court was happy with the

rehabilitation work of displaced people by the Gujarat, Madhya Pradesh and Maharashtra Government, it ordered the construction of dam upto ninety meters. It is at this juncture, Baba Amte, a great social reformer and Arundhati Roy, a great Literary figure joined the NBA. Baba Amte criticised the Supreme Court order and appealed K.R. Narayan, the then president of India to intervene the Supreme Court order in the interests of people. According to him it is a prerogative of the President of India to review the Supreme Court order when the fundamental rights of quite a large number of people are being violated. Thus, though in the beginning the NBA started as environment protection movement gradually it became the Human Rights protection movement.

6.5.3. Check your progress.

1. What were the purpose behind the Sardar Sarovar project?
2. Why the NBA was started by Medha Patkar?
3. How the NBA is protecting the Human Rights? Give Example.

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6.6 ROLE OF SOME RENOWNED INTERNATIONAL NGO' s IN THE PROTECTION OF HUMAN RIGHTS

There are hundreds of NGO' s working at the international level for the protection of Human Rights. The most renounced among them are The International League for Human Rights, Amnesty International and Human Rights Watch. These NGO' s are very active in the protection of Human rights. Let us discuss their role in relation to human rights.

6.6.1. The International League for Human Rights (ILHR)

This NGO is the oldest organization working in the field of human rights. It was established in 1942. in U.S.A. for defending the rights of people. It interacts with the government and investigates the cases of the violation of human rights. The league aims at establishing a just society in which people can claim and enjoy their fundamental rights. The ILHR was given consultative status in 1947. As a result of this it got the authority to testify the abuses of human rights before the United Nations Economic and Social Council.

6.6.2. The Amnesty International (AI)

This is another world famous NGO working for the protection of human rights. It was established in 1961. The AI mainly deals with the five areas viz women's Rights, Children Rights ending Torture and Execution, Rights of Refugees and Rights of prisoners of conscience. At present the AI is concentrating mainly on controlling the violence against women and checking the world arms trade. Its main branches are in London and New York.

6.6.3. Human Rights Watch (HRW)

This NGO was established in New York in 1987. It serves as an umbrella organization for U.S. Helsinki watch committee, America Watch, Asia Watch, Middle East Watch and Africa Watch. It publishes Human Rights publication Catalogue, quarterly news letters and Human Rights world watch reports. It evaluates the Human Rights practices of governments in the light of standards recognized by international laws and agreements including the Universal Declaration of Human Rights and the Helsinki Accord. Further it also evaluates the performance of the U.S. government in promoting human rights at the international level. Of course the organization mainly concentrates on evaluating the treatment of the U.S. government with refugees and visitors to U.S.

6.6.4. Check your progress

1. Explain the work of the protection of Human Rights by ILHR.
2. How the AI is protecting the Human Rights?
3. Describe in brief the work of HRW.

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6.7. SUMMARY

In this chapter we have briefly dealt with what the NGO are doing for the welfare of people. NGO' s also have to face some problems. Inspite of these problems NGO' s work for the protection of the physical environment and Human Rights. We have also seen how the three prominent NGO' s in India, The peoples Union for Civil Liberties, The Chipko Movement and the Narmada Bachao Andolan are playing a pivotal role in the protection of Human Rights in India. In the end of the chapter the work of the three NGO' s ILHR, AI and

HRW working at the international level for the protection of Human Rights is described very briefly.

6.8. KEY WORDS

NGO' s, Human Rights, Public Interest Litigation (PIL) PUCL, PUDR, Chipko, NBA, ILHR, AI and HRW

6.9. UNIT END QUESTIONS.

1. Why do NGO' s serve people better than the government?
2. What are the main functions performed by NGO' s? State the problems faced by them.
3. Why NGO' s are described as the eyes and ears of people.
4. Describe briefly the problems faced by NGO' s.
5. How the PUCL has been protecting the Human Rights of Indians?
6. The Chipko movement that began as agitation for protecting the environment has turned in to the Human Rights Protection movement. Explain with examples.
7. The Narmada Bachao Andolan is actively working for the protection of the Environment and Human Rights Illustrate.
8. Explain briefly some prominent NGO' s in India in the protection of Human Rights.
9. Briefly describe the role of some international NGO' s in the protection of Human Rights.

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7

NATURE AND TYPES OF SCIENCE

Unit Structure

7.1 OBJECTIVES

After studying the topic you will know about:

- To know about the nature, characteristics and classification of science
- To be aware of the difference between science and other disciplines like technology, religion, philosophy and astronomy
- To be able to justify and be aware of impact of each discipline in the life of human beings

7.2 INTRODUCTION

Science is a rational inquiry into nature of things. The characteristics of science makes it different from technology, astronomy, religion and philosophy. However much as there is a difference between science and other disciplines, each has some similarity with the other thus making life of man more meaningful and purposeful.

7.3 MEANING, DEFINITION AND CHARACTERISTICS OF SCIENCE

The word science is derived from the Latin word ‘scientia’ which means ‘to know’. Thus, the word science refers to all branches of learning. In this sense, it is similar to the Sanskrit words ‘Vidya’ or ‘Shastra’. In this sense, all branches from Physics and Chemistry to art and philosophy or even aesthetic can be regarded as science.

Biology, Theology, Psychology, and Sociology may have nothing in common. Yet they are regarded as sciences in a general sense.

But in the modern times, the word science is used in a specific sense. It is a branch of knowledge dealing with a body of facts or phenomena systematically arranged. This arrangement shows the operation of general laws. There is scope for experimentation in such sciences.

Science may be defined as a body of systematically organized factual knowledge collected by means of the scientific method.

This definition of science highlights **three characteristics of science**.

1. **Subject matter of science:** Science is a body of factual knowledge. It is not influenced by authority or tradition. It studies facts. Facts may include material objects like stones, soil, tree, planets etc. Facts also cover non-material objects like Time, Space, Gravity, Relativity, Energy etc. even mental states of human beings like stress and tension, social phenomena like poverty, crime etc. can become the subject matter of science. Even futurology, the study of the shape of things to come in future, can be the subject matter of science.

2. **Science as a method:** Science is a body of knowledge obtained by means of the scientific method. Such knowledge can be obtained by observation and experimentation. Where direct verification is not possible one can verify the truth of scientific knowledge indirectly. Aristotle used the method of Analysis; Descartes the method of systematic doubt, Francis Bacon used the Inductive method. Mathematics provided abstraction and generalization which are important processes in all scientific thinking. All these methods are useful in science. Modern scientist uses a suitable methodology to conduct scientific inquiry and to understand the world around him.

3. **Universal nature of science**: Scientific knowledge is universal in its application. Claims of science can be tested by anyone in any part of the world. Further, scientific knowledge is true at all times as it presupposes the existence or order and uniformity of nature.

7.4 AIM / PURPOSE OF SCIENCE

The aim of Science is two fold:

a. It enables us to know things.

b. It enables us to do things.

The former is the Theoretical aim of science and the latter, the Practical aim of science. Theoretically, science tries to know the nature of the world we live in. Astronomy, for example, tries to describe the nature of the universe of which our earth is a small part. But knowing is not the sole aim of science. It tries to apply this knowledge for practical purposes.

Science also has a practical aim. A scientist wants to apply the principles of science for the benefit of mankind. A large number of discoveries and inventions are aimed at improving the conditions of mankind. Discovery of steam – power brought about Industrial Revolution in England. The invention of the mariner's compass led to the discovery of sea- routes around the world. The practical aim of science has led to the growth of Technology which has completely transformed man's life in this century.

7.5 CLASSIFICATION OF SCIENCES

On the basis of their aim, sciences are classified into pure and applied.

Pure Science: The aim of pure science is to know things. The scientists try to understand the universe and solve the mysteries of nature. They are guided by curiosity. They want to know more and more about the universe and understand its nature. They derived intellectual satisfaction from their disinterested pursuit of truth. Scientist are more concerned with finding explanations for phenomena by thinking up theories. They are not motivated by practical considerations. stronomy, biology are some examples of pure sciences. Newton, Einstein is the scientist who belongs to the category of pure sciences. Deductive method is used for the collection of facts.

Applied Science: Science helps us to do things. When the goal of scientific activity is to control events we get applied science. Knowledge gained by scientists is put into practice for the benefit of mankind. Applied science gave rise to technology. A large number of inventions and innovations are the result of applied science. For eg. Marconi who invented the telegraph, Edison who gave us the electric lamp.

However there is no sharp division between pure and applied science. The growth of the latter depends upon the development of pure science. Sometimes, the needs of applied science give rise to new theories/ laws in pure science.

7.6 THREE FOLD CLASSIFICATION OF SCIENCE

Sciences are distinguished from one another on the basis of the different classes of facts they study. The familiar distinction between natural and social sciences is based on this difference. The classification of sciences is three fold. They are as follows:

Physical sciences: The physical sciences deal with objects in different forms – solids, liquids and gases. For eg. Chemistry and Geology deal with compounds. Eg. Water is a compound of hydrogen and oxygen. When this composition is changed we get a new compound. Physics, Chemistry, Geology, and Astronomy are some of the physical sciences.

Biological sciences: They deal with living beings. The biological sciences deal with life in different forms and included the study of organisms like plants, animals and human beings. Botany, zoology, physiology, anatomy are some of the biological sciences.

Social Sciences: Social sciences deal with human beings and their relation to society. The difference between human beings and other living organisms are that human beings are aware of their goals, aspirations and attempt to attain it. For eg. Economics study the economic behaviour of human beings, political sciences deal with political behaviour of human begins. History, Psychology, Economics are some examples oftay social science.

7.7 CHECK YOUR PROGRESS

1. Define Science

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2. State the two fold classification of science.

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3. What according to you is the most important characteristic of science?

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7.8 SCIENCE AND TECHNOLOGY

In the ancient times, there was no science. So skills and techniques developed independently of the knowledge of nature. For eg,. When the stone axe was made, a technique was created without science. However, today science and technology are interdependent. Science deals with man' s understanding of the real world about him - the inherent and fundamental properties of space, matter, energy and their interactions. Technology on the other hand deals with the construction of various tools and techniques for carrying out the plans and designs to provide objects essential for human sustenance, comforts, conveniences, and luxuries. According, to Edward De Bono, "Technology is the process of producing something useful, through the application of knowledge.

For the development of technology a technologist is a person who is a specialist, who designs and carries out the techniques by the use of the required tools, for the purpose of accomplishing a specified function.

The debate about the relationship between science and technology has been dominated by the "pipeline" model. According to this model, new technological ideas arise as a result of new discoveries in science. This model seems to correspond to some of the most visible success stories of World War II. For eg. the atom bomb and the radar were direct consequences of discoveries of science.

There are certain points to know about science and technology. They are as follows:

1. The purpose of science is to help us in investigating, or understanding the natural events, or occurrences in nature, as they are. The ultimate aim of science is to discover truth about the working of the Nature, which is verifiable by observation and experimentation. Technology on the other hand, is to apply knowledge for making, creating or manufacturing things and objects in accordance with our needs to serve our purposes. The goal of it is utilitarian for either the betterment or destruction of mankind.

2. The planning of the most efficient strategy of technological development often depends on scientific knowledge from many fields. This accumulated stock of existing scientific knowledge helps to avoid wasteful expenditure.

3. A need is felt to assess the risks of technology. For this, basic

scientific understanding is needed. For eg. The manufacture of new chemical presupposes as to how the wastes can be disposed.

4. Hypothesis is the base for scientific activity. A scientist is essentially guided from the start to end of his work by hypothesis, deduced from theory. A technologist too make use of hypothesis but his work is mainly based on experimentation.

7.9 SCIENCE AND RELIGION

Historically, science has had a complex relationship with religion. On the one hand, religious motivations have sometimes influenced scientific development. On the other hand, scientific knowledge has had effects on religious beliefs.

The term “religion” has been variously defined. Religion is broadly defined as a way of life or belief based on a person’s ultimate relation to the universe or a god or gods. E B.Taylor calls religion as a belief in spiritual things”. The above definition bring out that religion involves a set of beliefs, actions and emotions. In this sense Buddhism, Christianity, Hinduism, Judaism etc. may be considered religions. The aim of both science and religion is the pursuit of truth. There are certain similarities between the two. Science presents truth about the universe before us. Religion reveals truth about human life and spirit to us. Further science feeds the body and religion the soul as such both are necessary for the welfare of man.
At the same time there are certain points of difference between science and religion. They are as follows:

1. Rituals play an important role in religion which signify that the world is governed by some being greater than man which needs to be appeased to get favours for himself. Science on the other hand holds that occurrences in nature are impersonal. They are not governed by the will of any being.

2. Science is objective in nature. Scientists believe that with the help of reason, guided by observation, one can understand the mysteries of nature. Religion is subjective in nature. Religious attitude is one of humility. Religion regards reason to be powerless and holds that sacred knowledge comes through revelation. The Bible, the Koran, the Gita claim to contain what has been revealed.

3. Science questions, while religion is merely a matter of faith. A scientist is not governed by tradition. Nor is he influenced by faith. Scientist always demand confirmation or proof though observation

and experiment. Religious statements are accepted as true on the basis of tradition or authority.

4. Science is dynamic in nature. A false proposition is replaced by a true proposition in the light of fresh evidence. Eg. At one time it was thought that the earth was flat. later the Copernicus theory proved that the earth has always been round. Religion on the other hand, is dogmatic in nature. Its statements hardly change with the passage of time.

5. Religion claims to give knowledge of things that are beyond sense experience. So a religious man has to rely upon the authority of religious texts and religious institutions. On the other hand science deals with observable facts. That is why it is an open affair. Anyone can observe the course of nature.

Though the difference between science and religion are many yet they are not at loggerheads, nor enemy of the other. Both are necessary for the well being of the other as science nurtures the body whereas religion nurtures the soul.

7.10 CHECK YOUR PROGRESS

1. State how technology is different from science.

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2. Do you think that there is similarity between science and religion? Give reasons.

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7.11 SCIENCE AND ASTROLOGY

Astrology is one of the oldest form of study and its continuous history can be traced back over 4,000 years to the ancient Middle East. The astrology used in India and the West share common origins, but most cultures have developed their own form of mystical cosmology.

Astrology has been defined by Encyclopaedia Britannica as either a science or pseudo-science - the forecasting of earthly and human events by means of observing and interpreting the fixed stars, the

sun, the moon and the planets. Astronomy has exerted considerable influence on past and present civilizations. Astrology remains an integral part of religious and social life in India.

Astrology as a science is opposite to the findings and theories of Science.

The basic difference between science and astrology is that

a. Modern scientific method usually requires that theories be tested through experiments under controlled conditions.

b. Astrology is held as an occult science. The term “öccult” means hidden, whereas science deals with things which we can see and measure.

c. The actual practice of astrology is generally made to appear very scientific. However astrology s not supported by sound and verified scientific research. Astrology is not based upon collected data and carefully controlled, objective observations and neither can it be tested and retested by independent observers and researchers. The predictions of astrology can neither be proved nor disproved. As such Astrology claims itself to be an art.

In conclusion it can be said that Astrology can neither be considered as a natural science, nor as a social science. But it need to be condemned and it is becoming more and more fraudulent in the West. However, in India it has managed to retain its position among the sciences.

7.12 SCIENCE AND PHILOSOPHY

The word Philosophy is derived from the Greek word philosophia which means love of “wisdom”. Philosophy means the search for truth through logical reasoning rather than factual observation. Philosophy in this sense is the pursuit of wisdom. Philosophy is also looked upon as an analysis of the grounds of and concepts expressing fundamental beliefs. Philosophy is divided into four major branches, they are Metaphysics, epistemology, Ethics and Aesthetics.

The two distinctively philosophical types of inquiry have been described as analytic philosophy, the logical study of concepts and synthetic philosophy, the arrangement of concepts into a unified system. Accordingly there is Advaita philosophy, Buddhist philosophy, Chinese philosophy, Islamic philosophy, western philosophy, Indian philosophy and so on.

The points of difference between science and philosophy are as follows:

1. Science is positive in its approach as it tries to know the reality surrounding mankind whereas Philosophy is normative in its approach as it deals with things as they ought to be.

2. Most philosophical questions are highly fundamental. They seek answers to ultimate questions such as nature of soul, on time, space, morality of an action etc. that is, they are about the truth of highly fundamental beliefs and fundamental belief is one on which other beliefs depend.

3. Both philosophy and science agree on one feature and that is that it appeals to reason rather than authority.

4. Theories of science are fact based. The method of science consists of observation and experiment. The method of philosophy consists of mysticism, intuition, speculation etc. philosophers are mostly concerned with ideas rather than events. As such there is wide scope for controversies and different theories to emerge from time to time.

5. Science gives us specialised knowledge of reality. Philosophy gives us unified picture of reality.

6. Science concerns itself with relative or probable truth whereas Philosophy is concerned with Absolute truth.

Inspite of their differences both Philosophy and Science have exerted influence on each other. Many basic ideas that constitute scientific theories have their seeds in philosophical thoughts. For eg. Spinoza gave grounds for the universal principle of determinism. Similarly every major scientific discovery is a step forward in the development of the philosophical world view. For eg. Darwin theory of evolution had a profound impact on our conception of man's place in nature.

7.13 CHECK YOUR PROGRESS

1. How is astrology different from science?

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2. Do you agree that astrology is science or not. Support your answer.

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7.14 SUMMARY

The progress in science has taken place through the ages. The nature of science makes it different from other branches such as philosophy, religion, astrology and so on. The main characteristic of science is that it is objective in nature and controlled experiments can take place. Technology to a large extent is dependent on science or rather it can be said that both are interdependent on each other. In the field of religion there is no such scope of controlled experiments, or one just cannot think of it. The subject matter of philosophy makes it different from science though the end of both is knowledge or wisdom. There is a debate going on that whether astrology should be considered as a science or not?

7.15 UNIT END QUESTIONS

1. State the relationship between science and technology?
2. Bring out the points of difference between religion and science.
3. Do you agree that the subject matter of philosophy is different from science? Justify your answer.
4. Astrology is a branch of science? Do you agree with the statement or not. Justify.

8

CONTRIBUTIONS OF RENOWNED SCIENTISTS

Unit Structure

8.1 OBJECTIVES

After Studying the unit you will be able

- To get acquainted with the scientific achievements of great scientist of India and at international level.
- To know about how the scientist with their studies, findings and inventions ushered mankind into a new era.

8.2 INTRODUCTION

Science has played an important role in freeing mankind from the superstitious beliefs propounded by religious institutions. Scientist with their astounding discoveries have defied the laws of the Church and religious teachings without bothering about the outcome of such discoveries. In the present chapter, the contributions of some scientist who have left an indelible mark on the history of mankind are discussed.

8.3 GALILEO GALILEE

It is generally accepted that modern science began in the 17^{th} century. Galileo Galilee (1564-1642) was born in Pisa, Italy. He was physicist, mathematician, astronomer and philosopher. He was first modern scientist. His use of scientific methods places him on that pedestal.

Scientific method: As distinguished from non science, science gathers data by using scientific methods. Galileo's contribution to the scientific method is three fold.

1. Fidelity to fact: Galileo insisted that critical observation and experimentation are the only and true means of discovering and determining the physical truth, rather than by seeking answers in the works of Aristotle and that of the scriptures (sacred religious text). He maintained that earth goes around the sun, because his studies of the sky through telescope showed so. The view contradicted the scriptures.

2. The use of methods of experiment: Galileo's method consisted in the in combination of experiment with calculation. By doing so, he created the modern idea of experiment. For example, he developed the concept of acceleration that is used in modern physics, namely acceleration is the rate of change of velocity per unit time and the modern concept of friction and inertia in respect of objects in motion. The importance of Galileo's use of experiments for checking calculations in that he became first scientist to think of doing so after nearly 2000 years of what Aristotle had stated.

3. Mathematical element in physics: Galileo is perhaps the first scientist to clearly state that the laws of nature are mathematical. He was the first scientist to formulate a hypothesis (of falling bodies) in mathematical terms.

Contributions to Astronomy: The most important astronomical evidence for the heliocentric theory was furnished by Galileo. With a telescope which he had perfected to a magnifying power of 30 times, he discovered the satellites of Jupiter, the rings around Saturn and also the mountains on it. He also saw the spots on the Sun. Galileo also observed that Venus went through a complete set of phases, just like the moon. So, it may be presumed that it did not shine with its own light.

Galileo was the first to report that Moon has high mountains and deep depressions. In 1612, Galileo observed the planet Neptune. But he did not realize that it was a planet, and took no particular notice of it. He was able to determine that the Milky Way is a collection of celestial bodies independent of our solar system and to help to form some idea of the enormous distances of the fixed stars. Though there were many who held out against them, these discoveries of Galileo gradually convinced the majority of scientists that the main conclusion of Copernicus was true. The final triumph of this ides is commonly called the Copernican revolution. Galileo perceived the world to be a mechanical order controlled by natural laws.

Of course, Galileo suffered heavily for upholding the Copernican view. He had to face Inquisition, and was confined to his house for the rest of his life. But that is of no consequence to the advance of science.

Few more significant events have occurred in the intellectual history of the world, for it overturned the medieval world view and paved the way for modern conceptions of mechanisms; scepticisms and the infinity of time and space performed a pioneering role in development of modern astronomy. Galileo contributed to science both directly and through his work in physics and its relation to astronomy.

Galileo's contributions to Physics: Galileo pioneered the use of quantitative experiments whose results could be analyzed with mathematical precision. Today, most laws in physics are expressed in mathematics. Galileo for his contribution is sometimes called the founder of experimental Physics.

a. Galileo's concept of Inertia: Galileo's greatest contribution to physics was his formulation of the concept of Inertia. It stated that, a moving body on a surface will continue in the same direction at constant speed unless disturbed. Thus if there is any change in the velocity or in the direction of the motion, it must due to action of some "force". Galileo's principal of Inertia became, Newton's first law of motion.

b. Motion of Pendulum: Galileo's careful observation noticed that pendulum always take the same amount of time for each swing. On this basis he made instrument which is known as Pulse Meter. Later his son made the wall clock, which later developed into today's pendulum clock. This was a great improvement in sand and water clock.

c. Path of a Projectile: There are bodies whose motions are compounded with two motions, one uniform and other naturally accelerated. Such is a motion of a projectile (bullet shot from a gun, a stone thrown horizontally). Galileo proved that the path of the projectile has a geometrical property of a parabola.

d. Invention of instruments: Galileo's main inventions are as follows:

i. The Thermometer: Galileo is credited with his invention of first thermometer in 1606. In this device, he used the expansion and contraction of air in a bulb to move water in an attached tube.

Ii. Refracting telescope: In 1609, Galileo was among the scientist who used the refracting telescope to observe the stars, moons and planets.

Iii. Compound Microscope: In 1610, Galileo used a telescope at a closed range to magnify parts of insects. By 1624, he had perfected a compound microscope.

Iv. The hydrostatic balance: Galileo invented a hydrostatic balance. The Hydrostatic balance could weigh an object both in water as well in air.

Implication of Galilean Revolution: More than any other man, Galileo changed the manner of our thinking. The change is so overwhelming that it can be called as the “Galilean Revolution”. According to Stephen Hawking, Galileo probably bears more responsibility for the birth of modern science than anybody else and Albert Einstein called him the father of modern science.

8.4 SIR ISSAC NEWTON

Sir Isaac Newton (1642-1727) is clearly the most influential scientist ever lived. He was an English astronomer – cum – mathematician – cum physicist all rolled into one. His accomplishments in mathematics, optics and physic revolutionized the world. Just as Galileo was the founder of experimental physics; Newton was the founder of theoretical physics. His law of gravitation, which is a theory, systematized mechanics. The law is one of the truly great triumphs of human mind. It remained as important today as it was three centuries ago.

Newton’s three laws of motion: Newton thought that the Universe worked like a machine, and that a few simple laws governed it. He explained the working of the universe through mathematics. He formulated the laws of motion and gravitation. The three laws of motion, proposed by Newton, are mathematical formulas that explain how objects move when force acts on them.

In 1668, Newton published “Mathematic Principles of Natural Philosophy”. The principia contain Newton’s three laws of motion, which are:

1. Newton’s first law: The first law states that an object will remain at rest, or continue to move at a constant velocity (steady speed) unless an outside force acts on it. The tendency of the object to remain still, or keep moving in a straight line at a steady speed is called, Inertia.

2. Newton’s second law states the rate of change of momentum is proportional to the force acting and the change takes place in the direction, in which the force acts.

3. Newton’s third law states that to every action there is equal and opposite reaction.

The law of Gravitation: Newton formulated the basic, universal laws of gravity and gravitational force, which came to be known as the "Newtonian Revolution". Newton's problem was to determine in which way the gravitational force varies with distance. Kepler's third law gave him a hint. He discovered that the planets and other heavenly bodies followed the same laws that governed motions and bodies on Earth. This force, called gravity affects masses as large as planets and satellites. He concluded that the force of attraction between the two bodies varied directly as the sum of their masses and inversely as the square of the distance between them. In the 20th century, Newton's law of gravitation provided the evidence of Black holes.

Newton's disk: Newton showed that the sunlight which appears white is in fact composed of seven colours; violet, Indigo, Blue, Green, Yellow, Orange and Red. This seven colours could be separated with the help of prism, and the mixture of these seven colours produce white light. By rotating Newton's disk seven colours can be merged to form white colour.

Corpuscular theory of light: In 1704, Newton wrote Opticks. In this work, he propounded the Corpuscular theory of light. According to him, light is composed of tiny particles, or corpuscles. These corpuscles are emitted by the luminous (shinning) bodies. In this theory of light, 1675, Newton presupposed the existence of ether to transmit forces between the particles.

Mathematics: Newton's scientific inquiries led to development of differential calculus. With the help of the calculus, Newton was able to calculate the mass of the planets, including the earth as well as the sun. He estimated that the earth's density was between five and six times that of water. (Today scientist holds it to be 5.5)

Inventions: Newton's discovery in the field of optics and the refraction of light, which, in essence, was the beginning of the science of spectroscopy. Newton also devised the first reflecting telescope in which an achromatic image was seen in a concave mirror. This instrument is superior to refracting telescope, which was available earlier.

Newton was a genius who had a tremendous power of concentration. He is considered as "the greatest scientist who eve lived". An 18th century poem written by Alexander Pope states the importance of Sir Isaac Newton best:

"Nature and Nature's law lay hid in night"
"God said, let Newton be, and all was light"

Newton died in London on 20th march 1727, and was buried in the West Minister Abbey. He was the first scientist to be accorded this honour.

8.5 CHECK YOUR PROGRESS

1. What is meant by scientific method?

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2. State the importance of use of experiments by Galileo.

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3. Define Galileo's concept of inertia.

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4. Briefly describe the inventions made by Galileo.

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5. Describe the impact of Galilean revolution.

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6. State Newton's law of Gravitation.

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7. Examine the different inventions of Newton.

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8.6 ALBERT EINSTEIN

Albert Einstein (1879 – 1955) was the son of a German Jewish industrialist. Einstein got his Ph. D degree at the age of 26 in the year 1905 from Zurich University. In 1905, Einstein published three papers in Physics. The first paper spoke about the particulate nature of light; the second on Brownian motion; and the third dealt with the equivalence of matter and energy.

Einstein received a Noble Prize in 1921 for his Photon theory of Light. In one of his papers he showed that when light falls on metals like potassium, tungsten etc., they emit electrons. He called these electrons photoelectrons and the effect 'photoelectric effect'.

Special Theory of Relativity: Einstein's theory of relativity involved a giant leap of imagination. Special theory of relativity is also known

as the restrictive theory of relativity. It is a fundamental theory about time and space. This theory was developed by Einstein in 1905. It is the modification of the Newtonian Physics.

The theory of Special Relativity was created to deal with certain theoretical and experimental issues involving thermodynamics and light. One of the results of this theory of special relativity is the mass and the energy is equivalent. That is, if m units of mass could be made to disappear, mc^2 units of energy would be released. (Here c is the speed of light.). This theory is expressed by the formula "$E=mc^2$". Einstein showed that physical qualities like mass, length and time are not constant but vary with velocity of the body. The atomic bomb was the result of this equation

($E = mc^2$). This equation is also the basis of creating energy in nuclear reactors (for producing electricity) and stars like sun.

General theory of relativity: Einstein's general theory of relativity was developed in 1915. The special theory assumes that the space-time is flat. In general relativity, Einstein showed that gravitation is the curvature of space around a massive object. The general theory of relativity upgraded the theory of gravitation. The theory provides the basis of understanding of the black holes.

Explanation of Brownian motion: At the time of Einstein, an unsolved mystery was that small particles suspended in water appeared to jiggle continuously around, as if they were alive, even though they were made of inorganic materials. Einstein in his paper stated that the motion of free particles in a liquid is due to collision of particles with the molecules of liquid, thus supporting the atomic theory.

Bose-Einstein Statistics: in 1924, Einstein received a description of a statistical model from Indian scientist Satyandra Nath Bose, which showed that light could be understood as a gas. Bose's statistics applied to both atoms as well as the proposed light particles. Einstein submitted his translation of Bose's paper to the *Zeitsehrift fur Physik*. Einstein also published his own articles describing models and its implications. The sub-atomic particles studied by Bose were names "bosons"; and the statistic used to describe the behaviour of any assembly of the bosons is called Bose-Einstein Statistics. The first Bose-Einstein condensate was experimentally produced in 1995 by using Ultra-cooling equipments at the University of Colorado.

Einstein's other contributions: This multi-faced genius made several other contributions. The following are the main ones:

1. Relativistic cosmology
2. Capillary action

3. Critical opalescence
4. Atomic transition probabilities
5. The quantum theory of monotonic gas
6. Thermal properties of light with low radiation density
7. A theory of radiation with stimulated emission
8. Geometrization of physics

8.7 CHARLES DARWIN

Charles Darwin (1809-1882) was English naturalist and geologist. He came from a distinguished family of medical profession. He proposed and provided scientific evidence that all species of life has evolved over the time through the process he called natural selection.

The theory of evolution: Darwin conceived the idea of evolution in 1838. But he set forth these ideas in his classical work, “On the origin of the Species by Natural Selection”, much later in 1859.

Darwin explained his theory of evolution, or natural selection as nature’s selection of those features of a species which enable it to survive in a given environment and elimination of those, which are not necessary. By the expression “fittest” Darwin never meant the “strongest”, but the most adaptable. He saw progress in mankind in enlightened cooperation and not in strife and extinction of the weak.. In the mean while, another naturalist, Alfred Russell Wallace, had come up independently, with the same ideas. So the theory of evolution is called the Darwin-Wallace Theory of Evolution.

Darwin’s theory of evolution, indeed without doubt, was a denial of the Biblical account of the special creation of mankind, which created a great debate everywhere.

Darwin’s five year voyage on a survey ship, called Beagle convinced him that the species are taken in different directions when they are isolated from one another. He was convinced that the related species diverge from a common stock.

Along with Copernicus, Galileo, Newton and Einstein, Darwin has rightly earned his place in the scientific revolution.

8.8 CHECK YOUR PROGRESS

1. What is special theory of relativity also known as?

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2. When and for which theory did Einstein receive a Noble Prize?

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3. What is the importance of General Theory of Relativity?

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4. Describe Bose – Einstein's Statistics.

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5. What is Charles Darwin best known for?

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6. What does Charles Darwin mean by the expression 'survival of the fittest'?

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7. Name the naturalist who had come up independently with similar observation that of Charles Darwin.

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8.9 SIR C.V.RAMAN

Sir C.V.Raman was the first Indian and Asian physicist to win the Noble Prize. He put India on the International map of science. After graduating from the University of Madras, he opted for civil service in the Department of finance. But the thirst of knowledge could not restrain him. He resigned from the government job. He accepted the chair of physics at the University of Calcutta. The contributions of C.V.Raman are as follows:

Raman Effect: Raman discovered the spectrum of light scattered by transparent matter contained a number of lines. This is known as Raman Effect. It is for this contribution Raman was awarded the Noble Prize in Physics in the year 1930.

Raman's other contributions: The Raman Effect has led to the development of Raman laser, Raman Spectrography and Raman microscopy.

- Raman's studies on sound: Though Raman won the Noble Prize for scattering of light; his main field of interest has been the principle of sound, vibrations in musical instruments. His knowledge of the physics of sound was so accurate and outstanding that he was the only non – German invited to write on the subject Encyclopedia of Physics published in Germany in 1927.

The other notable contributions include molecular diffraction of light physics of crystals and musical instruments.

C.V.Raman founded the Indian Academy of Science in 1934. He rendered his invaluable services for 15 years. He accepted the charge as the Director of new founded Raman Research Institute at Bangalore. Here he investigated the crystal of structure and colour perception. Raman was knighted in 1929 and was named President of the Indian Academy of Science in 1934. Notable scientist such as K.S.Krishnan, S.N.Bose and Meghnad Saha worked under his leadership.

8.10 DR. HOMI BHABHA

Dr. Homi Bhabha (1909-1966) was a noted nuclear physicist, an able administrator, a builder of institutions. He is considered to be India's father of Nuclear Programme.

Contributions to science: The main scientific contribution of Dr. Homi Bhabha was the "cascade theory" of cosmic ray showers. In 1936, in coloration with Walter Heitler, he formulated this theory. According to this theory, cosmic rays are similar to those, emitted by radioactive substances and are of two types, namely, the primary cosmic rays, and the secondary cosmic rays. When the primary cosmic rays enter the earth atmosphere, they collide with atoms in the air, and thereby generate new nuclear particles. These new nuclear particles, which move with great speed, are known as the secondary cosmic rays. Bhabha's Cascade theory is concerned with the genesis of the non-penetrating component of the secondary cosmic rays. The theory involved the formulation of mathematical equations, which had great significance and applications in the field of physics and mathematics. Later, Bhabha concluded that observation of the properties of such particles would

lead to experimental verification of Einstein's theory of relativity.

Nuclear energy programme: Homi Bhabha was a visionary who conceived India's Nuclear Programme. Along with a handful of scientist's, he launched the nuclear science research in India in March 1944. Soon after independence Bhabha established the Atomic Energy Commission of India in 1948.

In 1955, he presided over the first United Nations Conference on Peaceful uses of atomic energy in Geneva. In 1958, at the second United Nations Conference for Peaceful use of Atomic energy, Bhabha & Prasad outlined the India's three-stage nuclear programme which has now become a reality. Bhabha realized the necessity of acquiring the capability to design and built nuclear power units on its own. So as early as 1965, he resolved that the third atomic power station at Kalpakkam would be a totally Indian venture.

Contribution to India's other programs: Bhabha was instrumental in initiating India's space program in the early years. Further he encouraged research in electronics, space science, radio astronomy and microbiology. Bhabha also made remarkable contributions to Quantum Mechanics, which was his special field of great interest. The famous radio telescope at Ooty was his initiation and it became a reality in 1970.

Setting up institutions: The main institutions founded by Bhabha are, Cosmic Ray Research unit at Institute of Science, Bangalore in 1944. From 1945 until his tragic death in an air crash on Mont Blanc on January 24, 1966 Bhabha worked as the Founder – Director of the Tata Institute of Fundamental Research, Mumbai and Chairman of India's Atomic Energy Commission. Electronics Corporation of India limited at Hyderabad and the Nuclear Fuel Complex, located at Hyderabad were also his initiative. The technologies required by ICIL & NFC have been developed by BARC. In recognition to Bhabha's contribution, the Atomic Plant at Trombay was named after him as Bhabha Atomic Research Centre (BARC).

8.11 CHECK YOUR PROGRESS

1. What is meant by Raman Effect?

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2. Name the institutions founded by Raman.

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3. What is the difference between primary cosmic rays and secondary cosmic rays?

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4. State the main institutions founded by Bhabha.

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8.12 SUMMARY

Galileo revolutionized men and Church thinking and to him goes the credit of using the scientific method in the modern sense. Galileo for his stress on experiments is also known as the father of experimental physics. Newton's theory of gravitation and his contribution to astronomy mark the final stage of transformation of the Aristotelians world picture given by Copernicus. For the various theories propounded by Newton he is known as the father of theoretical physics.

Einstein with his Special and General theory of relativity brought to notice that Relativity is understanding of world not as events but as relations. Einstein joined light to time, and time to space, energy to matter, matter to space, and space to gravitation. At the end of his life, he was still working to seek between gravitation and electromagnetism.
His theory had far reaching consequences. Darwin with his theory of natural selection was one of the most important scientists to give a final blow to the authority of the Church. His theory states that species arise in nature through evolution.

Sir C.V. Raman, put India on the international map of science with his discovery of the Raman Effect. Raman was also a versatile personality with a great interest in music. Dr. Homi Bhabha played a major role in shaping India's nuclear energy programme. He founded a number of institutions and his greatest contribution to science is his "cascade theory" of cosmic ray showers.

8.13 KEYWORDS

Scientific method, Experiments, Special Theory of Relativity, Theory of Evolution Raman Effect, Cascade Theory

8.14 UNIT END QUESTIONS

1. Briefly examine the contributions of Galileo towards the growth of science.

2. Why is Newton known as the father of theoretical physics?
3. Explain Einstein's theory of relativity.
4. What is Darwin best known for? State the importance of his theory.
5. What are the contributions of Dr. C.V.Raman towards the growth of science?
6. Bring out the contributions of Dr. Bhabha.

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9

NATURE OF ECOLOGY

Unit Structure

9.0. OBJECTIVES

After Studying the unit will be able

- To know the subject matter and scope of Ecology
- To understand the different components in the system.
- To know about Environmental degradation its causes, and the measures for protecting environment from its degradation.
- To understand the relationship between human activities (mainly Agricultural and industrial) and Environmental Degradation.

- To realize the importance of Environmental Ethics in the protection of physical Environment.

9.1. INTRODUCTION

Ecology studies organisms and the environment. Both the existence and survival of man totally depends upon the health of physical environment. It is necessary to know the components of the Eco-system or Environment. The physical environment is being degraded due to primary, Secondary, Tertiary and quaternary activities. Man is exploiting natural resources as per his wish. This also results in environmental degradation. Natural Resources Should be exploited judiciously and conserved for future generations. It is here where Environmental Ethics helps man in the exploitation and conservation of natural resources. This is essential for protecting the environmental from its degradation. And therefore, in this chapter, the topics like ecology, Components of the Eco-system Environmental Degradation due to human activities and Environmental Ethics are discussed.

9.2. NATURE OF ECOLOGY

9.2.1. Definition and meaning of Ecology.

The term Ecology was coined by Ernst Haeckel a German biologist in 1866. It is derived from the Greek terms `Oikos' and Logos. Oikos literally means dwelling place and logos means science or study. Thus, etymologically Ecology means the study of organisms at their dwelling place.

Haeckel defines ecology as "the comprehensive science of the relationship of organisms to the environment". Smith, a modern ecologist has also defined ecology as, "A multi disciplinary science which deals with organism and its place to live". He focuses on the study of eco-system.

Eugenics Warning a Danish botanist wrote a very comprehensive text book on ecology and therefore, he is accepted as the father of modern ecology.

Ecology is generally described as the study of eco-system which forms a self functioning whole in the nature. The eco-system refers to a fairly self sustained system of organisms living in the physical environment. Thus, the eco-system consists of the two main components viz the Abiotic and the Biotic component.

9.2.2. The A-biotic Component.

The Abiotic Component Consists of non living things. It refers to the physical environment that includes Land, water, gases, minerals,

metals, elements, Chemicals, Compounds dead plants etc. On the other hand the Biotic Components refers to organisms and living beings.

The Abiotic and Biotic components constitute the system which is known as eco-system. The ecosystem consists of the lithosphere, Hydrosphere, Atmosphere and Biosphere.

Lithosphere – This is the uppermost Layer of the Earth. It supports continents and oceans. Its thickness varies from place to place. It ranges between 35 to 50 Kilometers in the continental regions and between 6 to 12 Kilometers at the base of oceans. It is about 60 Kilometers at mountaintops.

Hydrosphere – This refers to the water occupied portion of the earth. It includes the water in lakes, rivers, glaciers, ice caps and oceans. It also includes the underground water. About 97 percent of water on the earth in bound in oceans and seas and the remaining 3 percent of water is found in the other water systems.

Atmosphere – This refers to a layer of gases that surrounds the earth. It is bound to the earth because of the gravitational force of the earth. It protects living beings from the most harmful ultra-violet rays of the sun. The ozone layer in the atmosphere absorbs ultra-violet rays and protects organisms from them. It reduces the intensity of heat of the sun. The atmosphere also serves as the most effective medium for communication.

There are atomic particles in the atmosphere up to 50 kilometres above the surface of the earth. The atmosphere contains the gas like Nitrogen, Oxygen, Argon, Carbon dioxide, Helium, Neon, Methane etc. Above 50 Kilometres, the atmosphere contains the gases like atomic oxygen, hydrogen, helium and Ozone. All these gases are present in the atmosphere in a definite proportion. There is also water in the atmosphere in the form of vapour up to 12 Kilometres from the surface of the earth. The freshness of water on the earth is due to the presence of water in the atmosphere.

Biosphere – It refers to living beings on the earth. Plants, animals, birds are organisms or living beings. They interact with one another. They also interact with the physical environment that consists of lithosphere, hydro sphere and atmosphere.

9.2.3. The Biotic Component.

The biotic components on the earth are classified into three types viz ; Producers, Consumers and Decomposers.

Producers – Green Plants are known as producers because they produce their food through the process of photo synthesis. They absorb simple materials from the soil and air and convert them into food with the help of sunlight. Producers also provide food to all living beings in the eco system.

Consumers – Animals including birds and human beings are known as consumers because they only consume the food prepared by producers. They do not produce food on their own. They have to depend upon producers for food. On the basis of the type of food they consume. Consumers are classified into four categories as follows.

Primary consumers – These are animals that eat only green plants. For example, good, Sheep, Cow, ox etc. Primary consumers are also known as herbivores.

Secondary Consumers – These are animals that eat herbivores. For example, fox, owl etc. These are known as carnivores.

Tertiary Consumers – These are animals that eat Carnivores. For example, lion, tiger, wolf etc. These are also known as carnivores.

Multi – Level Consumers – These are animals that eat both green plants as well as animals. For example, man, dog etc. These are known as omnivores.

Decomposers – These are small organisms that cause decay and decomposition. Fungi bacteria and insects are examples of decomposers. These organisms consume waste materials, dead plants and animals and obtain energy.

Thus the biotic component of the eco system also forms a very complex system.

9.2.4. Check your progress.

1. Define Ecology and explain its meaning.
2. State the A-biotic components in the Eco-system.
3. List the Biotic Components in the Eco System.

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9.3. SCOPE OF ECOLOGY

Ecology as defined by Haeckel is the most comprehensive Science. It touches almost all the aspects of organisms and the environment in which they live. Therefore, ecology has several branches which are at present developing as independent science.

9.3.1. The main branches of ecology.

Global Ecology - It attempts at understanding the earth as a single eco system.

Eco – physiology – This studies adaptation and response of plants and animals to the physical environment.

Community Ecology – This is concerned with the study of interactions among communities of different species in the environment. This explains the emergence and growth of diverse species and also the impact of diversity in the eco systems. It is also known as Gene ecology.

Population ecology – It studies a single species of organisms in relation to its environment. It mainly deals with the growth, spread, fluctuations and destruction of population of different organisms. It is also known as autecology's.

Behavioural ecology – It is mainly concerned with knowing the role of behaviour of organisms in their adjustment with the environment.

Ecosystem Ecology – It is closely related with biotechnology. It studies the flow of matter and energy from organisms.

Evolution Ecology – This concentrates on the study of the general principles of the evolution of several species of organisms in the eco-system.

Landscape Ecology – It deals with the study of the effects of changes in the use of land in the eco system.

Political Ecology – This explains now ecological problems can be controlled by developing eco-friendly political and economic systems.

Ecology can also be divided on the basis of the areas of interest. For example plant and animals ecology. Ecology is further divided on the basis of local eco system. For example, polar and tropical ecology etc. On the basis of application of ecology it is divided into resource, conservation, restoration and pollution ecology. Thus, ecology is not only a theoretical science but also an applied

science. Applied Ecology guides people in the proper exploitation conservation and restoration of resources given by nature. This helps in maintaining ecological balance.

9.3.2. Check your progress.

1. Explain briefly the scope of Ecology.
2. State the different branches of Ecology.

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9.4. ENVIRONMENTAL DEGRADATION

The quality of Environment depends upon ecological balance in the physical environment. Physical environment was ecologically more balanced in the past. Unfortunately this ecological balance is increasingly disturbed day by day. This has affected the quality of environment adversely. And the result is environmental degradation.

9.4.1. Definition of Environmental Degradation.

The term `Environmental Degradation' is defined as "an undesirable and excessive addition of some substances to air, water and soil which adversely affects and alters the original, natural quality of the environment". Air, water and soil are the main components of the physical environment. And excessive addition of poisonous substances to them reduce the quality of these basic components of the environment. All the there components get degraded. The soil, water and air pollution are examples of environmental degradation.

9.4.2. Types of Pollutants

Substances that pollute the environment are known as pollutants. When these pollutants are excessively present in the environment, the health of the physical environment is affected adversely. Pollutants are residues of the products that we produce, use and throw away. Following are the main types of pollutants.

Solid – This includes the hard waste from household, industries and agriculture. It is known as garbage.

Liquid – This includes the waste water from household and industries.

Gaseous – Carbon dioxide, carbon monoxide, Sulphur dioxide, etc. are examples of gaseous pollutants.

Metals – Excessive amount of lead, mercury pollute the air

Toxins – Poisonous chemicals like phosphate also pollute the physical environment.

Radioactive isotopes – When the radioactive particles are added into the environment, it gets polluted.

Fallout – Nuclear waste is the most dangerous pollutant. The environmental pollution due to nuclear waste is known as fallout.

9.4.3. Causes of Environmental Degradation.

There are several social, economic and ecological factors that cause environmental degradation. Some of them are as follows

Population Explosion – Human population is increasing continuously. But there is no corresponding increase in natural resources. This puts pressure on the available resources. They are exploited beyond limit and the environment gets degraded.

Rise in gross Consumption – Rise in the human population has led to corresponding increase in the gross consumption. to Satisfy the basic need of hunger, agricultural activities are intensified. Land or soil is used excessively. The quality of soil gets lowered resulting in environmental degradation.

Need for more living space - Continuous rise in the human population has created the need for more living space. For this purpose trees are cut and forest are cleared recklessly. This leads to deforestation, soil erosion and desertification which are the glaring instances of environmental degradation.

High generation of waste materials – The rise in gross consumption has led to generation of tremendous garbage and sewage or the solid and liquid waste. Incomplete and improper waste disposal causes environmental pollution or degradation.

Industrialisation – Rise in the human population has created the need for more industrial goods. This necessitated the need

for more industrial plants. Industries in general and chemical industries in particular generate toxic waste that pollutes the air, water and soil. And with these three type of environmental pollution, environmental degradation sets in.

Urbanization – Industries are generally established around towns and cities. This prompts villagers to migrate to cities in search of employment opportunities sometimes villages near industries get transformed in to town, cities and mega cities. This causes Urbanization. This puts undue pressure on sanitary facilities and also on infrastructures available to city-dwellers. This also causes ecological problems that contribute to environmental degradation.

Cost of pollution Control – Environmental degradation can be checked by controlling environmental pollution. But it is a very costly affair. Again no pollution can be controlled completely. Sometimes measures used for controlling the environmental pollution also cause pollution. And, therefore environmental degradation continues.

9.4.4. Measures suggested for preventing Environmental Degradation-

Though it is not possible to control environmental degradation completely it is possible to protect the environment from its further degradation. It can be presented and controlled by –

Exploiting Natural resources very carefully.

Conserving the available natural resources as far as possible.

Controlling the air, water and soil pollution.

Checking industrialization.

Discouraging Urbanization

Creating ecologically healthy human settlements.

Providing adequate sanitary facilities like closed drainages, and public latrines and toilets.

Creating environmental awareness among people.

Developing eco-friendly outlook

Protecting and promoting ecological balance.

9.4.5. Check your progress.

1. Define `Environmental Degradation'.
2. State the different types of pollutants.
3. What are the main causes of Environmental Degradation ?
4. Suggest the measures for protecting Environmental Degradation.

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9.5. HUMAN ACTIVITIES CAUSING ENVIRONMENTAL DEGRADATION

Man is particularly responsible for environmental degradation. As a matter of fact the physical environment tends to restore ecological balance. But human activities disturb it. Man has to undertake different types of activities for satisfying his survival needs. And there is no alternative to this. But these activities, when undertaken excessively cause irreparable environmental degradation. Human activities that contribute to environmental degradation are divided into the following four categories.

Primary activities – These are undertaken by man for obtaining means for satisfying his basis needs. For this purpose he has to undertake activities like farming, fishing etc. These are essential for satisfying the primary needs of man. Therefore these activities are known as primary activities.

Secondary activities – Means and materials obtained through primary activities cannot be used directly by man for satisfying his basic needs. These materials have to be processed before their use. Activities undertaken by man for processing the materials obtained thorough primary activities are known as secondary activities. Industrial activities are the examples of secondary activities.

Tertiary activities – Agricultural and industrial goods obtained through primary and secondary activities have to be marketed in order make them available to people. These goods also have to be transported from the place of production to the place of consumption. All such transport and trading activities are known as tertiary activities.

Quaternary activities – People require services of technical experts and skilled persons. For example, people require the services of doctors, engineers, electricians, architects etc. for meeting their difference types of needs. All such service oriented activities are known as quaternary activities.

All the above four types of human activities cause environmental degradation either directly or indirectly. But really speaking, agricultural and industrial activities are mainly responsible for environmental degradation. It is necessary to known how agricultural and industrial activities cause environmental degradation.

9.5.1. Environmental Degradation due to agricultural activities

Agricultural activities are primary activities. These are undertaken by man for obtaining materials for satisfying his hunger. Human population is increasing continuously. This has led to rise in overall consumption. In order to satisfy hunger of the human population, man tries to produce more agricultural goods. In his attempt to produce more the land available to him is used excessively and indiscriminately. He has developed several faulty agricultural practices that necessarily cause environmental degradation in general and soil degradation in particular. Over cultivation, overgrazing, over irrigation, deforestation, excessive use of chemical fertilizers, use of pesticides, insecticides and herbicides are the main faulty agricultural practices. All these faulty practices contribute to environmental degradation.

All the above mentioned faulty agricultural practices have harmful effects on the physical environment. For example, deforestation leads to soil erosion. It causes reduction in overall rainfall. It also destroys plant, animals, birds and the wild life. It causes extinction of species of animals.

Excessive use of soil for the purpose of cultivation results in the loss of nutrients in the soil. This reduces the bioproductivity of soil.

Faulty water supply causes either salination of soil or water logging. In adequate water supply causes salination of soil and excessive supply of water results in water logging.

Use of chemical fertilizers for improving agricultural production and the use of pesticides, insecticides and herbicides for the protection of crops in the field not only pollute the soil but also water and air and the environment gets degraded.

Thus intensified agricultural activities necessarily disturb ecological balance and the result is environmental degradation.

9.5.2. Environmental Degradation Due to industrial activities –

Like agricultural activities, industrial activities also contribute to environmental degradation. Industrial activities are secondary activities and these are essential for processing the materials obtained through primary activities. These activities cannot be avoided completely because most of the materials obtained through arming, finishing etc have to be processed and refined before they are used by man for satisfying his basic needs. For example, food grains have to be finished, rice has to be polished and oil from groundnut and other agricultural goods has to be refined finishing, Polishing and refining are essential secondary activities. For this purpose industries are established. These agro industries generate enormous solid as well as liquid waste. And if it is not properly disposed of it causes environmental pollution.

Again certain industrial products like paper, leather, clothes, paints chemicals, medicines etc are indispensable in our life. And therefore there is need for the paper leather, textile, chemical and pharmaceutical industries.

Again man requires energy in different forms. In order to generate energy from different sources of energy like water, heat and atom hydraulic power plants, thermo electric projects, atomic power plants are constructed. These energy generating projects are also at most essential.

But all the above mentioned industries and power plants contribute to environmental degradation. The solid, liquid, toxic, gaseous waste from these industries and projects cause the soil, water and air pollution. And the physical environment gets degraded because of the disturbance in lithosphere, hydrosphere and biosphere. This destroys plants, animals, birds and the wild life. Thus even the biosphere gets disturbed, with the disturbance in all the four spheres of the eco system, the environment gets degraded.

9.5.3. Check your progress.

1. State the types of human activities that cause Environmental Degradation.
2. How do agricultural activities cause environmental Degradation?
3. How do industrial activities cause environmental degradation?

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9.6. ENVIRONMENTAL ETHICS (MEANING AND SCOPE)

9.6.1. Meaning and Scope of Environmental Ethics.

Ethics is a branch of philosophy.

It is a normative science. It is concerned with the discussion of questions such as what is moral or immoral ? What is right or wrong? Ethics emerged as a separate Science very recently. Now it has been recognized as an independent science.

Environmental Ethics is a branch of Ethics. It studies relationships between man and man, man and animals and man and nature. Man has been facing ethical problems pertaining to the physical environment. For example, It is ethical to cut trees and clear forests for satisfying the survival needs of man while neglecting the basic needs of animals and birds? It is not obligatory on his part to preserve the environment for future generations? Environmental Ethics discusses all such value oriented questions. This discussion help in changing man's outlook towards man, animals and nature. It makes it clear that men and animals have equal rights on natural resources and they have equal right to enjoy unpolluted environment. And, therefore from the point of view of environmental ethics anthrop centric or man centred ecology is wrong. It strongly advocates not only the zoo centric (animal cantered) but even the eco centric outlook towards the nature. Man alone has no right to use natural resources as he likes. He has to think about other species while exploiting natural resources. It is morally obligatory on his part to preserve natural resources for animals and birds. It is also his duty to protect the environment for future generations.

Thus Environmental Ethics mainly deals with the discussion of Environmental Rights of man, animal and birds and also the moral responsibility of man to protect the environment. Like man, every animal has right to life (and of course right to dignified life), and right to enjoy unpolluted environment. And, therefore, man cannot exploit the nature as per his wish. He has to think that there are other animals who have equal claim on the use of resources given by nature. Again he must realize the fact that the protection of environmental health is essential not only for his existence and survival on the earth but also for the survival of animals and birds. It is necessary to give up man centre outlook and develop not only 300 centric but eco centric outlook towards the nature.

9.6.2. Importance of the study of Environmental Ethics.

It is clear from the above discussion of the meaning, subject matter and scope of environmental ethics that its study is essential for the

following Purposes

For fair distribution of natural resources.
For the conservation of natural resources for future generations
For the protection of environmental rights of men, animals and organisms.
For prevention of further environmental degradation
For developing eco centric outlook towards the nature
For creating reverence for man, animals and the whole creation.

9.6.3. Check your progress

1. Explain the meaning and scope of Environmental Ethics'.
2. What is the importance of the study of Environmental Ethics?

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9.7. SUMMARY

Ecology is an independent science. It is concerned with the study of organisms and environment. The physical environment is being degraded due to human activities. Intensified agricultural as well as excessive industrial activities causes, Environmental Degradation. Man's existence and survival on the earth is in difficulty because of Environmental Degradation. It has to be prevented and controlled. For this purpose natural resources have to be exploited to the optimum and they have to be conserved also Environmental Ethics advises man to protect Environmental Degradation.

9.8. KEY WORDS.

Ecology, Eco-System, Biotic, A-biotic, Environmental Degradation and Environmental Ethics

9.9. UNIT END QUESTIONS

1. Define Ecology and explain its subject matter.
2. Describe the main components of eco-system.
3. Explain briefly the structure of Ecosphere.
4. Illustrate the main branches of colony.
5. Define `Environmental Degradation What are its main causes?
6. State and explain different types of substances that pollute

the physical environment.

7.Explain the types of human activities that cause environmental degradation.

8. How do agricultural activities cause environmental degradation?

9. Discuss, with examples, environmental degradation due to industrial activities.

10. Define `Environmental Ethics'. And explain briefly its subject matter.

11. Discuss briefly the meaning and scope of environmental ethics. Explain its importance.

9.10 REFERENCES

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10

ENVIRONMENT AND HUMAN HEALTH

Unit structures

10.0 OBJECTIVES:

After reading this unit you will be able to-

- Understand the relationship between environment & community health
- The various types of diseases.
- Recognize some of the symptoms of diseases

10.1 INTRODUCTION

Health is a very attractive term. It is a relative concept. Health is considered as wealth. Every one wishes to have a good health. If a person has a good health then only he/she can make progress in life. Human body has its own mechanism of maintenance. The body has got the capacity of making constant adjustment and retaining the same. This mechanism is called as “Homeostasis”. However due to some reasons this mechanism may get disturbed as a result persons health is affected. A person is said to be in good health if he is able to function properly in a given environment, thus there is a direct relationship between health and environment. If environment is protected and is pollution free then community health can be maintained. However today the quality of environment has been deteriorated and therefore it is affecting community health.

10.2 ENVIRONMENT AND HEALTH

Environment means the physical, chemical and biological condition in which human beings live. Health depends on the quality and condition of air, water, food, soil and climate. If the air, water, soil, are polluted or the food is contaminated then a person suffers.

Quality of natural environment and social environment is very important for the maintenance and promotion of good health. Social environment mainly refers to lifestyle of a person, food habits, consumption of alcohol, fatty and oily diet, stress, tensions etc.

WHO (World Health Organisation)defines health as “Health is a state of complete physical mental and social wellbeing & not merely an absence of diseases or infirmity” health has three dimensions viz physical health which means our bodily organs & various systems must function properly within a given environment. Mental well being means mind should have a proper control over our emotion, action, thought and social well being means we are able to adjust well with others as we are living in a society. Health is a state of dynamic equilibrium or adjustment between a person and his/ her environment.

Community health may be defined as “the organized way of application of resources to achieve the greatest health for greatest number of people”. Community health depends on the quality of environment.

If the quality of environment is not good or there is pollution or environment degradation then more number of people will fall sick. Community health depends on two important factors i.e. sanitation and vaccination. Sanitation involves maintaining personal cleanliness and cleanliness of the surrounding area. Sanitation is the science and work of bringing about healthful and hygienic condition. As the W.H.O. defines it as the control of all those factor which exercise or may exercise deleterious effect on his physical development, health and survival. Sanitation aims at keeping the basic necessities of life- air, water, food and housing disease free.

Air sanitation means clean and pollution free air. It has been observed that where pollution is more there people suffer and in such polluted areas respiratory diseases, cough, cold, asthma are the common problems.

Water sanitation- if people get good and adequate water supply then there is fall in diseases but if water is polluted then more number of disease producing germ will breed in that water, causing danger to the health of the people.

Food sanitation- concern about good quality of food. Food should not be exposed to bacteria and flies. Before we take any kind of food we must wash our hands. Inefficient sanitation facilities may lead to infection in eyes, ears, skin etc.

Sanitation also involves sewage and refuge disposal. The disposal of human waste is one of the most important problems as it leads to a serious situation which poses threat to human health.

The central sewage disposal system is the most important requirement but which is not present in most of the urban cities.

Vaccination-We are surrounded by microorganisms which may cause diseases. When our body gets in contact with them it develops resistance. This resistance gives us immunity (fighting power) against diseases. This is natural immunisation. Today artificial immunisation can be provided with the help of vaccination. Vaccination helps in developing immunity to fight with certain diseases. In our country pulse polio vaccination is popular program. By providing vaccination many diseases like cholera, typhoid hepatitis can be prevented. It is rightly said prevention is better than cure.

10.3 RELATIONSHIP BETWEEN ENVIRONMENT AND COMMUNITY HEALTH.

A disease is a change in the body's condition which may be due to environmental factors that could be nutritional, chemical, biological, or physiological. Thus health and environment are interconnected. Unfavorable environment is related to emergence of diseases in poor countries. Majority of deaths are due to infectious diseases which mainly arise due to unfavourable environment. Children in the poor countries are the major victims of the environmental related diseases like diarrhoea, cholera, dysentery. Environment affects human health are mainly due to following important reasons.

1) Scarcity of natural resources.
2) Exposure to biological agents.
3) Developmental impact on environment.
4) Pollution.
5) Climatic changes.

1) Scarcity of natural resources – For satisfying one's basic needs, a person depends on natural resources like air, water, etc. however absence of clean pure air, lack of access to pure drinking water, adulterated food causes various health problems. According to recent survey 7% of all deaths and diseases all over the world are caused by actual shortage of water and unhygienic condition.

2) Exposure to biological agents- Environmental hazards includes micro organisms or biological agents; such as bacteria, viruses, parasites which causes various diseases. All the bacteria are not harmful to human health. There are some which are carriers of diseases; they are called as pathogenic organisms.

3) Developmental impact on environment—In industrialized and developing countries developmental policies may lead to health problems. Deforestation, buildings of dam have been shown to be reason of rise of malaria, fever etc. When development projects

are planned without keeping people in mind, health disaster often follow. Heavy air pollution is affecting mainly the health of poor people which is responsible for increase of many diseases.

4) Pollution and health- For economic development, industrialisation is considered as most important factor. However it is also responsible for increasing of air pollution, water pollution, soil pollution etc. This further affects human health. A person‘s health depends on his environment. If the environment is not good and if there is pollution in the industrialized world then the person’s health will be affected. Air pollution, water pollution and noise pollution are increasing so numbers of people suffering due to diseases are also increasing. In the urban industrialised society, air pollution is common problem. It is mainly caused by burning fossil fuels, such as petrol diesel etc. Air pollution causes health problems like asthma, bronchitis, nervous system damage, head ache, nausea etc. Noise pollution affects hearing system, blood pressure. It also increases risk of heart diseases

5) Climate changes- Due to the changes in the environment automatic changes are taking place. Climatic change consists of extreme weather like extreme heat or extreme cold. “Climate change can cause any possible health problem including cancer, heart disease, fatigue, irritation, skin allergies, headache, nausea, damage to nervous system, water borne diseases.”

A **Check your Progress**

Q.1 Health is a state of complete _____, _____and_____ wellbeing.

Q.2 Community Health mainly depends on _____and_____

Q.3 Homeostasis refers to _____

Q.4 Explain the environmental factors that affects human health?

_____

_____

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10.4 FOOD RELATED HEALTH PROBLEMS (FOOD BORNE DISEASES)

Food, water and air are the most important factors for the

survival of human beings. A person's health depends on clean and pollution free air, water and unadulterated food. However in industrialized society completely pollution free air and water are rare. If water gets contaminated then it becomes the breeding ground for producing diseases , so there are waterborne diseases, food borne diseases and air borne diseases. Some micro-organisms are the carriers of diseases; these micro-organisms are transmitted to man.

Salmonellosis –

The people of the developed countries are getting affected from this disease. Every year, approximately 40,000 cases of Salmonella poisoning are reported in the United States. Since many milder cases are not diagnosed or reported, the actual number of infections may be more than *30 times greater*. This disease is caused by Salmonella bacteria which are rod-shaped, flagellated, and are known to cause disease in humans, animals, and birds (especially poultry) worldwide Approximately 600 people die every year from acute salmonellosis.

The most common symptoms are diarrhoea, fever, abdominal cramps .Diarrhoea may get so severe that the victim needs to be hospitalized. In these cases, the Salmonella infection may spread from the intestines through the blood stream to other body sites, which can cause death unless the victim is treated promptly with antibiotics. Salmonella infections usually get better without treatment in 5-7 days. Treatment is necessary if the victim becomes severely dehydrated or the infection spreads through the blood.

There is no vaccine for Salmonella. For prevention following steps are suggested.

- Cook poultry, ground beef, and eggs thoroughly before eating. Do not eat or drink foods containing raw eggs, or raw unpasteurized milk.
- Wash hands, kitchen work surfaces, and utensils with soap and water immediately after they have been in contact with raw meat or poultry.
- Thoroughly wash fruits before consuming.
- Peel and discard outer leaves or rinds of fruits and vegetables.
- Keep refrigerators clean and cold.
- Wash your hands thoroughly after using the toilet or changing diapers, and before preparing food.
- People who have salmonellosis should not prepare food or pour water for others, until they have been shown to no longer be carrying the Salmonella bacterium.
- Mother's milk is the safest food for young infants. Breast-feeding prevents salmonellas and many other health problems.

10.5 WATER BORNE DISEASES

Water is the most essential requirement for the existence of life including trees, animals and humans. In the polluted water various micro-organisms are present. Some of them are harmful to us as they are the carriers of various diseases like diarrhoea, bacillary, dysentery, typhoid fever and cholera.

1) Diarrhoea

Diarrhoea is common cause of infant's death all over the world. According to UNICEF 17% of deaths among children is due to diarrhoea. According to the report of The Times of India dated 24/04/2009 among the five diseases registered at municipal clinics, the incidence of diarrhoea is the highest across the city (Mumbai) its main symptoms are persistent looseness of bowels malabsorption of fat, yellowish greasy stools, fever and anemia. The loss of fluid through diarrhoea can cause sever dehydration which is one cause of death. In diarrhoea there is loss of water, electrolytes, important, salts and other nutrients. Diarrhoea commonly results from gastroentitis caused by viral infections, parasites or bacterial toxin. Diarrhoea can also be caused in those who are lactose intolerant (if they take excess lactose or milk product)**.** Symptomatic treatment for diarrhoea involves the patient consuming adequate amount of water to replace that loss preferably mixed with electrolytes to provide essential salts and some amount of nutrients. For ill malnourished individual diarrhea can lead to dehydration and if it is not treated properly then it may become life threatening

2) Typhoid fever

It is caused by bacterium known as salmonella typhi. Bacteria are found in water or foods by a human carrier deposited and are then spread to other people in the area. India, Pakistan and Egypt are known as high risks are for developing these diseases. Worldwide typhoid fever affects more than 13 million people annually, with over 50 thousand patients dying due to this disease.

Patients with acute illness can contaminate the surrounding water supply through stool which contains a high concentration of the bacteria.

The common symptoms are poor appetite, headaches, generalized aches and pains, fever, lethargy and diarrhea. People with typhoid fever usually have a sustained fever as high as 103- 104 Fahrenheit. Chest congestion develops in many patients and abdominal and discomfort are common. Typhoid fever is treated with antibiotics.

3)Cholera- Is an acute diarrhoea, caused by infection of intestine with the bacterium vibrio cholera, approximately one in 20 infected

persons has severe diseases characterized by profuse watery diarrhoea, Vomitting, leg cramps. Due to diarrhoea there is loss of bodily fluids, which may lead to sever dehydration. Without treatment death can occur within hours**.** A person may get cholera by drinking water or eating food contaminated with the cholera bacterium.

According to BBC news dated 29/August /2007 in Eastern India the outbreak of cholera has affected Rayagada, Koraput and Kalahandi districts in the state of Orissa where more than 2,000 people were admitted to hospitals. Officials say thirty-five people have died of the disease in three tribal districts in the past two days, they added that the death toll from this disease has risen to 115 Doctors say contaminated food and water are to blame for the epidemic.

In the treatment of Cholera most important step is immediate replacement of the fluid and salts lost through diarrhoea. Patients can be treated with oral rehydration solution, a pre-packaged mixture of sugar and salts to be mixed with water and drunk in large amounts. This solution is used throughout the world to treat diarrhoea. Severe cases also require-intravenous-fluid-replacement.

Antibiotics shorten the course and diminish the severity of the illness, but they are not as important as rehydration. Persons who develop severe diarrhoea and vomiting in countries where cholera occurs should seek medical attention promptly. Although cholera can be and is, if left untreated, life-threatening, prevention of the disease is normally straightforward if proper sanitation practices are followed. It is observed that in those countries where sanitation practises are not followed there cholera poses severe problem.

4) Hepatitis – Hepatitis is infestations and inflammatory disease of the liver. Hepatitis is acute when it lasts less than six months and chronic when it persists longer. It is caused by the group of virus called Hepatitis. There are many types of hepatitis like hepatitis A, hepatitis B, hepatitis C. From these hepatitis A is less common. Hepatitis B is the most infectious blood borne disease. It is a viral infection that attacks the liver and can cause both acute and chronic disease. About 2 billion people worldwide have been infected with the virus and about 350 million live with chronic infection. An estimated 6,00,000 persons die each year due to the acute or chronic consequences of hepatitis B.

When the hepatitis is mild it requires no treatment, however in case of very severe hepatitis liver transplantation is required. The Initial features are and include, muscle and joint aches, fever, nausea or vomiting, diarrhoea, and headache. Hepatitis mainly affects liver functioning including removal of harmful substances,

regulation of blood composition, and production of bile to help digestion. The symptoms in acute and chronic hepatitis differ. In acute hepatitis whatever the cause is, the common symptoms are loss of appetite, dark urine, yellowing of the eyes and skin (i.e. Jaundice) and abdominal discomfort. Only 5-10 percent of adults infected with Hepatitis B virus develop chronic infection. They are called chronic carriers. Two third of these people themselves do not get sick but they may transmit disease to others. Chronic Hepatitis may lead to liver Cirrhosis i.e. hardening of the liver, or liver cancer (hepatocellular carcinoma). About 15-25 percent of people die of liver diseases.

Treatment-
Acute hepatitis usually goes away by itself so therefore it does not require any treatment. However if the patient suffers due to vomiting or diarrhoea the treatment is required to be given for controlling these symptoms. Chronic hepatitis requires a proper medical care. There are four medications currently approved by the Food and Drug Administration (FDA) for treatment of active hepatitis B infection.
Alfa Interferon
Lamivudine
Adefovir dipivoxil
Baraclude

Precaution-
Current public health efforts to prevent the disease have focused on vaccinating people.

Soil Borne Diseases- Small children like to play in soil, as a result they easily become victims of soil borne diseases. Among these diseases the most common are intestine parasitic infection caused by worms. According to WHO's report (1996) 35 million people were infected by worms. Another soil borne infection is tetanus. This diseases affects newborn and thier mothers. As a precaution, during pregnancy anti tetanus injections are given.

B Check your Progress

Q1. In Salmonellosis treatment is necessary if the victim becomes severely _____or the infection spreads through _____
Q 2. Hepatitis is _____when it lasts less than six months and _____when it persists longer.
Q3 The loss of_____ through diarrhea can cause sever ____
Q.4 Typhoid is caused by ____known as _____

_____

_____

_____

_____

10.6 AIR BORNE DISEASES

1) **Tuberculosis**

Tuberculosis is often abbreviated as *TB.* It has a long history. During ancient times in India it was known as 'Rajyaroga' .It is caused by mycrobacteria called as *Mycobacterium tuberculosis.* Tuberculosis is spread through the air, when people who have the disease cough, sneeze, or spit. It is the disease of lungs. However, TB can also attack other parts of the body such as the central nervous system, circulatory system, bones, joints, skin and even the lymphatic system. The chances of affecting TB increases in the people with the weakened immune system. AIDS, HIV and other immune-declining conditions makes it easier for the person to contract TB.

Some symptoms of TB are chest pain, prolonged cough for more than three weeks, coughing up blood, fever, chills, night sweats, appetite loss, weight loss, pallor and fatigue .T.B. can be detected with the help of chest x-rays. Besides this the help of following test is also done i.e.), a tuberculin skin test, blood tests, as well as microscopic examination and microbiological culture of bodily fluids

Treatment for tuberculosis is difficult and requires long courses of multiple antibiotics. Proper treatment is very important for a T.B. patient to live a long and healthy life. Prevention of T.B .mainly depends on vaccination mainly Bacillus Chalmette Guerin (B.C.G) these vaccines are available for children. Unfortunately, no vaccine is available that provides reliable protection for adults.

According to the World Health Organization (WHO), nearly 2 billion people—one third of the world's population—have been exposed to the tuberculosis pathogen. Annually, 8 million people become ill with tuberculosis, and 2 million people die from the disease worldwide. However it has been found that in many Asian and African countries the problem is more severe than in US or other developed countries.

2) Diphtheria

Diphtheria is an acute infectious disease. It is a contagious disease spread by direct physical contact. Diphtheria is an upper respiratory tract illness characterized by sore throat, low fever, and an adherent membrane (a pseudo membrane) on the tonsils,

pharynx, and/or nasal cavity. A milder form of diphtheria can be restricted to the skin. Symptoms include fatigue, fever, a mild sore throat and problems swallowing. Children infected have symptoms that include nausea, vomiting, chills, and a high fever, although some do not show symptoms until the infection has progressed further. In 10% of cases, patients experience neck swelling, informally referred to as "bull neck." These cases are associated with a higher risk of death. Sometimes a powerful toxin is also produced which may damage the heart and nerves. It is caused by bacterium coxynebacterium diptheriae. It affects the myelin sheaths in the central and peripheral nervous system.

Although its incidence has been reduced greatly by immunization, an epidemic in the former USSR resulted in 47,802 cases and 1,746 deaths in 1994, and 1,500 deaths in 1995. Today widespread vaccinations are available for this disease as a result diphtheria has largely been eradicated in industrialized nations In the US for example, there were 52 reported cases of diphtheria between 1980 and 2000; between 2000 and 2007 there were only five cases

Patients with severe cases will be put in a hospital's intensive care unit and be given a diphtheria anti-toxin. Antibiotics are also given to patients.

3) Influenza

Influenza is commonly known as flu. It is an infectious disease. Influenza is an acute respiratory viral infection which is caused by Orthomyxoviridae viruses .Common symptoms of the disease are chills, fever, pharyngitis, muscle pains, severe headache, coughing, nausea, vomiting, gastroenteritis, weakness and general discomfort. In more serious cases, influenza causes pneumonia. Influenza is transmitted through the air by coughs or sneezes.

Today vaccines for influenza are commonly used by the people in developed countries. This vaccine is called as the trivalent influenza vaccine (TIV)

There are various types of flu. The most famous and lethal outbreak was the so-called Spanish Flu pandemic (type A influenza, H1N1 subtype), which lasted from 1918 to 1919. From 20 to 100 million people have been killed due to this disease. During those times antiviral drugs were not available.

Patients suffering from Influenza are advised complete rest. They should drink plenty of water or other liquids. Paracetamol helps in curing the fever and body aches. Besides this sometimes anti viral drugs are also prescribed.

4) Pneumonia is the disease of the lung. Before the discovery of antibiotics one third of the people suffering from pneumonia subsequently died. It is caused due to bacteria, viruses, fungi, and chemical or physical injury to the lungs. Characteristic symptoms of pneumonia are cough, high fever along with chills, chest pain, and difficulty in breathing. From patient's condition of chest, speed of breathing doctor can detect it, but for further confirmation he takes the help of X-ray of chest, sputum is also pathologically tested for diagnosis. If the pneumonia is caused by bacteria or fungi, the organisms can often be detected by sputum examination. Treatment depends on the cause and type of pneumonia, different treatment is prescribed for different type sometimes treatment for one may not be effective for the other. The bacterial pneumonia is treated with antibiotics. Viral pneumonia caused by influenza A may be treated with rimantadine or amantadine, while viral pneumonia caused by influenza A or B may be treated with oseltamivir or zanamivir

10.7 OTHER DISEASES

1)Malaria:-The mosquito is considered as one of the most dangerous insects, many diseases are caused by mosquito bite, Malaria, Dengue, Filariya, Chikungunya etc. Due to international travel, trade and migration, the disease producing mosquitoes are also migrating from one country to another. Every year there are 350 to 500 million cases of malaria all over the world killing between three million people. Malaria is caused by parasite called Plasmodium i.e. transmitted by the female Anopheles mosquitoes. Malaria is commonly found in tropical areas such as Africa, Central and South America, South East Asia and the Pacific Islands. The common symptoms of malaria are headache, aching muscle, weakness or lethargy. Later on fever becomes higher along with chills, the headache becomes more severe and there is also loss of appetite and vomiting. If a person is infected with P. falciparum then his/her malaria becomes more sever in such cases. Person may suffer from low blood pressure, jaundice, kidney failure, etc. In case of sever malaria even some times the brain and central nervous system can be fatal.

Prevention: - It can be reduced by preventing mosquito bite, mosquito net spraying insecticides in the houses and standing drain water.

Treatment: - It involves specific anti-malarial drugs along with the supportive measures. Malaria became endemic to Mumbai in Sept. 2002. In case of malaria initially fever comes and goes, so it is confused with ordinary fever. Malaria is confirmed only after blood test. Generally chlorquin tablet is prescribed. If the malaria infection with plasmodium Falciparum is severe then patient requires hospitalisation. Anti-malaria drugs and some supporting measures

are used for the treatment of malaria. For malaria prevention is always better. In the malaria affected areas Indoor Residual Spraying (IRS) insecticides is very effective for prevention. Some more preventive measures are using mosquito nets, mosquito repellant creams and insecticide vapourisers.

2) Dengue: - Dengue fever and dengue haemorrhagic fever (D.H.F) are closely related viral diseases. Out of these two D.H.F is more severe. Like malaria these are also mosquito-borne viral infection. Every year 40 million people are affected by these diseases. In 1996 there was an epidemic of dengue in Delhi in which 10,252 cases and 423 deaths were reported. Haryana, Punjab, Uttar Pradesh, Karnataka, Maharashtra & Tamil Nadu were also affected. Cause: - Dengue and D.H.F are caused by four distinct viruses transmitted by Aedes aegypti mosquitoes.

The symptoms of these diseases are sudden onset of fever with severe headache, muscles and joint pains and red rashes. In some patients there may also be Gastritis along with abdominal pain, nausea, vomiting or diarrhea.

In dengue dehydration may take place for which Oral fluid Intake or intravenous fluid supplementation is necessary. For treatment of dengue paracetamol preparation are prescribed. For preventing dengue one of the best methods is mosquito control. Aedes mosquito breeds mainly on water stored, in some artificial container like plastic bottles, cups, tyres etc. Periodic draining of these water collections will be effective in reduction of these mosquitoes. Other methods are the use of mosquito nets or mosquito repellent creams.

3) Chikungunya: - Chikungunnya is a form of viral fever. A widespread outbreak of chikungunya occurred in Tamilnadu, Karnataka, Kerala, Andhra Pradesh and some parts of Maharashtra in 2006-07 . In August 2006, thousands of cases were reported in Rajasthan. Chikungunya is caused by chikungunya virus (CHIKV), it is transmitted by the bite of an infected Aedes aegypti mosquito. This mosquito generally breeds on clean stored water. The symptoms of this disease are sudden onset of high fever, headache, joint pain and or swelling of joints, stiffening of joints, nausea and vomiting, & sensitivity to light. The patient can not move his/her limbs. In this disease even after the control of fever and other symptoms, the pain of joints persists for several week or months.

For this disease specific antiviral treatment is not available. Generally for controlling pain & other symptoms pain reliving drugs like paracetamol, ibuprofen is prescribed. Patients are advised to take complete rest. Aspirin is to be avoided.

Prevention for chikungunya is same as for other mosquito born diseases i.e. preventing mosquito bites & elimination of mosquito from that area by spraying insecticides, thermal fogs, avoiding or eliminating water collection covering properly the stored water. Mosquitoes can be prevented from entering the house by using mosquito nets on windows.

4) Bird Flu: - Every year new strains of flu emerges somewhere in the world and then quickly spreads to other parts of the world. The bird flu virus was first identified in Hong Kong in 1997 and from there it has spread to other countries in Asia, Europe and Africa. This disease mainly affects living organisms like birds and animals but besides that sometimes human beings are also affected by it. Bird flu is a highly contagious type of flu which is spreading through domestic & wild bird populations. This disease can make some domesticated birds, including chickens, ducks, and turkeys, very sick and kill them.

Bird flu is also known as Avian Influenza. It is caused by the H5N1 virus which is mainly found in birds. The latest outbreak of Bird flu has occurred in West Bengal's Birbhum district. According to report of the Times of India (dated 15th Jan 2008) nearly 19,000 chickens died in the village of Margram between 8th and 13th January 2008.

The widespread presence of H5N1 in poultry population may pose a problem to human beings. If the virus of bird flu passes from poultry to the humans then it may result in severe disease. Human beings may get infected through the direct contact with infected poultry or contaminated object.

The symptoms found among the humans are fever, cough, sore throat, muscle ache, conjunctivitis and in severe cases, breathing problems and pneumonia that may be fatal. Severity of the disease depends on the immunity of the person.

According to CDC (Centre for disease control and prevention) two antiviral medications, oseltamivir and zanamivir would probably work to treat influenza caused by H5N1 virus, but additional studies still need to be done to demonstrate their effectiveness.

Proper cooking of poultry products must be done in the areas affected by the bird flu in order to prevent the spreading of the disease. Consumers should make sure that the poultry products which they are consuming are well cooked.

5) **Conjunctivitis –** it is an eye ailment which is mainly inflammation of the eye. It is caused by allergic reaction or an infection (usually bacterial, but sometimes viral). Sometimes it may be caused by irritants like shampoo, dirt, smoke or chlorine.
The main symptoms of conjunctivitis are inflammation and redness

of the eye, swelling and redness of the areas around the eye, thick yellow or white discharge from the eye and in some cases there is itching in eyes. The patients also complain of pain and blurry vision. Conjunctivitis requires medical attention. Treatment differs according to the cause of the problem. For the allergic type, cool compresses and artificial tears sometimes relieve discomfort in mild cases. In more severe cases, non-steroidal anti-inflammatory medications and antihistamines may be prescribed. Bacterial conjunctivitis is usually treated with antibiotic eye drops or ointments that cover a broad range of bacteria.

Like common cold, there is no cure for viral conjunctivitis; however, the symptoms can be relieved with cool compresses and artificial tears (found in most pharmacies). For the worst cases, topical steroid drops may be prescribed to reduce the discomfort from inflammation. Viral conjunctivitis usually resolves within 3 weeks.

Conjunctivitis is spread by touch and not by looking into the eye of an infected person

To avoid spreading infection, take these simple steps:

- Disinfect surfaces such as doorknobs and counters with diluted bleach solution
- Don't swim (some bacteria can be spread in the water)
- Avoid touching the face of the infected person
- Wash hands frequently
- Don't share towels or washcloths
- Do not reuse handkerchiefs (using a tissue is best)
- Avoid shaking hands with the infected person

6) Liptospirosis: - Leptospirosis is an infectious disease caused by a particular type of bacteria called a spirochete. Leptospirosis can be transmitted by many animals such as rats, foxes, and others. People contract the disease by either ingesting contaminated food or water or by broken skin and mucous membrane (eyes, nose, sinuses, and mouth) contact with the contaminated water or soil. Leptospirosis bacteria can enter the body through broken skin and mucous membranes. The bacteria can also enter the body when a person swallows contaminated food or water. Once in the bloodstream, the bacteria can reach all parts of the body and cause signs and symptoms of illness. Most infected persons have a mild to moderate illness that is like many other tropical diseases. Symptoms include fever, headache, chills, nausea and vomiting, eye inflammation, and muscle aches. In more severe cases, the illness can result in liver damage and jaundice (yellowing of the skin and whites of the eyes), kidney failure, and internal bleeding. People who are seriously ill with leptospirosis often need to be hospitalized. Symptoms usually begin about 10 days after infection.

Leptospirosis is diagnosed by a special blood test that is available through state health departments. It is treatable with antibiotics. Treatment should be started as soon as possible. Severely ill persons might need intravenous antibiotic treatment and other supportive care. This disease can be prevented by minimizing contact with stagnant rain water, mud, and vegetation that might be contaminated with the urine of infected animals, especially rodents.

Check your Progress

Q. 1 What is the causing agent of malaria?

Q. 2 What are the symptoms of dengue fever?

Q. 3 What steps you must take to prevent chikungunya

Q. 4 Fill in the blanks

1. Conjunctivitis is a _____ ailment. The main symptoms are_____.2. Bird flu is also known as _____,the virus of it passes from_____to humans

_____

_____

_____

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_____

_____

_____

10.8 SUMMARY

There is a close interconnection between environment and human health. Health depends on the nature and quality of environment. In the good healthy environment where there is less pollution people enjoy good health, whereas the unhygienic, unsanitary conditions, polluted environment gives rise to the occurance of various diseases. WHO declares that the enjoyment of the highest condition of health is the fundamental right of every individual.

Environmental sources like air, water and food are the carrier of certain diseases. They may transmit certain bacteria, viruses and parasites. Besides this some of the insects like mosquitoes are the carriers of certain diseases e.g. malaria, chikungunya, dengue fever. Changing environment gives rise to new strains of viruses & bacteria causing new diseases like Bird Flu, Swine Flu etc.

10.9. UNIT END QUESTIONS

Q.1 Define health. Explain the relation between environment and health.

Q.2 How is one's health affected by environmental factors?

Q.3 Discuss briefly some of the water related and air related health problems.

Q.4 Explain in brief causes, symptoms and treatment in the following diseases:
(a) Typhoid (b)Diphtheria (c) Chikungunya (d) Leptospirosis (e) Tuberculosis (f) Bird flu

Q.5 What are the precautionary measures that are to be taken to prevent the following diseases?
(a) Salmonellosis (b) Conjunctivitis (c) Malaria

11

IMPACT OF DEVELOPMENTAL PROJECTS ON HEALTH AND ENVIRONMENT

Unit Structure

11.0. OBJECTIVES

After Studying the unit you will be able

- To know the necessity of Developmental projects.
- To obtain information about different types of Developmental projects.
- To be aware of the problems arising due to mega

developmental projects.

- To learn about the factors to be considered before proposing any new Developmental projects.
- To know the impact of Dams, nuclear power projects and Thermo - Electric projects on the environment and Health.

11.1 INTRODUCTION

Developmental projects are essential for economic development of any country. These projects are essential for providing infrastructures to people. But on the one hand Developmental project are unavoidable and on the other hand these projects have harmful effects on the environment and health. And, therefore, in this chapter an attempt is made to discuss different aspects of developmental projects such as the purposes behind developmental projects, types of these projects, factors to be considered before proposing any new project and the Impact of Dams, Nuclear Power Plants and Thermo - Electric Projects on the environment and health.

11.2 DEVELOPMENT PROJECTS

Economic development of any country depends upon two factors viz availability of natural resources and well developed infrastructures. Natural resources are the gifts of nature. They cannot be increased. And hence available natural resources should be used judiciously. They should be exploited and conserved to the optimum for bringing about the development of country.

Infrastructures are man-made means of travel and transport, Banking and insurance services, means of communication, energy are the examples of infrastructures. Indian economy is mixed economy. In India means of production are owned by people and infrastructures are provided to them by the government. Energy is the most fundamental infrastructure required for national development.

11.2.1 What are Developmental Projects?

Developmental projects are planned in order to make infrastructures available to people in general and industrialists in particular. Because developmental projects provide infrastructures required for agricultural, economic and industrial development in India, they are described as 'the centres of national development'.

11.2.2 Types of development projects -

On the basis of size, developmental projects are classified into two types viz small and big or mini or mega developmental projects.

Any irrigation project restricted to a village is an example of mini developmental project. The Sardar Sarovar project is a mega developmental project.

On the basis of purpose, developmental projects are classified into two categories viz single - purpose and multi-purpose developmental projects. Dabhol power project is a single-purpose project because it was undertaken for the sole purpose of generating electricity. The Narmada dam is a multi - purpose project because right from the beginning it was undertaken for providing drinking water to people as well as supplying water for the purpose of irrigation and also for the generation of power.

Developmental projects pertaining to economic development of country are broadly classified into the following five groups -

1) Agricultural projects - These are undertaken for bringing about agricultural development in the country. For example, irrigation projects.

2) Industrial projects - These are undertaken for bringing about industrial development. For example, iron and steel projects.

3) Transport projects - These are undertaken for providing travel and transport services to people. For example, roadways and railways.

4) Communication projects - These are undertaken for providing the communication services. For example post, telephone and internet services.

5) Power projects - These power projects are planned and undertaken for generating energy or power. For example, Nuclear power projects.

11.2.3 Problems arising out of Developmental projects -

On the one hand, developmental projects are essential for bringing about economic development of the country, but on the other hand, all these developmental projects also create several social, economic and environmental problems. These projects affect the environment and human health adversely. The main problems arising out of developmental projects are as follows -

1) Land is acquired from people for the purpose of construction of projects and a large number of people get displaced.

2) Local people lose their source of income and the means of livelihood, because of mega developmental projects.

3) Because of Developmental projects people are forced to migrate somewhere else for earning their livelihood through alternative sources.

4) People are also forced to change their employment pattern. For example, farmers who lose their land become factory workers.

5) Displaced people do not get rightful compensation in time for the loss of their property and employment.

6) The problem of rehabilitation is the most serious problem arising out of developmental projects.

7) Developmental projects also affect the environmental quality and human health adversely.

8) Because of these economic and ecological problems, local people start protesting the projects. This gives rise to social tensions and agitations.

11.2.4 Factors to be considered before proposing any new developmental project -

Impact of developmental projects on health and physical environment is very serious. And, therefore, it is necessary to think over the social, economic and ecological effects of developmental projects while proposing any new project. Some of the factors to be considered in this context are –

1) Whether the proposed project will have adverse effects on the physical environment.?
2) Whether the project will change the life style of people?
3) Whether it will change the employment pattern of people on a very large scale level?
4) Whether it will displace quite a large number of people?
5) Whether it will affect human health adversely?
6) Whether sweet fruits of projects will be shared equally between people?
7) Whether the cost of proposed project is feasible?

By considering the relative merits ad demerits, the proposed project should be either allowed or rejected. Such an exercise is known as Environmental Impact assessment (EIA). This is very essential for permitting any new project. It is better to prevent problems by rejecting the project than facing these problems arising out of developmental projects. Thus, any developmental project, it is proposed, requires a detailed and critical evaluation of the likely social, economic and ecological problems arising out of it.

11.2.5. Check your progress -

1. What are Development projects?
2. Explain the types of developmental projects
3. State the problems arising out of developmental projects.
4. List the factors to be considered before proposing any new Developmental projects.

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11.3 IMPACT OF DAMS ON ENVIRONMENT AND HEALTH -

In this chapter we are going to discuss the impact of Dams, Nuclear power plants and Thermo-electric projects on the environment and human health. These are all power or energy generating projects.

11.3.1 Purposes behind the construction of Dams -

Dams are generally constructed for retaining the rainwater to be used for the purposes of drinking, irrigation industries etc. The stored water is also used for generating energy or power. Thus, dams are multipurpose developmental projects.

Water is a source of energy. The energy generated from water is known as hydropower or hydel power. It is very cheap, extremely clean and pollution-free . It is also a renewable source of energy. And therefore most of countries in the world prefer hydropower dams to other power projects. Bhakra Nangal, Chambal Damodar Valley and Sardar sarovar projects are the major multi-purpose as well as mega developmental projects in India. All these involve the construction of small, medium and large storage dams as well as power houses.

Construction of large dams is essential to retain the rainwater for generating huge amount of hydro energy. This is essential for meeting the ever increasing energy needs of the country. The hydropower requires to be generated throughout the year. And for this purpose dams are constructed. On the one hand Dams are unavoidable and on the other hand with their construction several social, economic and ecological problems arise. Dams have adverse effects on the physical environment and human health.

11.3.2 Impacts of Dams on environment -

1) Dams cause the submergence of fertile agricultural and forest land.

2) Construction of dams causes destruction of forests. Thousands of hectares of forests get submerged.

3) Dams also disturb the biosphere. Both the terrestrial and aquatic animals are killed. This reduces biological diversity on the earth.

4) The huge volume of water stored in the dams may cause earthquakes.

5) Due to submergence of agricultural and forest land, farmers and tribal lose their land and they get displaced. This also creates another serious problem of rehabilitation of these displaced people.

6) The overflow of water from dams as well sudden release of a very high volume of water from them can cause floods that cause thousands of deaths of people.

7) Construction of dams also cause ecological imbalance which is the prime source of health problems.

11.3.3 Impact of Dams on human health -

Dams also give rise to serious health problems. They create conditions suitable for the spread of endemic or local and epidemic diseases. Environmental degradation in the form of air and water pollution causes air-related and water-related diseases. The storage of water in dams creates conditions conducive to the breeding of mosquitoes that cause epidemic and communicable diseases like malaria, filarial etc.

During the construction of dams workers are exposed to agents of diseases and suffer from many infectious diseases. Local people suffer from respiratory diseases like cough, cold and even Asthma. Again when people migrate somewhere else they carry these diseases with them and both the migrants and natives suffer from Infections and communicable diseases.

11.3.4 Check your progress -

1. What are the purposes behind the construction of Dams ?
2. State the impact of dams on the environment
3. What are the effects of Dams on the human health?

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11.4 IMPACT OF NUCLEAR POWER PLANTS ON ENVIRONMENT AND HEALTH.

11.4.1 What are Nuclear Power Plants?

Nuclear power plants are constructed for generating nuclear or atomic energy. There are two processes of producing the nuclear energy viz Nuclear Fission and Nuclear Fusion. In the former nuclear of atoms are split while in the latter, nucleus of atoms are fused or combined. In both the processes, there is loss of atomic mass and the mass lost is converted into energy which is named as nuclear or atomic energy.

When the atom bomb is exploded tremendous nuclear energy is created through the process of nuclear fission. And when the hydrogen bomb is exploded enormous nuclear is generated through the process of nuclear fusion. There is no control over the energy generated through atomic bomb blasts. It is so powerful that it destroys every thing in the range of bomb explosions. This is the reason why bombs are used as weapons in the wars for the purpose of destruction.

It is possible to control nuclear energy produced through the processes of Nuclear Fission and Nuclear Fusion. And for this purpose, nuclear reactors are constructed. Since there is complete control over the energy created in nuclear reactors, it can be used for peaceful purposes.

11.4.2 Types of Nuclear Reactors.

On the basis of purposes behind constructing the nuclear reactors they are classified into three types viz 1) production Nuclear Reactors 2) Research Nuclear Reactors and 3) Power Nuclear Reactors.

Production Nuclear Reactors are built for producing the plutonium from uranium or the uranium from thorium. These basic elements are used for generating nuclear energy.

Research Nuclear Reactors are used for producing the free neutrons and radioisotopes which are also the prime sources of nuclear energy.

Power Nuclear Reactors are used for producing the heat and it is

converted into electrical and mechanical energy.

11.4.3 Nuclear Reactors in India -

India also producers Nuclear power through nuclear reactors. The Atomic Energy commission was set up in India in 1948. Dr H. J. Bhabha was made the chairman of this commission. Under his able guidance, the three Atomic Reactors Viz Apsara, Circus and Zernila were built. The first atomic power station was constructed at Tarapur in 1963. Even the plutonium plant was installed in 1965. A Nuclear device was exploded at Pokharan for peaceful purposes. Thus the credit for the nuclear development in India goes to Dr Bhabha.

At present no country con avoid the use of nuclear power. There is alternative to the use of atomic energy. But the generation of nuclear energy in nuclear reactors, its use for destructive purposes and the tremendous waste from nuclear power plants and nuclear tests have adverse effects on the physical environment and human health.

11.4.4 Impact of Nuclear Power Plants on Environment -

Nuclear power plants give rise to the following ecological and environmental problems.

1) Nuclear reactors require uranium as a raw material. It is extracted through mines. The mining activities cause soil erosion, landslides, air pollution, the pollution of surface and underground water. And the over all result is soil degradation.

2) Nuclear power plants require large volume of water of cooling. This extremely, heated water from power plants is charged with radio active waste. When it is thrown into rivers and oceans it pollutes water at both the places. And the quality of environment is affected.

3) Explosion of nuclear bombs, use of nuclear weapons and nuclear tests destroy both the movable and immovable property. The bomb blast generates tremendous amount of heat. It literally burns everything in its range. The radiation caused through the use of nuclear weapons persists in the environment for hundreds of years.

4) The nuclear waste pollutes the physical environment. It is known as fallout. The nuclear waste, when added into the environment, pollutes the three main components of the ecosystem viz lithosphere, hydrosphere and atmosphere.

5) Nuclear weapons have to be tested before their actual use. Tests

conducted for this purpose are known as nuclear tests. These tests are conducted either inside the earth and ocean or into the atmosphere. These tests necessarily produce effects on the environment. The effects of nuclear tests may be either local or global. Local effects are felt near the test site. But the global effects of nuclear tests are felt all over the globe. Under ground tests disturb the rock formation in the region. This results natural calamities like earthquakes, landslides etc. The radio active waste from underground tests reach the underground water and it gets polluted. It may also pollute soil and the surface water. Nuclear tests conducted inside the ocean pollutes the oceanic water destroys a large number of aquatic animals. Atmospheric nuclear tests also kills birds and animals. Thus, nuclear tests necessarily disturb the biosphere. Thus the nuclear power plants that produce enormous nuclear waste disturb all the four components of the eco-system the lithosphere, hydrosphere, atmosphere and biosphere.

11.4.5 Impact of Nuclear power plants on human health -

The physical environment that gets degraded through the nuclear waste affects the human health adversely as follows.

1) Radiation of neutrons and gamma rays destroys the plant and animal cells within few hours. It also damages genes and chromosomes. This causes genetic defects and hereditary problems that are transmitted to future generations.

2) The nuclear radiation causes excitation in living cells. These cells are damaged badly and new altered cells are produced. This is known as 'Biological Magnification'. It causes bodily deformities that are likely to be passed on from parents to their children.

3) While mining and refining the Uranium, a radicalize gas called 'Radon' is generated. Workers who work in the Uranium mines get irradiated and suffer from the most dreaded disease like cancer.

4) The Uranium processing plants pollute the water, soil and air in their vicinity. This has adverse effects on the human thyroid.

5) The production of Plutonium and Tritium in the production of Nuclear Reactors discharge huge radioactive material And the radiation caused by this material necessarily leads to the development of lung cancer among workers.

6) Radioactive materials discharged by the reprocessing plants pollute the water. This polluted water pollutes the milk of animals if they eat the grass grown on this polluted water !

7) Radiation from nuclear waste causes the most terrible hereditary defects and diseases like Tuberculosis and cancer. It also causes

infertility, miscarriages among women.

11.4.6 Control of adverse effects of Nuclear Radiation -

The effects of nuclear radiation on human health are extremely damaging or fatal. And therefore people must be protected against the harmful effects of radiation of nuclear elements. Following are the ways of controlling the adverse effects of nuclear radiation.

1) The nuclear waste should be disposed of properly. Pipes should be used for carrying the nuclear waste.

2) Nuclear power plants should be covered with cement concrete etc. for controlling the spread of nuclear waste into the atmosphere.

3) People should be informed well in advance about the harmful effects of radiation and the radioactive waste.

4) If necessary, people should be shifted form the nuclear power plants to some safer place.

5) It is essential to control the exposure of people to highly sensitive nuclear particles.

6) People should be given prompt medical assistance.

7) People can be protected from the ill-effects of nuclear radiation by improving the resistance power of people.

Though it is not possible to control the harmful effects of nuclear radiation completely, it is possible to minimize them considerably.

11.4.7 Check your progress -

1. What are Nuclear Power Projects ?
2. State the types of Nuclear Power Projects.
3. Name the Nuclear Reactors in India.
4. What are the impacts of Nuclear Power Plants on the environment?
5. State the harmful effects of Nuclear Power Plants on health.
6. What are the different ways of controlling the adverse effects of Nuclear Radiation.

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11.5 THERMO-ELECTRIC PROJECTS

11.5.1 What are Thermo-Electric Projects?

Thermal electricity is produced in thermal generators generally by burning fossil fuels like natural gas, coal etc. But when this energy is produced in hydro turbines by running water it is known as hydro-electric power.

In thermal power plants, water is heated in order to convert it into steam. This steam is used for driving the hydro turbine that generates electricity. This steam is also compressed for converting it into water after if leaves the turbine. This water is extremely hot. It should be properly disposed of. The electricity generated in the thermo-electric projects helps in solving the problem of the scarcity of energy.

Like nuclear power plants, the thermo-electric projects have adverse effects on the environment and human health.

11.5.2 Impact of thermo-electric projects on environment -

The thermo-electric projects damage the physical environment in the following ways.

1) Thermo-electric power plants require enormous amount of water for several cooling processes involved in it. But in these processes water itself gets extremely heated. It is generally thrown into the rivers and oceans. This extremely hot water destroys oxygen in the water of rivers and oceans. It gets polluted. This is known as thermal pollution.

2) Construction of thermo-electric projects causes deforestation. This leads to the destruction animals and birds and the biosphere is disturbed.

3) Toxic chemicals and poisonous gases thrown into the atmosphere from the thermo-electric projects cause air pollution and the atmosphere is affected adversely.

4) Improper disposal of liquid waste from thermo-electric projects into the pure water uses water pollution and the hydrosphere is disturbed.

5) Thermo-electric projects also cause noise pollution. Combustion turbines generators, compressors, condensers and cooling towers are the main sources of noise.

6) The operations of the thermo-electric power projects also generate solid waste. These solid waste materials need to be

disposed of properly. Their improper disposal causes soil, water and air pollution.

7) Thermal power plants also cause the concentration of carbon dioxide, carbon monoxide, chlorfluro carbon, etc. This has caused global warming which is one of the most serious ecological problems.

8) The thermo - electric power projects also cause acid rain. It is due to the release of nitrous oxide and sulphur gas into the air by the burning of fossil fuels.

11.5.3. Impact of thermo-electric projects on health.

Human health depends upon the quality of physical environment. Thermo-electric projects affect quality of environment adversely. And the polluted environment is one of the major causes of the deterioration of health in general. Following are the harmful effects of thermo electric projects on health.

1) Extremely hot water released by Thermo-electric projects, when thrown into the oceans and rivers reduces the level of oxygen in the water. This has adverse effects on the health of aquatic animals because they require high oxygen level in the water for their healthy survival.

2) Fossil fuels like coal, natural gas etc are burnt for generating heat that is converted into thermal energy. These fuels are obtained through mining activities. Extracting coal from mines is extremely risky. It causes the accumulation of greenhouse gases into the atmosphere. Therefore people working in the coal mines suffer from respiratory diseases. These workers also die prematurely.

3) Coal-burning produces any toxic and radioactive elements like uranium, plutonium etc. that cause atmospheric pollution. Again these pollutants have adverse effects on the health of men and animals. They suffer from different types of diseases.

4) The air, water and food pollution caused by the nuclear waste from the thermo-electric projects also cause diseases related to air, water and food.

5) Toxins and chemical thrown into the atmosphere by the thermo-electric projects also cause bodily as well as hereditary diseases.

11.5.4 Solutions to problems due to Thermo-electric projects -

All these health related problems arising out of the environmental pollution caused by thermo-electric projects can be solved by -

1) disposing of the waste from thermo-electric projects properly.

2) reducing the amount of waste generated by these projects.

3) Controlling the environmental pollution caused by these projects.

4) Asking the people to avoid exposure to toxic, gaseous and radio active waste from the projects.

5) Improving the immunity or resistance power of people.

11.5.5 Check Your Progress -

1. What are Thermo-Electric Project?
2. What are the impacts of Thermo-Electric projects on the environment?
3. State the adverse effects on the Human Health.

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11.6 SUMMARY

Developmental projects are undertaken mainly for making infrastructures available to people. Energy is one of the essential infrastructures. Developmental projects are planned for generating power. Dams, Nuclear power plants and Thermo-Electric Projects are the main power plants. They are unavoidable but they have adverse effects on both the environment and health. And, therefore, solutions of the problems arising out of Developmental projects are stated in the end of the chapter.

11.7 KEY WORDS

Developmental Projects, mega and Mini Developmental Projects, Multipurpose Developmental Projects, Atomic Reactors, Nuclear power plants, Thermo-Electric projects.

11.8 UNIT END QUESTIONS.

1. 'Developmental projects are unavoidable but also extremely harmful'. Explain.
2. What are developmental projects? Explain their importance in national development.

3. Illustrate different types of developmental projects.
4. Explain briefly the main social, economic and ecological problems arising out of developmental projects.
5. State and describe the factors to be considered before proposing any new developmental project.
6. Describe briefly the impacts of Dams on the environment and health.
7. What are Nuclear power projects? Discuss briefly their impacts on the physical environment and human health.
8. How energy is generated in the thermo-electric projects? Explain the impacts of these projects on the environment.
9. What are the health problems caused by thermo-electric projects? Suggest ways of solving these problems.

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12

ENVIRONMENTAL PROTECTION

Unit structure

12.0 OBJECTIVES

After studying the unit you will be able

- To know different sources of the waste that pollutes environment.
- To learn about the ways of proper disposal of waste.
- To illustrate the concept of carbon Bank: a novel way of protecting the environment from green house gases.
- To know the causes of natural and human induced

Calamities.

- To get acquainted with the pre-calamity and post-calamity measures.

12.1 INTRODUCTION

Physical environment is being degraded continuously. This environmental degradation is caused through human activities. Household, industrial and agricultural activities are mainly responsible for environmental degradation or pollution. All these human activities create enormous amount of waste. If this waste is not properly disposed of, and if it is added into the environmental components like soil, water and air, the result is environmental pollution. Thus the waste generated through a Variety of human activities is the main pollutant of the physical environment. The polluted environment invariably affects the health of people, man's existence and survival on the earth have come into difficulty. Hence it is necessary to protect the environment from its further degradation for man's healthy survival on the globe. The importance of environmental protection cannot be disputed.

12.2 WASTE MANAGEMENT

The main cause of environmental degradation is the 'waste' generated through the primary (agricultural) secondary (industrial), Tertiary (trading and marketing) and Quaternary (Service-oriented) activities. On the one hand, man has to undertake these activities for satisfying his basic needs and on the other hand these activities generate different types of waste that pollute or degrade the environment.

12.2.1 Types of waste -

'Waste' means useless remains, residue or refuse of used or unused materials. Household, industrial and agricultural activities undertaken by man generate huge amount of waste which is hazardous to human health. And if its disposal is not properly managed it poses dangers to the health of man and physical environment. Thus 'Waste' is injurious to health. In this context, it is necessary to know the types of hazardous waste generated through human activities. The main types of waste are as follows -

1) Infectious waste - This refers to the organic and inorganic materials that can cause infection. For example, germs, Viruses, Solid and liquid waste generated through human activities cause infection to men, animals and plants.

2) Toxic waste - this includes substances that are poisonous. Toxic Materials can cause serious infection, illness, irreparable harm or even death. Some chemicals are highly toxic.

3) Reactive waste - It has a tendency to react very actively with water and air. It pollutes both water and air. Gunpowder and other explosives are the examples of the reactive waste.

4) Corrosive waste - This includes substances that corrode others. For example, rust, acids and bases. These waste materials destroy both the inorganic matter and organic cells.

5) Flammable waste - This refers to materials that get burnt easily at lower temperature. For example, petrol, kerosene, Gasolene, Alcohol are the examples of Flammable waste.

6) Radioactive waste - This refers to nuclear elements produced in nuclear reactors and atomic power plants. Uranium, Thorium, plutonium are the examples of radioactive waste. These materials cause acute environmental pollution.

12.2.2 Improper waste management and Environmental pollution -

All these different types of hazardous waste pollute soil, water and air. When these waste materials are disposed into the ground, both the surface and underground water get polluted. This polluted water also pollutes agricultural goods indirectly.

Again pesticides, insecticides and herbicides, when used excessively either for protecting crops in the field or for improving agricultural production, remain in the soil and cause soil pollution. Further these toxic chemicals enter the human body through food. This causes poisoning when the air polluted by these chemicals is inhaled, it causes different types of respiratory diseases.

The intake of heavy metals like lead, mercury etc causes severe health problems. Lead affects the functioning of red cells in the blood. Their life span is reduced. It also damages nerve cells in the brain and causes brain diseases. Mercury causes poisoning if people are exposed to it.

A chemical called Vinyl chloride, which is used for manufacturing the plastic, causes genetic defects and bone deformities. It also creates problems related to eyesight, deafness and blood circulation.

Thus, the waste, if it is not managed properly, pollutes the physical environment as well as creates severe health problems. The risk involved in health problems due to addition of hazardous waste in the environment necessitates the environmental protection. This can be done by disposing of waste properly.

12.2.3 Ways of Waste Management -

1) Waste should be disposed of simply by dumping it in open ground reasonably away from residential Zone.

2) The waste should be disposed of by burying it deep into the ground. This is relatively a better way of disposing of the waste than dumping it on the open ground.

3) It can be thrown into rivers and oceans. .

4) The best way of disposing of the waste is to burn it completely. It is known as incineration. This method is used for disposing of the solid, liquid as well as gaseous waste.

5) The waste can also be disposed of by recycling it. It is also used for producing useful products. These products can be used and reused and the problem of waste disposal is solved easily.

6) The problem of waste can also be solved by reducing the generation of waste at source. For example, the Volume of waste can be reduced considerably by exploiting the natural resource to the optimum and also by using them judiciously.

7) The generation of waste can also be reduced by encouraging people to use reusable and biodegradable products and discouraging them from using non-disposable and non-biodegradable products.

Thought it is not possible to control environmental pollution due to improper disposal of waste completely, its intensity can be reduced to a great extent by disposing of the hazardous waste properly.

12.2.4 Check your progress -

1. Define 'waste'.
2. State the different sources of waste.
3. List the types of waste.
4. What are the ways of proper disposal of waste?

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12.3 CARBON BANK: MEANING AND NEED FOR CARBON BANK IN INDIAN METRO CITIES.

12.3.1 Meaning and scope of carbon Bank and Carbon Trading.

All countries in the world are facing the problem of global warming. The temperature of the world is rising alarmingly. This is mainly due to the depletion of the ozone layer and the concentration of carbon in the atmosphere. It destroys green plants on the earth and therefore this is known as greenhouse effect. And the Carbon is also described as green house gas.

Considering the seriousness of the ecological problems like the depletion of the ozone layer, change in the climatic conditions, loss of biodiversity, green house effect, global warming, melting of snow, rise in the level of oceanic water etc, an international conference called 'The Earth Summit' was held in 1992. It established the 'Global Environment Facility (GEF), an international organization that provides grants and funds to tackle the global environment issues. The Earth summit was followed by the conference in Kyoto in Japan in 1997. It aimed at tackling the problem of global warming by reducing the emission of green house gases all over the world. About 172 Countries in the world signed the Kyoto Protocol and agreed to reduce the level of emission of green house gases like carbon dioxide (Co_2). The emission of carbon can be reduced by replacing the existing carbon generating industries with Carbon-free industries. For this purpose a novel market based plan was suggested. It is known as 'Carbon Trading'. It presupposes that even carbon is a tradable commodity. It can be marketed or exchanged. And for exchanging it, 'Carbon Bank' is needed. Some countries in the world have already opened carbon banks. For example, Carbon Bank, U.S. It is one of the leading Bank in the field of Carbon trading. There are carbon banks in the metropolitan cities in the countries like Britain, China and India. Morgan Stanley Carbon Bank is the first carbon bank.

12.3.2 Carbon Trading : an example -

Companies that run industries can open account in the carbon bank. They have both the carbon credit and carbon debit accounts in the carbon bank. Operations in these banks are similar in other banks. Let us take one concrete example to explain, how carbon trading take place.

Suppose there are two companies - A and B. Both of them are running industries that emit certain units of carbon. A central authority allows the company to emit some Units of carbon in its industrial plant. But in practice, the plant may emit either less or more units of carbon allowed by the central authority. For example if the company A is allowed to emit 100 Units of Carbon, but if it emits

only 75 units of carbon the company has reduced the emission of 25 Units of Carbon and therefore these 25 units of carbon will be transferred to the carbon credit balance of the company. On the other hand, if company B is allowed to emit 100 units of carbon, but if it emits 125 units of carbon, the company has increased the emission of 25 units of carbon, these 25 units of carbon will be transferred to the carbon debit balance of the company.

The units of carbon of these two companies can be adjusted. The company B will purchase 25 units of carbon from company A Of course, the company will have to pay money to company A. Thus company A will earn money by selling the additional units of carbon in its carbon credit balance. As a result of this both the companies will try to reduce the emission of the units of carbon. The company A will try to reduce the emission of carbon to earn money from other companies. And the company B will try to reduce the emission of carbon in order to save the expenditure on the purchase of the units of carbon. This is known as 'Certified Emission Reduction' (CER).

12.3.3 Carbon Trading is a clean Development mechanism -

Thus, the carbon trading serves as an incentive for both the companies to reduce the emission of carbon. And the physical environment will be protected from the greenhouse effect, global warming caused by concentration of carbon. Thus, carbon trading is a Clean Development Mechanism (CDM).

Carbon Trading definitely benefits those companies that invest in non-polluting solar, Biodiesel and Biogas plants. They can earn a lot by reducing the emission of carbon. There are several Indian companies like Torrent Power, Chennai Petroleum, Gujrat Fluro Chemicals, Jaypee Associated etc. Which are using non-polluting source of energy. These Indian companies will earn money by selling units of carbon to companies in other countries. Thus, carbon trading is the surest way of reducing the emission of carbon from industries. And the physical environment is protected against the concentration of carbon and global warming.

12.3.4 Carbon Banks in Metro cities in India -

The main function of Carbon Bank is to reduce the emission of carbon dioxide. Metro cities in India are suffering from the problem of concentration of green house gases like carbon dioxide, nitrous oxide, chlorofluro carbon, carbon monoxide etc. And therefore, metro cities like Mumbai, Chennai, Kolkata, Delhi etc need carbon banks. It is relevant to note here that in 2007 Clinton Foundation announced a plan to reduce the emission of carbon dioxide and other greenhouse gases. This plan is supported by large banks. It is going to be used for reducing the emission of highly dangerous green houses in sixteen metro cities in the world. Mumbai is one of

them. Financial Support from banks will be used for installing new energy-efficient technologies. India is planning to run some cities in solar energy which is non-polluting and an inexhaustible source of energy.

12.3.5 Check your progress -

1. What is Carbon Trading?
2. Explain the concept of carbon Bank.
3. How does carbon Trading protect the environment.
4. Explain the need of Carbon Bank in metro-cities in India.

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12.4 RESPONSE TO NATURAL AND HUMAN-INDUCED CALAMITIES-ROLE OF NGO's.

Calamity is an event that occurs all of a sudden with little or no warning. It disrupts the life of a large number of people. It causes social, economic, ecological and even emotional problems. And, therefore, it requires mobilizations of efforts to solve these problems. The factors that cause calamities are beyond the control of people who are affected by it.

12.4.1 Types of Calamities -

There are two main types of calamities, Natural and human-induced calamities. Earthquakes, Volcano eruptions, floods, droughts, heavy rains, cyclones, Land slides etc. are the examples of natural Calamities. Road accidents, railway mishaps shipwrecks, air-crash, accidents in industries and nuclear power plants, chemical industries, oil leakage, oil spills, forest fires etc are the examples of man-made or human induced Calamities. As a matter of fact like man-made calamities even natural Calamities are also indirectly caused by human activities. Population explosion, excessive industrialization, Urbanisation, natural resources, deforestation, lack of environmental awareness are the main causes behind natural calamities.

12.4.2 Disaster Management -

Natural calamities or disasters have either to be prevented or managed properly after their accordance. There is a separate

science Called 'Disaster Management'. It is a multi-disciplinary science. It takes help from several sciences to manage disasters. While tackling any disaster or Calamity it concentrates on the following things.

1) Accurate forecasting about disaster well in advance.
2) Giving timely warning to people.
3) Effective communication of messages to all the concerned.
4) Objective risk assessment.
5) Evacuation of people from the disaster-site.
6) Prompt provision of medical services to disaster-hit people.
7) Undertaking of relief and rehabilitation activities.

12.4.3 Role of NGO's in the Management of Natural Calamities -

It is here where Non-government organizations (NGO's) help people. There are thousands of NGO's working at the local, national and international level working for the cause of people. The Chipko movement, The Narmada Bachao Andolon, People's Union for Civil Liberties, The Gandhi Peace Foundation and The Kerala Shastra Sahitya Parishad are some of the prominent NGO's in India.

NGO'S play a pivotal role in the management of natural calamities. These NGO'S help the disaster affected people in several ways as follows:-

1. NGO's can start rescue and relief activities very promptly.

2. These Voluntary organisations provide medical assistance to affected people.

3. They can also provide funds for rehabilitation of people.

4. These organisations can arrange camps for providing training to people required for rescue operations and also for rescue operations and providing first Aid.

5. NGO's can also arrange workshops, conferences and seminars for educating the masses about environmental problems.

6. Because NGO's work at grassroots level they get public support easily. They can undertake environment awareness campaigns on large scale level.

7. Voluntary organisations can fight for protecting the environmental rights of people by filing Public Interest Litigation (PIC) in the law courts.

8. Because of public support, NGO's can also pressurize the

government to discontinue the developmental projects that affect the environment adversely.

9. Of course, NGO's can also help the government in managing the natural as well as human-induced Calamities.

12.4.4 Check your progress -

1. State the main types of calamities.
2. Explain the term 'Disaster Management'.
3. Comment on the role played by NGO's in the Management of natural calamities.

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12.5 EFFECTIVE MANAGEMENT OF NATURAL CALAMITIES -

12.5.1 Natural Calamities in India.

The Indian land is sensitive or susceptible to Natural Calamities like the earthquakes, cyclones, floods, droughts, landslides etc.

Earthquake literally means sudden shaking or trembling of the earth. It is mainly due to volcanic eruptions. It causes collapse of buildings, dams, destruction of roads and railway tracks, tunnels. It also results in floods, tsunamis and landslides It cause deaths of large number of people. And, therefore it is considered as the worst natural calamity. The Himalayan mountain regions are more prone to earthquakes.

A cyclone is due to low pressure of air at a particular place. The wind violently rotates around the centre of barometric pressure. Tropics are low pressure areas and therefore, tropical region is more prone to cyclones. India is a tropical country. And, therefore, both the eastern and western coastal strips of India are very susceptible to cyclones and they take place in the Bay of Bengal, the Indian ocean and the Arabic sea. A cyclone is followed by heavy rainfall and floods in the region and it destroys both the immovable and movable property. Thousands of people get displaced and a large number of people lose their lives.

Flood literally means an overflow or out pouring of water of rivers

and seas. The India sub-continent is more susceptible to floods. The monsoonal winds that bring rains to India are very uncertain. Again the major rainfall in India takes place in three to four months from June to September. Therefore great rivers like the Ganga and Brahmaputra get over flooded during the monsoon season. Like any other natural calamity, floods cause deaths of thousands of people, destruction of crop in the field and also erosion.

Drought literally means long absence of rain. It refers to rainfall lower than the average rainfall. Several states in India like Rajasthan Madhya Pradesh, Maharastra, Gujrat Orissa are very often hit by droughts. Droughts cause reduction in agricultural production. People suffer from starvation. They also cause deaths of people and the livestock.

Landslide literally means a sliding down of a mass of soil on a steep slope. It also means a sudden fall of huge mass of rock. It occurs because of the changes in the composition of water and vegetation. These changes take place due to the destabilization of natural forces and also through human activities.

12.5.2 Human-induced Calamities -

Like natural calamities, in India induced calamities are also highly destructive. Because of increase in the human population and undue pressure on the means of travel and transport road accidents and railway mishaps, shipwrecks and air crashes are increasing day by day. These accidents cause deaths of people and destroy the immovable properties Accidents in industries, mines and nuclear power plants like gas leakage, oil spills fallout, release of radioactive substances into the atmosphere are also becoming very common. Fire in cities, industries and forests, terrorists attacks, bomb blasts, use of nuclear weapons, biological warfare are also examples of human-induced calamities.

All the above mentioned natural as well as man-made calamities need to be managed at two levels-either before or after their occurrence. Measures taken for preventing all the different types of calamities are known as pre-calamity measures. And the measures taken for tackling all the calamities after their accordance are known as post-calamity measures.

12.5.3 Pre-Calamity Measures -

Following are the pre-calamity measures for managing all the different types of calamities.

1) Developing highly advanced calamity forecasting mechanism.

2) Preparing a detailed map of calamity prone region for locating

the calamity very promptly.

3) Regular inspection of the arrangements made for managing the natural as well as human induced calamities.

4) Making arrangement for providing the necessary training to people, government officials for facing and managing the calamity.

5) Arranging seminars, conferences and workshop for providing information to the people about the causes and consequences of the calamities as well as about the types of measures the for tackling them.

6) Developing highly efficient warning system for making people mentally prepared to face the calamity.

7) Arrangement of Public awareness programmes regularly.

8) Asking people to insure their life and property.

When all the preventive or pre-calamity measures fail and when the calamity occurs, the post-calamity measures become essential.

12.5.4 Post-calamity Measures -

1) Fixing up the accurate location of the calamity.

2) Starting of rescue operations immediately.

3) Providing the First Aid and necessary medical assistance to the calamity-hit people.

4) Arranging vaccination programmes for controlling the spread of epidemic diseases.

5) Providing food to the displaced people.

6) Making arrangement for providing prompt relief to people.

7) Helping the people to get the insured amount against their life and property from insurance companies.

8) Shifting of people to some safer place.

9) Making preparations for rehabilitation of the displaced people.

12.5.5 Check your progress -

1. What are natural calamities? Give examples.
2. List the main man-induced calamities.

3. State the pre calamity measures.
4. List the post calamity measures.

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12.6 SUMMARY

Human activities generate a tremendous amount of waste. The waste if not properly disposed of pollutes the physical environment. This can be prevented by Managing the waste properly. Carbon Trading is a novel way of protecting the environment from the green house gases. Carbon Banks are also necessary in metro cities in India for solving the problem of the concentration of carbon in metro cities in India. Calamities are either natural or human - induced. Both these calamities can be prevented and managed with the help of pre-calamity and post-calamity measures respectively.

12.7 KEY WORDS

Waste, Waste Management, Carbon Bank, Clean Development Mechanism (CDM), Natural Calamity, Human-induced Calamity, Disaster Management, Calamity Management.

12.8 UNIT END QUESTIONS

1. Explain with examples the main types of hazardous waste.
2. What are the ways of proper disposal of waste.
3. Explain the meaning of 'Carbon Trading' How does it help in protecting the environment?
4. What is 'green house effect'? How does carbon trading help in protecting the environment from it?
5. How does carbon trading take place? Give examples.
6. Explain the concepts of 'Carbon credit' and 'Carbon debit' How carbon trading is a source of earning money for industries?
7. What is 'Disaster Management'? State the main factors involved in it.
8. Describe, with examples, the main natural and human-induced calamities.
9. State and explain briefly the pre-calamity measures for tackling the natural and man-made calamities.
10. What are the post-calamity measures for tackling the man-made and natural calamities.

11. 'When pre-disaster Management fails, post-disaster Management becomes essential Illustrate.

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13

TECHNOLOGICAL ADVANCEMENTS AND ITS APPLICATIONS

Unit structure

13.1 OBJECTIVES

After reading the unit student will

- Learn about Space and Laser Technology
- Know about benefits of both the technologies

13.2. INTRODUCTION

Science and technology have become an integral part of the common man's life. The advancement made by man in various spheres of life has an impact on us. It becomes imperative for us to understand the various advances made in the field of science. The astounding discoveries in Space technology have helped us understand the mysteries of the Universe as well as how man can reap benefits by outward and inward exploration of space.

Laser technology is used in different fields, be it defence, medicines or in entertainment. One needs to remember that all the advancement made in one technology helps the development in other technology.

13.3 SPACE TECHNOLOGY

Space Technology has come to age with the advance in the field of science and technology. Man's dream to launch itself on moon and other planets has become possible due to artificial satellites and rocket launchers. Space means the region beyond the Earth's atmosphere or beyond the solar system.

Space technology means the investigation of space beyond earth's atmosphere with the help of manned or unmanned space vehicles. These include rockets and satellites. Space technology is essentially concerned with (1) space exploration (2) space flights, (3) artificial satellites, (4) space probe, (5) launch vehicles, (6) space shuttles, (7) manned space flights to Moon, Venus and Mars, (8) global communications and broadcasting and (9) improvement of education, healthcare, disaster management, weather forecasting, environmental protection, management of natural resources.

Before taking into consideration the benefits of space technology let us take into consideration the developments, made in the field of space science.

13.3.1 SPACE AGE

Space age has become possible only when rockets and artificial satellites were developed. The modern space age came into existence when Russia sent out Sputnik I in 1957. Within a short span of time, space technology has shrunk the world into a global village. For the first time man has acquired a technology for which the sky is no limit.

13.3.3 ROCKETS

In the year 1926 Robert H.Goddard became the first American physicist to build and launch modern rocket. A rocket moves by shedding weight of the fuel it burns. It burns fuel at a very high pressure. This is necessary so that the rocket can escape the gravitational pull of the earth.

In India ISRO – Indian Space Research Organization operates and maintains the Thumba Equatorial Rocket Launching Stations. India made progress in the field of rockets by successfully lunching the second Geosynchronous Satellite Launch Vehicle (GLSV-D2) on 8th May, 2003. India became sixth in the world to develop such launch capability. The latest rocket launched by India is PSLV-C9 on 26th April, 2008. It launched 10 satellites within a space of 20 minutes. After Russia India became the second country to achieve such a difficult feat.

13.3.4 ARTIFICIAL SATELLITES

The space crafts that move in an orbit around the earth are called artificial satellites. Satellites orbit around the earth at various altitudes upto 22,300 miles. At 22,300 miles a satellite circles the earth in exactly 24 hours. If the orbit is around the equator, it will stay fixed above one spot on the earth. Satellites are used for various purposes. At present GPS, a constellation of 24 satellites is the most efficient one. It can pinpoint the position of any object on earth at any given time.

India has launched satellites for communication, remote sensing, and technology and applications. The latest satellite to be launched by India in space is INSAT-4A.

13.3.5 BENEFITS OF SPACE TECHNOLOGY

The benefits of space technology are concerned with (a) outward exploration and (b) inward exploration.

(a) Outward exploration

- Exploration of outer space:
  Exploration of outer space began when Russia sent out Sputnik, a space satellite. Man reached Moon in 1969, and took a walk on its surface. Then came Space Stations, called the “Skylab” and the “Salyut”. The Hubble Space Telescope pushed man’s vision to the very edge of the universe. Since April 1990, the Hubble Space Telescope has been generating new sciences with astounding images of the cosmos, including of new galaxies, of the birth and death of the stars.

- Space Tourism: Space tourism is fast becoming a reality. The famous British businessman, David Ashford’s company Bristol believes that holidays in space hotels can become profitable in the next 15 years.

- Mining minerals in space: There are about 400 asteroids close to earth. These mini plants are rich in minerals like iron, gold, platinum etc. Plans have been made to exploit these mineral deposits.

(b) Inward exploration

- Remote Sensing: For exploration inward, remote sensing is used. Inward exploration has benefited mankind much more.
  Meteorology: Weather forecasting is one of the important functions of satellites. Indian satellites of the INSAT series are multi-purpose ones, and one of their functions is meteorological earth observations.

- Hydrology: Groundwater resources can be determined through information from satellites. This becomes of great

significance since India is predominantly an agricultural country.

- Oceanography: The location of abnormally warm oceanic areas plays an important role in rainfall. Remote sensing devices can be used for predicting rainfall. The most important oceanic resources are plankton and fish. By collecting information about the ocean temperature, it has become possible to locate large schools of fish.

- Geological and mineral resources: The physical resources of our planet are extremely limited. Space exploration may solve this problem. Concentration and fuel resources and particular geological features are interrelated. Space satellites are being used to identify such features.

- Communication: Satellite communication has brought about the internet revolution. Satellite communication has also become indispensable during disasters such as cyclones, earthquakes and floods.

    - Rich dividends from Space Programme: Space Programme might yield incalculable dividends in the fields of transport and communication, trade and commerce, food and agriculture, and industry and manufacturing.

    - Defence needs: To meet their defence needs USA and Russia have placed a series of satellites in space With the help of these satellites one can locate the position of an object as small as a car. Well advanced satellites namely Global Positioning System (GPS) comprises of 24 satellites. The Russian version of GPS is called Glosass (Global Orbiting Navigating Satellite System). With GPS, receiver anywhere in the world can determine his location at any time of the day or night.

        - Agriculture: Application of remote sensing techniques are of great importance in agriculture. They are very useful for early detection of plant diseases.

13.3.6 CHECK YOUR PROGRESS

1. Define Space Technology.

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2. When did Space Age commence?

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3. State the progress made by India in the field of Space Technology

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13.4 LASER TECHNOLOGY

The term Laser is an acronym for Light Amplification of Stimulated Emission of Radiation. Sources of light which provide highly powerful coherent beams of light by making use of the amplification of light is called LASERS.

It is a device which is used for producing an exceeding intense and sharply directed beam of light. The laser beam is very powerful, of very high intensity and of a single wavelength. Laser light travels in a narrow beam, and the sides of the beam stay almost parallel.
Ruby laser is the first successful laser device that was demonstrated by Maimen in 1960. It operates on the principle that atoms can produce light energy when they are reorganized.

13.4.1 PROPERTIES OF LASER

Following are the properties of Laser:

1. Laser light is highly directional, that is it travels only in one direction.
2. The beam is monochromatic having only single frequency.
3. The beam is highly coherent.

13.4.2 TYPES OF LASER

There are three major types of Lasers based on their light amplifying substances. They are

- Solid lasers
- Gas lasers and
- Liquid lasers.

A solid or a liquid or a gas which is used as a source of the atoms. In the first laser a solid Ruby crystal was used. So it was called Ruby Laser.

A pumping source to stimulate or excite the atoms. This source is generally a beam of light. This beam falls on the source and the atoms from the source are excited.

An optical Resonator, this is a tube which reflects the laser beam back and forth resulting in its amplification. So the powerful laser beam will omit from this tube.

13.4.3 LASER RESEARCH IN INDIA

A carbon dioxide laser has been successful developed by B.H.U. for work on photo chemistry.

Nitrogen Laser has been developed by Kerala University, Cochin University and IIT Mumbai for the research work.

A large number of solid state lasers have also been developed by and worked out by BARC and defense science laboratory.

A laser guidance system has been developed by scientist. It is filled into the surface to air missile Prithvi.

13.4.4 APPLICATIONS OF LASER

Laser beam has wide area of applications in various fields. Some of the applications are as follows.

Industry –

a. Laser beams are used for various purposes. Industrial lasers cut teeth in saws, drill eyes in surgical needles, guide bulldozers, and inspect fabrics for flaws.
b. Laser welding is used in the field of electronics and microelectronics which requires precision welding of thin wires.
c. Lasers are used for printing small electronics and new electronic articles. They are used for marking on plastic metal products etc. Laser prints are very fast and of very high quality.
d. Lasers are widely used in cutting metals, ceramics, plastics, cardboard, cloth etc. The most common laser used for this is carbon dioxide laser. They are also used in vaporizing materials.
e. Laser drilling is now commonly done instead of normal drilling techniques for drilling holes in diamonds, other gems, metals, etc. Now one can easily drill a hole as small as the hardest of substances.
f. Apart from this laser scanners are used to read bar codes on consumer goods, to inspect precision components in workshops, to read text and other documents.

2. Laser in defence

All the guided missiles used in modern warfare use laser beam for guidance system to locate the enemy accurately. It becomes clear by laser that criss-crossed the air in the Gulf wars of 1991 and 2003. The lasers measured ranges and illuminated target for missiles. Laser guns are precision weapons. Laser device are helpful in determining trajectory of any moving object like an aircraft or a rocket. The Kargil war of May 1999 showed the precision of laser guided bombing by aircraft.

3. Communication

Lasers are increasingly used in communication and discovery of range in aviation, space research and the use of war weapons. A laser can transmit voice messages and television signals. The high frequency of laser light enables a laser beam to carry much more information than radio waves can. Therefore one of those beams can transmit many

telephone calls and television programmes at a time. For eg. Modern optic fiber cables can carry 32,000 two way telephone calls at once over a single laser beam. Lasers are also being used in other communications devices, including high-speed photocopiers and printers, compact disk players and some videodisc players.

4. Cartography
Surveyors use a laser range to measure distances in making maps.

5. Meteorology
Laser beams can be bounced off the air to gather important data about the nature and extent of pollutants. The technique, known as lidar (light detention and ranging) is being used for monitoring environment. The laser has measured the wind speeds near airports, it has also measured the hole in the ozone layer over Antarctica and it has succeeded in tracing the volcanic ash from Mount St. Helena.

6. Lasers and Health
Lasers are widely used in the field of medicine.
a. Dental surgery: To sit on the dentist chair in now no longer a painful thing. A laser system that enables a dentist to fill tooth without causing any pain and sealing cracks in the tooth has been developed by Premier Laser system. The patient does not feel any pain or vibrations.

b. Laser in cancer: A nitrogen laser is developed by Centre for Applied Technology which can be used to close cavities in the lungs of TB patients. An orange sized tumor could be removed through small coin sized opening by using a laser beam.
c. Lasers to “see” under the skin: A laser called LDI (Laser Doppler Perfusion Imaging) can “see” under the skin to measure blood flow.
d. Laser for blocked arteries: in many cases of angina and heart attacks, the heart muscle does not get normal supply of blood. A new technique, called PTMR (Percutaneous Transluminal Myocardinal Revascularisation), uses a Holmium laser system to make holes directly into the heart muscle. This procedure creates new pathways of blood within the heart muscle itself.
e. Treatment of eye diseases: LASIK and ICR are the two techniques that have drawn worldwide attention. The LASIK technique enables people to give up spectacles or contact lenses. Laser is also used for treatment of glaucoma, i.e. high occult pressure, which can cause loss of vision and possibility of

blindness.

f. Laser in cosmetic surgery: Laser technique helps on skin resurfacing.

g. Laser in space technology: Laser Technology plays a vital role in satellite communication. Vikram Sarabhai Space Centre has built a mobile laser system for remote sensing upto height of 60 kms. This system uses Ruby laser.

h. Military operations: In military operations, a laser beam can be bounced off a target, such as an enemy airplane or ship, to determine its distance and speed. Some types of bombs and artillery shells are guided to their targets by laser beams.

13.4.5 CHECK YOUR PROGRESS

1. Define Laser.

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2. State the use of Laser in the field of space technology.

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3. How does laser help in communication.

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13.5 SUMMARY

The 21st century has seen a quantum leap in the progress of science and technology. However certain technology due to their path breaking nature plays a commanding role.

Space Technology due to its advancements has opened new avenues for mankind. The outer exploration of space may provide answers to mankind with respect to scarce resources. However it is possible due to advance in the field of satellites and rocket technology. Inward explorations of space have resulted in better communication and have played an important role in making world a global village.

Laser technology finds its utility not only in the defence sector but have become ubiquitous and finds its applications in every section of modern society including consumer electronics, information technology, science, medicine, industry, law enforcement, entertainment and the military.

13.6 KEYWORDS

Artificial satellites, Rockets, Outer space, Remote Sensing, Laser

13.7 UNIT END QUESTIONS

1. Define Space Technology. State the progress made in the field of rockets and artificial satellite.

2 State the benefits of inward exploration of space technology.

3. Write a note on space technology with special reference to the benefits of outward exploration of space.

4. Define Laser and state the types and properties of Laser.

5. State the applications of Laser in the field of industry and defence.

6. What is laser? State the uses of laser in the field of health.

14

TECHNOLOGICAL ADVANCEMENTS AND ITS APPLICATIONS

Unit Structure

14.1 OBJECTIVES

- To acquaint students with the progress made in the field of Biotechnology, Information Technology and Nanotechnology
- To create an awareness of the hazards of Biotechnology and Nanotechnology

14.2 INTRODUCTION

The field of Biotechnology, Information technology and nanotechnology are rightly called as the sciences of future. The breakthrough in the above fields have helped development in the field of science, and health as well as to solve food problem Information technology plays a crucial role in making a world a global village. However at the same time, one needs to be aware too of the hazards of the above mentioned technologies.

14.3 BIO TECHNOLOGY

Biotechnology can be defined as the scientific manipulation of living organisms. It combines disciplines like genetics, molecular biology, biochemistry, embryology and cell biology. Biotechnology is the scientific art of using living organisms in industries. It is the application of technology on biological system. The breakthrough in Biotechnology has changed the fields of Agriculture, Dairy farming and pharmaceuticals, Animal Husbandry, Industries.

14.3.1DEVELOPMENT OF BIOTECHNOLOGY:

In 1970's the development of two processes gave a boost to biotechnology. These are (1) recombinant DNA and (2) gene splicing

Recombinant DNA: In 1972, it was found that the DNA of two viruses could be recombined. Soon the combination between genes from different bacteria was achieved.

Gene splicing: The cutting of DNA molecule is known as gene splicing. Paul Berg is credited for this breakthrough in the field of science.

Gene revolution: Plants and animals are modified by introducing certain DNA molecules. These molecules work as "magic bullets", and transform particular characteristics of organisms in useful ways.

14.3.2 AREAS OF BIOTECHNOLOGY

Specialization in biotechnology has resulted in defining areas in biotechnology. Red biotechnology is applied to medical processes, Green biotechnology is applied to agricultural processes, White biotechnology to industrial processes, and Blue biotechnology to marine and aquatic applications. Bioinformatics is an interdisciplinary field. It deals with biological problems using computational techniques.

14.3.3 GENETIC ENGINEERING

Genetic engineering is a part of Bio-technology aiming at manipulation and reconstruction of the genetic make-up of micro – organisms, with a view to make them better equipped for agricultural, or, industrial, or, medicinal uses. Most of the benefits of biotechnology have come through genetic engineering.

14.3.4 APPLICATIONS OF BIOTECHNOLOGY

The applications of biotechnology are in four major areas. These include healthcare, crop production and agriculture, non – food uses of crops and other products and environmental areas.
I. Biotechnology in the field of medicine and Pharmaceuticals

- Genes linked to diabetes identified: Scientist claim that they

have found five areas of DNA that could account for 70 percent of the genetic risk for type – 2 diabetes.

- Using biotechnology pharmaceutical companies can create drugs and products based on the proteins, enzymes and RNA molecules that are associated with specific genes and diseases.
- Modern biotechnology is often associated with the use of genetically altered microorganism's production of substances like synthetic insulin or antibiotic.
- Biotechnology is also associated with landmark breakthroughs in new medical therapies to treat Hepatitis B, Hepatitis C, Cancers, Arthritis, Hemophilia, Bone fractures and cardiovascular disorders.
- Gene Therapy: Gene therapy is a modern medical breakthrough. Biotechnology may be used for treating or even curing genetic and acquired diseases like cancer and AIDS by using normal genes to supplement or replace defective genes. Vaccines developed carries genes for malaria parasites, rabies virus hepatitis, - B virus has already been created.
- Cloning: Cloning involves the removal of the nucleus from one cell and its placement in an unfertilized egg cell whose nucleus has either been deactivated or removed. Successful cloning took place when Ian Wilmut cloned a sheep called Dolly from the mammary glands of an adult female.

II. Biotechnology for industrial uses

a. Fermentation Techniques: The bio engineers today can improve and control fermentation processes by controlling the genetic material of micro organisms that are used in industry. Many new drugs have also been obtained.

b. Sea weeds and biotechnology: Several products delivered from marine algae material are essential for biotechnological techniques. For eg. Phycoerythin – a protein contained in red algae – is used in biotechnological applications such as dye to detect reactions.

c. Biodegradable bacterial thermoplastics: Polybags create problems for the environment. Polymer manufacturers are considering biodegradable alternatives. One such alternatives is PHA's (poly-beta-hydroxyalkanoates) produced by bacteria.

d. Production of enzymes: Enzymes are being produced by technology. Enzymes are used in meat industry. Soft drink, detergent powder treatment of poisoning, treatment of industrial waste, medicine and diagnosis are possible through biotechnology.

e. Petro Plant: Biotechnologists have produced industrial ethanol

from molasses from plants. Such alcohol is mixed with petrol to produce gasohol which is used in motor vehicles. Scientists have also extracted petroleum like substances from certain plants called petro plants. This is cheap renewable source of fuel.

III. Agriculture:

Modern biotechnology can be used to slow down the process of spoilage so that fruits can ripen longer on the plant and then be transported to consumer. This improves taste, texture and appearance of fruit. Tomato is the first genetically modified food.

Shooting rice: the international Philippines have developed typical varieties of rice like 1R58 and IR43. Even the Indian Agricultural Research institute has produced another variety of rice namely Pusa NR519. This variety has successful superfine grain which is resistant to both pests and diseases.

14.3.5 ENZYME IMMOBILIZATION

Enzymes are the best described as biological catalysts. Enzymes are of natural origin and are produced by living cells. For centuries enzymes are being used in many industries as banking or wine making. More recently they are being used in pharmaceutical chemical and food industries. It is therefore not easy to remove them from final product. But it is difficult to reuse them. So enzyme activity is lost in one cycle of chemical reaction.

Most of the problem in reusing enzymes can be overcome by immobilization. The trick is to link enzyme chemically to a large molecule such as gelatin. It can then be used as a catalyst. It can be extracted with the large molecule for use once again. Immobilized enzymes have been successfully used in production of Semi synthetic penicillin and in the large scale production of fructose from maize. Fructose is sweeter than glucose, yet it has the same calorific value and is used as a low calorie sweetener. So enzyme immobilization consists in attaching an enzyme to a support over which a substance is passed and converted into a product. Enzymes entered into the field of biotechnology when the technique of immobilizing them was invented.

The advantage of this technique is that at first glance we can stop the reaction immediately by removing the enzyme from the reaction solution. Secondly the product is not contaminated with the enzyme. This is especially useful in pharmaceutical and food industries. The use of enzymes in detergents is now common. Enzymes play vital role in paper manufacture, textile industry, cosmetic production and the production of antibiotics. Scientists are finding it very easy to produce enzymes of their choice. The important discovery in this respect is RNA or Ribozymes. It is the very significant achievement of biotechnology that is why scientists

are applying the applications ribozymes in medicine, industry and molecular biology. The whole credit of inventing Ribozyme technology goes to professor of biology, Thomas Cech of the University of Colorado (USA) and Sydney Altman at Yale University (USA). For their outstanding performance these two professors have jointly won the Noble prize for Chemistry.

14.3.6 HAZARDS OF BIOTECHNOLOGY

Despite the benefits that may be derived from genetic and bio technology the possibility of hazards has given rise to a great deal of fear and suspicion. Some people fear that a virus, causing human cancer, might be introduced into bacteria that normally live in a human body. These bacteria may become cancer producing agents. Genetic engineering, it is feared, may be misused for carrying on biological warfare by spreading new types of diseases. It may interfere with the evolutionary process. Many scientist claims that the ingestion of genetically engineered food is harmless. However recent evidence shows that there are potential risks of eating such foods as the new proteins produced in such foods could act themselves as allergens or toxins or reduce its nutritional value. Some scientist point out that genetic engineering is unnecessary. Many of its results can be achieved by less dangerous techniques.

14.3.7 CHECK YOUR PROGRESS

1. Define Biotechnology.

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2. What is meant by gene splicing?

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3. Mention the different areas of biotechnology.

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14.4 INFORMATION TECHNOLOGY

Information can be defined as the collection of data through various methods of communications, such as people, newspapers, radio, television and internet. Information along with technology has given birth to a new technology, called Information Technology (IT)

Information Technology (IT) may be defined as the study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware. It is a combination of telecommunications and computing to obtain process, store, transmit and output information in the form of voice, pictures or text. This includes the following:

- Computer hardware
- Software applications and operating systems
- World wide web
- Web-based information
- Telephones and means of telecommunication
- Video equipment and multimedia products

14.4.1 COMPONENTS OF INFORMATION TECHNOLOGY

IT includes four main components. These are hardware, software, data, and people. All components are essential for the proper functioning of a system in IT.

Hardware: Computer hardware consists of physical components that form a computer system. It is the machine that stores and transmit information

Software: Computer software is a set of instructions in the form of programs, which control the sequence of tasks.

Data: Data is unprocessed representation of raw facts, concepts or instructions that is suitable for communication, interpretation or processing of tasks.

People: People perform various functions with the help of hardware and software to produce the desired results by using IT.

14.4.2 APPLICATIONS OF INFORMATION TECHNOLOGY

Information Technology affects almost every aspect of the modern man's life. The following are some of the applications of IT.

1. Ready access to information: With the help of search engines the computer can lead an individual to the relevant source on the internet within milliseconds. .

2. Storing information: Storing information has become an easy task. A modern computer's capacity is vast. Moreover whatever information is stored is readily accessible.

3. Aid to decision making: A computer can organize information in different ways. It can show how different data are interrelated. This enables individuals and organizations to take decisions that fit a given situation.

4. e- Governance: Governments must be able to take quick and

correct decisions. For this information is available to the decision – makers through Government intranets.

5. Business prosperity: Rapid developments in IT have contributed towards new ways of processing, transferring payments, and delivering services electronically. “b2b” and “b2c” are the common words used in business which for layman means business to business and business to consumers. “b2b” enables an organization to interact with its suppliers and distributors in an efficient way. Through the “b2c” component of e-commerce, an organization can make direct sales to its consumers, and attend to their complaints in time. “Virtual shops” have widened the consumer’s choices.

6. Efficiency in industry: Efficiency in industry has increased as the Computers issue commands, and production processes that are carried out efficiently and in a precise way.

7. Information technology in media: IT used in media includes audio – visual equipment like the television, radio, VCR, video cameras, and computers. Multimedia applications are being increasingly being used as a part of the global revolution in electronic media. Internet too forms a part of this media.

8. Information Technology in education: E-learning or learning through computer technology is fast becoming the means of providing good and standardized education. Virtual classrooms allow students to understand, learn and interact efficiently. The greatest benefit of e-learning is that it is accessible around the clock, both through the internet and through special software.

9. Information technology in publication: Publishing houses and e-book stores have begun to use information written in printed books on their computer screens. Special e-book devices even allow users to carry an entire library with the comfort of a single book.

10. Information technology in defence services: IT allows defence personnel to create access and manage information, and solve problems through computers. Developments in IT have led to smart information devices. The battlefield of the future will include unmanned combat vehicles, and communication systems that can cooperate automatically in order to perform military operations.

11. Information technology in mobile computing: The increased use of cell phones has led to wireless internet, called WAP. One of the most important advantages of mobile internet is that the user’s geographical location can be identified. Bluetooth technology has been used increasingly. Global Positioning

System or GPS is a satellite – based navigation system. It can pinpoint the location of anything.

12. Flexi time: the computer doesn't restrict individual's to continue to office only. He may not be at one place only. Such companies allow their workers to work at places of their choice. This facility helps organization also. When an employee is unable to attend the work place, the productivity may not suffer due to availability of computer machine.

14.4.3 COMPUTER SECURITY

Computer security refers to protection given to computers and information contained in them against unauthorized access. Computer security also involves measures that ensure confidentiality, integrity and availability of information. The installation of antivirus software can help in the protection of computer and its data. Firewall, cryptography, digital signatures and such other things can help in computer security. (For more details refer to Chapter Misuse of Science and Technology)

14.4.4 CHECK YOUR PROGRESS

1. What is meant by Information Technology?

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2. State the various components of Information Technology

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3. Bring out the application of Information Technology in the field of publications and mobile computing

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14.5 NANOTECHNOLOGY

Nanotechnology is a multi-disciplinary technology which has its linkages with applied physics, material science, interface and colloid science, device physics, supramoleuclar chemistry, biological engineering, and electrical engineering. As such Nanotechnology is so small that we can't see it with the naked eye.

The term Nanotechnology was coined by 1974 by Prof. Nario Tanihuchi of Tokyo Science University. Nanotechnology as defined

by Prof. Nario Tanihuchi is, “Nano-technology mainly consists of the processing of, separation, consolidation, and deformation of materials by one atom, or by one molecule.”

To further describe, Nanotechnology is a field of applied science and technology that is concerned with the control of matter on the atomic and molecular scale, generally 100 nanometers or smaller, and the fabrication of devices that lie within that size. In short nanotechnology is the application of nanostructures to produce nanoscale devices.

14.5.1 APPLICATIONS OF NANOTECHNOLOGY

Following are the main applications of Nanotechnology:

1. Producing nanocrystalline diamond fibers: Diamonds are electrically insulating, chemically inert, and optically transparent. In nanoparticulate form, they possess an additional property that makes them suitable for drug delivery and drug diagnostics.

2. Advance in technology: With the help of nanotechnology a mini “super computer” that runs faster is being made. It will be the world’s fastest computer.

3 Batteries: One of the hindrances to developing smaller and higher performance electronic devices is the weigh of lithium batteries. Chinese scientists have prepared tin nanoparticles that are enclosed within elastic hollow carbon spheres. This tin-based nanocomposite shows great potential as anode material in lithium – ion batteries.

4. Mass production of food and consumable: Nanotechnology will help end the epidemic starvation with food left over to spare. Instead of waiting for rain to come, one can grow food in a small space.

5. Environment and Pollution control: Carbon nanotubes and other nanomaterials could lead to effective filters for capturing and storing greenhouse gases. This will help in curbing pollution.

6. Nanoparticles are useful in diagnosing and monitoring of medical conditions: Protein detection is a powerful tool for diagnosing and monitoring cancers and other medical conditions. For this, chemical methods are slow, expensive and sometimes difficult to handle. Now researchers have shown simple way of detecting proteins by using nanoparticles. These nanoparticles are much brighter than organic dyes and only need one light source for excitation. This means that the cost of treatment will be considerably reduced.

7. Nanotechnology in cosmetics: in production of some sunscreens, nanosized titanium dioxide and zinc oxide are being used. These materials absorb and reflect ultraviolet rays. Nanosized iron oxide is used in some lipsticks as a pigment.

14.5.2 DISADVANTAGES OF NANOTECHNOLOGY

Nanotechnology has brought significant changes in today's world. It is fast becoming science of the future. However there are certain risks in the use of nanotechnology. Nanotechnology creates an impact on health and environment. Nano bomb is the most dangerous bomb weapon created by nanotechnology for military purpose. It contains deadly viruses that can self multiply in order to wipe out its intended target however big. This is the use of nanotechnology that many people have come to fear.

14.5.3 CHECK YOUR PROGRESS

1. Who coined the term nanotechnology?

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2. Define nanotechnology.

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3. How can nanotechnology help in the advancement of technology?

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14.6 SUMMARY

Biotechnology is concerned with manipulation of living organisms. Genetic engineering is the most significant form of biotechnology. It is very helpful in agriculture, industry, and medicinal fields. It also includes enzyme immobilization. However, biotechnology has the potential for harm too.

Though computer is only a machine it has innumerable

applications. Information technology deals with the study, design, development, implementation, support or management of computer – based information systems, particularly software applications and computer hardware. However the need for computer security too is felt as it comes under constant threat of viruses, worms, etc.

Nanotechnology is the study and making of small microscopic things. Nanotechnology is “advance to the future”. Nanotechnology is a multidisciplinary field and is a dual technology too. However nanotechnology carries risks to health and environment.

14.7 KEYWORDS

Biotechnology, Genetic Engineering, Enzyme Immobilization, Nanotechnology

14.8 UNIT END QUESTIONS

1. Define Biotechnology and state the progress of biotechnology in the field of medicine and agriculture.
2. Explain briefly Enzyme Immobilization?
3. What is Biotechnology? Bring out its hazards.
4. Discuss briefly the various aspects of Information Technology and its applications.
5. Define nanotechnology. Describe any four applications of nanotechnology.

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15

MISUSE OF SCIENCE AND TECHNOLOGY

Unit structure

15.0 OBJECTIVES

After studying the unit

- You will come to know that how and why the sex-ratio is declining in our country.
- How the change in the food structure can affect our health genetics.
- Nuclear power has its dark side.
- Well educated and qualified are engaged in criminal activity and the nature of crime has changed with the wide use of technology.

15.1 INTRODUCTION

One of the objectives of science and technology is human welfare. It works for progress of human beings making his life more comfortable. Science gives us knowledge and technology/uses that knowledge for practical purposes. However the modern development in the field of science and technology may lead to the destruction of human society. Technological innovations are misused by the people e.g. atomic power can be used for solving the problem of shortage of electricity, so it is beneficial. However it can also be used for making bomb which may lead to destruction of the society.

Similarly genetically modified food can solve the problem of food scarcity however it may cause problem to a health of person. So science and technology can bring happiness in man's life or it may be misused for making one's life sorrowful and unhappy.'

15.2 SONOGRAPHY AND SEX-DETERMINATION TESTS

Sonography (Ultrasongraphy) is an ultrasound based on diagnostic imaging technique used to visualise muscles and internal organs like kidney, liver etc. It is used for finding out abdominal and organ disorders. The most common use of sonography is during pregnancy, and it is well known to public. It is safe test as no complications arise from the use of sonography. It has no known long term side effects. Its most important advantage is it becomes possible to see 'live' images .of the inner organs of our body. The diagnosis becomes easier and more accurate. The equipment which is used in sonography is widely available. Scanners are easily carried to any place. Compared to other method like scanning, sonography is less expensive. In sonography one can actually 'see' the internal parts, tissues and organs of our body. If there is any abnormal mass, cancerous or non-cancerous tumours, cysts or any abnormality then that can easily be detected with the help of sonography. Sonography can also be used for prenatal testing. Prenatal testing is testing for diseases or condition of foetus or embryo before it is born. One can see the location of the baby and also internal organs of baby. Such prenatal test are very useful. If there is any defect or major problem is found in the unborn child then accordingly necessary steps can be taken. If there is any genetic abnormality in the child then it can be detected through prenatal testing. Ultrasound can identify up to 50% of abnormality related to the central nervous system of the foetus. New para Sex-determination tests.- Although sonography is very useful for finding the growth of a child or detecting abnormalities in our body, however it is widely misused in our country due to various reason. It is used for knowing sex- of the child in mother's womb. Besides sonography sex of the foetus can be determined by amniocentesis (after 15 weeks), ultrasonography (after 12 weeks) & chorion villous sampling (after 9-12 weeks). Among these various tests ultrasonography most commonly used for this purpose. The information that one acts through sonography that whether a foetus is girl or boy is misused. If it is found that sex of a child is female then it is aborted. In our country in various states there is a craze for male child. It is due to prevailing superstitious belief, religious practice, rituals as well as certain customs (like dowry system) of our country. It is believed that only sons can perform the last rites on the dead body, sons are considered as inheritors of family. Women are not given a due respect in a society. There is a gender discrimination. Many women are of the opinion that whatever they have suffered their daughters should not suffer the same, and hence they do not want to give birth to a girl child. In some of the societies women with only female children are looked down. Their status depend on whether they have male child or not , so this women are interested in male child. Sex determination test are misused by them & if they found that if the foetus is of female child

then it is aborted. This practice is common in Rajasthan, Haryana, and Madhya Pradesh. According to a study conducted by Gwalior based Centre for Integrated Development in January 2002, in 90 out of 100 abortion cases reported from nursing homes in Gwalior & near by areas, the child happened to be female.

Effects of Sex-determination tests.

Sonography & sex determination tests are misused for aborting unwanted female child. This has various effects on society.

1) It has adversely affected male-female ratio. The sex ratio which was 945 females per 1000 males in 1991 dropped to 927 per 1000 males in 2001. The extent of this ratio differs from state to state. In Kerala there is more number of women because there people are more educated, there is matriarchal society & there is sexual equity. In the states of Punjab, Haryana, Madhya Pradesh the sex ratio is dropping. In Maharashtra the sex ratio is 922 women for 1000 men. According to the Population Foundation of India (PFI), there were 975 girls per 1000 boys in 2001 in Chhattisgarh. In 2006 this figure had dropped to 918

2) In near future there will be fall in number of female children. This will disturb the balance of the society.

3) Even during the time of marriages it will be difficult for boys to find bride. It will lead to some undesirable practices. In Dang district on the Gujarat-Rajasthan border, eight brothers of the same family married to one woman.

4) As there will be lesser numbers of females so chances of some other wrong practices may take place. There are chances that a bridegroom will have to pay a price to brides family. It is reported that boys marry girls from Bihar after “buying them”.

It is also feared that sex-related and other crime against women may increase in the society.

6) Sex-determination tests leading to abortion may affect the health of women. It may affect her emotionally & psychologically.

Measures to check the danger of sex-determination tests.

There is an urgent need to stop sex determination test, this will be possible only through legislation Maharashtra was the first state to pass a law. Maharashtra regulation of use of prenatal diagnostic technique (PNDT) Act was passed in 1988. Later on the Pre-natal Diagnostic techniques (Regulation & Prevention of misuse) Bill was introduced in Loksabha, and accordingly it was passed on 20th September,1994 and was amended in 2004 as “The pre-conception & Pre-natal Diagnostic Techniques (Prohibition

of sex selection) Act, 1994".This Act prohibits sex-selection, before or after conception. Under section 30B of this Act no person shall sale any ultrasound machines or scanners or any other equipment capable of detecting sex of foetus to any genetic counselling centre, Genetic laboratory, Genetic clinic or any other person, not registered under the Act.

15.3 SYNTHETIC FOOD AND GENETICALLY MODIFIED FOOD; USE OF INSECTICIDES AND PESTICIDES

Since long back farmers are using the method of selective breeding to create plants with desirable qualities. In these techniques without altering plant's genes in a laboratory new variety of the plant or animal can be created. However this process is very slow. Development in the genetic engineering has given mankind a tool for changing the characteristics of living organisms. The changes in the food products are brought immediately with the help of genetic engineering. Here the structure of genes is altered in order to get the desired result thus we get genetically modified food (GM food), its quality is different from natural food.

Genetic modification involves altering the natural structure of DNA coding by bringing DNA from another living organism. Genetic engineering begins with the identification and isolation of a gene which expresses a desirable trait. Then a recipient plant or animal is selected, and the gene is inserted and incorporated into its genome through a vector.

Typically, genetically modified foods are plant products: soybean, corn, and cotton seed oil. These plants have been modified in the laboratory to enhance desired traits such as increased resistance, improved nutritional content. For example, a scientist can isolate a gene responsible for drought tolerance and insert that gene into a different plant. The new genetically-modified plant will gain drought tolerance as well. In GM food the gene may not come from the plant but it may come from any living organism including virus, bacteria, animal or completely different plant. Potato may receive genes from tomato, pig may receive gene from spinach or fish may receive genes from pigs.

GM foods were first put on the market in the early 1990s. The first commercially grown genetically modified crop was the tomato (called flavrsavr).It was made more resistant to rotting. It was brought in the market by Californian company Calgene. The next GM food crop released in the market was soybean. Presently many types of genetically modified food are existing. Between 1995 and 2005, the total area under cultivation with GMO had increased by 50 times from 4.2 million acres to 222 million acres. In India

large area is under cultivation with GM cotton. In the US, by 2006 89% of the planted area of soybeans, 83% of cotton, and 61% maize were genetically modified varieties.

There is a controversy with regard to use of GM food. The supporters of GM food claim that it can solve the food scarcity problem of the world, however according to new researches some of the GM food is causing allergy and there are also harmful effects of it

Advantages of GM food

1) Pesticide resistant and increase in yield-- some of the GM food crop contains pesticides resistant hence farmers does not have to spray the pesticide so they can save the money. Cotton crops in India that was genetically modified to resist insects produced dramatically increased yields and significantly reduced pesticide use compared with non-bioengineered crops, according to the results of farm trials reported by researchers at the University of California, Berkeley, and the University of Bonn in Germany.

2) Herbicide tolerance- the farmers face the problem of weeds which they have to remove it, for this they use herbicides (weed killer). This process is expensive and time consuming. With the help of genetic engineering crops are genetically-engineered to be resistant to one very powerful herbicide and this could help in reducing the use of herbicide, thus preventing the environmental damage caused by herbicides.

3) Disease resistance sometimes the yield is good but later it is destroyed by the diseases There are many viruses, fungi and bacteria that cause plant diseases .scientist are working to create plants with genetically-engineered resistance to those diseases.

4) Nutrition GM Food can be engineered in such a way that it can contain the required vitamins, minerals, proteins, medicines, vaccines etc. so that it will be helpful to solve the problem of Malnutrition. For example if rice could be genetically engineered to contain additional vitamins and minerals, nutrient deficiencies could be alleviated. Researchers at the Swiss Federal Institute of Technology Institute for Plant Sciences have created a strain of "golden" rice containing an unusually high content of beta-carotene (vitamin A).

5) Pharmaceuticals Medicines and vaccines often are costly to produce and sometimes require special storage conditions not readily available in third world countries. Researchers are working to develop edible vaccines in tomatoes and potatoes.

Disadvantages of Genetically Modified food

Nowadays commercialization of GM food has increased. Many people including scientist, environmental activists, religious organizations, have criticized GM foods, According to them it may lead to hazards. GM food has its effects on environment, public health.

Environmental hazards

1. Unintended harm to other organisms-- there is a fear that GMO''s may be spread to other non-genetic crops through wind, bird or insect. It may cause harm to them. Last year a laboratory study was published in *Nature*21 showing that if pollen from BT corn is blown by the wind onto milkweed plants in neighbouring fields, the caterpillars could eat the pollen and perish. It is not possible to design a BT toxin that would only kill crop damaging pests and remain harmless to all other insects. However this study has become controversial. There is no agreement about the results of these studies.

2. Reduced effectiveness of pesticides – the scientists feared that insects will become resistant to BT or other crops that have been genetically modified to produce their own pesticides.

3. Gene transfer to non-target species there are chances that crop plants engineered for herbicide tolerance and weeds will cross-breed with the non GM crops resulting in the transfer of the herbicide resistance genes from the crops into the weeds. These "superweeds" would then be herbicide tolerant as well.

4. Effects on fishes—Gene spliced 'super salomen' are engineered by the scientist. These GM fish are available throughout the year. However these fish could accidentally end up in lakes, streams, ponds or oceans. There they may be able to destroy wild fish population or disturb the food web or increase the competition for food.

5. Endangering the biodiversity-It is said that genetic engineering has replaced the nature's role in creating hybrid crops. The natural crops has broad genetic base whereas GM crops has shrinking genetic pool. Dr John Hagelin says " when genetic engineers disregard the reproductive boundaries set by natural law, they run the risk of destroying our genetic encyclopaedia, compromising the richness of our natural biodiversity, and creating genetic soup."

Health hazards –

Genetically engineered plant may contain a new protein, or a particular nutrient may change to form which cannot be metabolized or absorbed properly. There is also fear that the uncharacterized DNA introduced in gene may result in unknown protein or side effects.

Allergic reactions – Some of the GM food may develop allergic reaction which may be fatal. In 1996 Brazil nut genes were inserted into Soyabeans by a company called Pioneer Hi- Bred. However some individual developed allergic reactions to this nut

Unknown effects on human health There is a growing concern that introducing foreign genes into food plants may have an unexpected and negative impact on human health.

Check your progress

1. By which test can the sex of the foetus be determined and after how many weeks.

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2. Name the states where the sex determination tests are conducted on a large scale.

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3. Name the plants which are genetically modified.

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4. What does genetic modification means.

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5. What does recent research in genetic modified food suggests.

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15.4 NUCLEAR POWER

Scientist has discovered that an atom contains lots of energy. Energy has both positive as well as negative effects with the help of atomic energy. One can obtain power/electricity and it can also be used for destructive purpose. The atomic bomb explosion at Hiroshima & Nagasaki has shown to the world its destructive power.

Atomic energy can be obtained by two ways i) Nuclear fission ii) Nuclear fusion. Nuclear fission consists in splitting a large nucleus into two smaller one, Energy is generated by disintegration of atoms. This technique was discovered in 1939. Nuclear fusion consists in fusion of atomic elements. For maintaining a fusion reaction, the temperature of several million degree is required. Nuclear fusion occurs when two light weight (element of atom) model combine and form a heavier nucleus. From these two methods nuclear fission is more popular. All the existing power plants depend upon fission process. The device which is used for producing controlled nuclear fission or controlled nuclear fission is called Nuclear Reactor. There are different types of nuclear reactors which are used for different types of functions, some of them are Production Nuclear Reactors ,Research Nuclear Reactors. Besides these number of other varieties of reactors has been developed like Pressurised Water Reactors (PWR), the Boiling Water Reactor (BWR) etc.

Radio active elements, uranium or thorium is mainly used for releasing or liberating atomic energy. One of the advantage of atomic energy is it requires very less raw material. The energy released from one pound of uranium (U^{235}) is equivalent to energy that we will get by burning 1,600 tonnes of coal. Supporters of nuclear power claim that it is more safe because uranium does not release any green house gases and does not produce ash like fossil fuels. Another advantage is nuclear power offers cheap electricity supply. However besides these advantages nuclear power has many disadvantages. It can endanger the future of man kind. Following are the misuses of nuclear power.

1)Nuclear bombs:- The misuse of nuclear power was seen during the second world war when, America drooped 3 nuclear bombs on the cities of Hiroshima and Nagasaki and in 1945 about 2,40,000 people died, or were burnt alive and turned into ashes by nuclear

fire in both the cities of Nagasaki & Hiroshima. These two bombs had destroyed almost everything in these two cities, including the buildings, trees. Even those who survived the attacks for them life became most miserable & more than 2000 cancer deaths in 1978 were attributed to the bomb blast. After these experience of Hiroshima & Nagasaki world has not learned any lesson, on the contrary more and more destructive atomic weapons are created by the countries. Today's most nuclear weapons are many times power full than the bombs dropped in Hiroshima & Nagasaki.

2) Nuclear Terrorism:-Today all over the world terrorist activities are increasing. Every nation is afraid of nuclear terrorism. There is a fear that terrorist may attack nuclear power plants causing tremendous destruction or may use nuclear weapons, or may build nuclear weapons. According to the report of the International Task Force on Prevention of Nuclear Terrorism, the nuclear terrorism is increasing, it is because terrorist are using more & more sophisticated weapons. There is also a fear that terrorist group may acquire the knowledge and material for building nuclear weapons. There are chances that terrorist may acquire this material from those places where it is processed, stored and used. There is another fear of use of 'dirty bombs', they are known as Radiation, Dispersal, Devices (RDD), which is used as conventional explosives to disperse radio active material.

3) Other danger involved in nuclear power:- Besides misuse of nuclear power other danger is also involved

a) Accidents in power plants- there are chances of disaster taking place due to nuclear accidents. Any explosion or accident at a reactor can endanger the life's or health's of millions of people. Although lot of preventive and safety measures are taken while building nuclear power plants, but even if a minute (minor) operation mistake takes place then also it can cause a disaster. In Chernobyl Nuclear Power Station in Ukarine an accident took place on 26th April 1986, as a result of which the radio active debris was blown into the air that caused an enormous fire. Many people have died in this accident and it is predicted that in the next fifty years many will die because of cancer due to this accident. In 1979 in the Three Mile Island power plant nuclear radio active substances got leaked in to the atmosphere

b) Effects on environment- The blast or explosion emits hazardous radio active substances which remains in the atmosphere for hundreds or even thousands of years, spreading to vast areas. So that area also gets polluted. The environmental pollution caused by explosion of nuclear bomb is called as 'Fallout'. Nuclear plant is completely safe. The main danger of nuclear reactor is it releases lots of radioactive elements in the form of gases or steam or radioactive water in to the environment. These

radioactive substances get mixed into the air, water causing contamination of environment. Nuclear tests are also not completely safe from environmental point of view. In atmospheric nuclear tests, explosion emits many poisonous radio active elements like carbon 14, iodine 131 etc which remains in the atmosphere for many thousands of years and they are also carried away with the wind to hundreds of kilometre away where the environment become polluted. Under ground nuclear tests produce environmental effects in the form of earth quake like shock waves, the rock foundation of that region becomes weak. Under ground explosion emits the radioactive material which may get mixed with underground water sources or may reach to the surface polluting water and soil. Radioactive water cannot be easily identified as its colour or its odour is not changed. Animal life and plant life which survives on that water also gets affected.

c) Effects on health-Nuclear explosion releases radiation. These radiations consist of gamma rays and beta rays which are harmful to our health. For example strontium 90 gives off beta particles, that can causes bone cancer, genetic damage, leukaemia and shortening of life. Genes and chromosomes are adversely affected due to radiations, these defective genes are passed on to the next generation as a result they develop abnormalities. The radiation can also cause congenital deformities or defects, miscarriages, still births, mental retardation and deaths.

Uranium mine workers also suffer from radioactivity. Uranium ore contains radium 226 which generates radioactive gas namely radon. This poisonous gas is inhaled by workers as a result they suffer from lung cancer. In East Germany about 600-9000 people died of lung cancer due to such radiation exposure

d) Nuclear waste- It creates another problem. Nuclear waste contains hazardous radioactive substances. The nuclear waste was dumped by Uranium corp. of India Limited in the ponds of two villages of East Singbhum district of Jharkhand. This has affected the health of tribal people. Many of them are suffering from cancer, T.B, congenital deformities, miscarriages and infertility.

Preventing misuse of Nuclear Power

To stop complete misuse of nuclear power is an impossible task but it can be reduced because of development in the field of nuclear power. A team of scientists from U.S are working on building a small sealed portable autonomous reactor called as S-Star. The design of this reactor is as such that it can reduce the misuse of material used in it. Nuclear fuel will be contained within the sealed tamper proof reactor vessel when it is transported to the particular place.

In 1957 the IAEA (International Atomic Energy Agency) was set

up by the U.N with sole objective of seeking spreading the knowledge of nuclear technology for peaceful purposes. It lays down certain conditions and norms in this field so that harmful effects of nuclear technology can be prevented.

15. 5 CYBER CRIME

Nowadays computers are used for various purposes. Everybody is using computers from white collar criminals to terrorist organizations and from children to adults. It is said that new generation is growing with computers. It has various advantages. The development in information technology has brought changes in work style, business activities, and communication network and so on. However there is another darker side of it i.e. with the development and wide use of computers the cyber crimes are also increasing, conventional crimes like forgery, extortion, kidnapping etc. are being committed with the help of computers. Computer crime, cyber crime, e-crime, hi-tech crime or electronic crime generally refers to criminal activity where a computer or network is the source, tool, target, or place of a crime. As the use of computers has grown, computer crime has become more important. Security software giant Symantec draws from the various definitions of cyber crime and define it as 'any crime that is committed using a computer or network, or hardware device'.

Cyber crime refers to unauthorised access to computer systems or networks. An international legal definition states “although the term ‘cyber crime’ is usually restricted to describing criminal activity in which the computer or network is an essential part of the crime, this term is also used to include traditional crimes in which computers or networks are used to enable the illicit activity”.

Computer crime can broadly be defined as criminal activity involving an information technology infrastructure, including unauthorized access, illegal interception (by technical means of non-public transmissions of computer data to, from or within a computer system), data interference (unauthorized damaging, deletion, deterioration, alteration or suppression of computer data), systems interference (interfering with the functioning of a computer system by inputting, transmitting, damaging, deleting, deteriorating, altering or suppressing computer data), misuse of devices, forgery (ID theft), and electronic fraud.

There are various reasons for cyber crime. Most of the cyber crimes are committed by well-educated qualified professionals.

1. Teenagers and children- In one of the study conducted by psychologist it was found that majority of teenagers who hack and invade a computer system do it for fun. Their intention is not to cause harm to others. The study reveals the fact that most youngsters performed illegal computer actions out of

curiosity.

2. Disgruntled employees- They are also involved in cyber crime. These employees are those who have been either removed by their employee or are dissatisfied with them. So in order to take revenge they may resort to cyber crime.

3. Professional Hackers- professional hackers are the experts in the computer systems. Their skills and knowledge is used by some people to get the required information, or to hack the computer system or the site of rivals. Professional hackers do these kinds of activities for the sake of money.

4. Business Rival—According to Stig kristoffersen If a company with online business, whether its sales of products or services or anything else are desperate enough to win a fight towards their competitors, and they are willing to step over the legal boundary, they can pay some few hundreds of dollars for a DDOS attack on their competitors servers. Here the help of professional hackers is taken for winning competition in business.

5. Ex-Boy friend, Divorced husband etc.—sometimes a person rejected by ex-lover/ex-wife takes revenge by defaming the person through net.

6. Organised hackers—There are some educated people who are expert in knowledge of computers. Their knowledge is used by some organized criminal groups for fulfilling certain objectives. Their knowledge is turned into tools within the computer crimes and lots of them are working for organized networks.

Types of Cyber crimes---

Computer crimes are vulnerable. Cyber Crime refers to all activities done with criminal intent in cyberspace, According to V.Shivakumar cyber crime fall into three slots.

- Those against persons.
- Against Business and Non-business organizations.
- Crime targeting the government.

The following are some of the crimes ,it is not an exhaustive list.

1) Data diddling :-This crime is committed when a person knowingly or intentionally conceals, destroys or alters, or intentionally or knowingly causes other to conceal, destroy or alter any computer source code used for a computer. Data diddling is one example of such type of an offence. In this raw data altered before it is processed by a computer. (After its processing again the same data is brought back) when the processing is over the same

data is brought back.

2) Hacking :- . Hacking in simple terms means an illegal intrusion into a computer system and/or network. It is breaking into computer system, frequently with the intension of altering or modifying existing systems or networks. There is an equivalent term to hacking i.e. cracking, but from Indian Laws perspective there is no difference between the term hacking and cracking. Generally hacker's intention is to cause wrongful loss or damage to a person by either destroying or deleting or altering the information stored in the computer. Some hackers hack for personal monetary gains, such as to stealing the credit card information, transferring money from various bank accounts to their own account followed by withdrawal of money. They extort money from some corporate giant threatening him to publish the stolen information which is critical in nature.

Hacking is punishable. Who so ever commits the hacking shall be punished with imprisonment up to three years or with fine up to Rs two lakh or with both. For prevention a person must take a proper care with regard to using his/her password.

Government websites are the hot targets of the hackers due to the press coverage, it receives. Hackers enjoy the media coverage.

3) Mail Related Crimes

a) Email Bombing- in email bombings large numbers of emails are sent to individuals. or organisations with the intention of crashing their e-mail account or server. These e-mails are sent in two ways.

1) To the same e-mail id large number of mails are sent 2) the same e-mail id is signed to many subscriptions as a result it receives several mails resulting into crashing of the server. In this case a person has to stop those subscriptions manually. One foreign national had repeatedly sent thousands of mails to the Simla housing board till their server was crashed. He engaged in this crime because he wanted to take revenge.

b) Spamming- it refers to sending unsolicited bulk messages. There are various types of spam like instant messaging spam, UseNet newsgroup spam, web search engine spam, mobile phone message spam. The e-mail spam is most commonly known. The characteristic feature of all spam is unrequested messages or mails are received by the person. Most of the firms are involved in spamming for their advertisements.

c) E-mail spoofing – A spoof e-mail is that which is originated from one source but it appears to be originated. Spoofing means a hacker logs-in to a computer illegally using a different identity than his own. The originator source's name or email address is hidden

and some other familiar name appears, the intention behind this act or crime is to arouse interest among the receiver so that he or she will open the mail and shall respond to it.

d) Defamatory e-mails- some times the defamatory e-mails are sent in order to harass the person. These kind of defamatory mails are very harmful to the people who have been made victims e.g. one of the employees of the company started sending derogatory, defamatory, obscene, vulgar and abusive emails to his employers and to the different subsidiaries of the said company all over India.

e) Threatening e-mails- while sending the e-mails the person's identity can be disclosed. The benefit of this is taken by some and they send threatening e-mails or blackmail someone through the internet.

4) Salami Attacks-

This attack is a crime committed by making certain minute alterations in the computer programming. The intention of these attacks is financial gains. In this alterations are so insignificant that it remains unnoticed. For eg. A bank employees inserts a program that deducts a small amount of money (Say Rs. 5 a month) from the account of customer. No account holder will probably notice this unauthorized debit but the bank employee will get a large amount of money

5) Denial of Service attack—

In this attack the intention is to abrupt or disturb the services provided by a particular website or services offered by high profile web servers such as banks, credit card payment gateways etc. In this attack a computer resources is flooded with so many requests that it can not handle them, and as a result the web server may crash or it may become very slow and ineffective. Due to this attack the unauthorized users are denied the services offered by that web server. Denial of service attack had brought down websites like Amazon, CNN, Yahoo.

6) Virus attacks –

A computer virus is a program that can 'infect' other legitimate programs by modifying them to include a possibly 'evolved' copy of it self. Viruses can spread themselves, without the knowledge or permission of the users, to potentially large numbers of programs on many machines. It may cause damage to the data or files stored in a computer either by deleting it or altering it. Virus involves into actions like displaying message to prompt an action which may set of the virus, erase files ,Scramble data on a hard disk ,Cause erratic screen behaviour, Halt the PC, Just replicate itself! Virus can spread widely and fast and do much damage. In 2000 the dangerous virus lovebug had affected nearly 30 million computers. In 2001 another virus named Nimda has affected both webservers

and non servers. This virus can be transmitted by merely viewing the infected page. Trojan attack is another virus. It is an unauthorized program which passively gains control over another's system by representing itself as an authorized program. Generally it is installed through email.

7) Worms attack—
Worms enter a computer and generate their own commands. They make copies of themselves till they eat up all the available space on a computer' memory.

7) Software Piracy- It is theft of software through the illegal copying of genuine programs or the counterfeiting and distribution of products intended to pass for the original. Due to software piracy retail revenue losses are increasing worldwide. It can be done in various ways for example, end user copying, hard disk loading, counterfeiting, illegal downloads from the internet.

8) Pornography-- The use of computer networks to produce and distribute child pornography has become the subject of increasing attention. Today, these materials can be imported across national borders at the speed of light. The more overt manifestations of internet child pornography entail a modest degree of organisation, as required by the infrastructure of IRC and WWW, but the activity appears largely confined to individuals.Publishing, transmitting any material in electronic form which is lascivious or appeals to the prurient interest is an offence under the provisions of section 67 of I.T. Act -2000.

9) Phishing-- "Phishing" is derived from the word "fishing", and it means luring or enticing an unwary customer of a Banking or Financial Institution to pass on sensitive information pertaining to their account. Scamsters then use this information to siphon off funds or, undertake transactions that are billed to the original customer. It is technique of pulling out confidential information from the bank/financial institutional account holders by deceptive means. For example, An unwary internet banking customer of a financial institution receives an E-mail purportedly from the institution, which warns the customer that their internet banking privileges will be revoked due to a long period of inactivity—unless they confirm their login name, password, date of birth and other "security" details so that the same can be "updated" on the Institution's server. Tens of lakhs of such e-mails, ostensibly from a reputed financial institution are sent to people at large, hoping to catch some of the legitimate, gullible customers of that financial institution. A database of valid e-mail addresses is separately harvested by the crooks over a period of weeks or months in advance. Such an E-mail contains a clickable URL or a link, which promises to take the Customer to the Internet Banking interface of the Institution.

The moment an unsuspecting customer clicks on such a link, they are taken to what is known as a “spoofed” webpage, which the fraudsters have created. The mis-users then log-in remotely into such victims’ accounts and transfer funds into an account opened by them using forged documents,

10) Cyber stalking:-The criminal follows the victim by sending emails, entering the chat rooms frequently. Here the intention of criminal is harassing the victim. Cyber stoking includes false accusations, the transmission of threats, identity treats, and soliciting minors for sexual purposes, and gathering information for harassment purposes.

Cyber Crime Prevention

Computers are used almost in all the fields, individuals, organizations, companies depends on computer for collection of data, dissemination of information, storing of important information. Therefore there is a need to take proper precaution of protecting computer systems and the data that is stored in them.

So as a precautionary method one must install anti-virus software to his/ her personal computer. Firewalls are also used as a computer security measure. Organizations require their internal systems from the internet. This application is called firewall. It prevents unauthorized outside connection from entering into the network.

Following steps are suggested by Mr. V.Shiva Kumar, Asst.Director A.P Police Academy:-

PREVENTIVE STEPS FOR INDIVIDUALS AND CHILDREN:

They should not give photographs to anyone on the Net without first checking or informing parents, guardians. They should not respond to messages, which are suggestive, obscene, belligerent or threatening, and not to arrange a face-to –face meeting without telling parents or guardians.

PARENTS:

Parent should use content filtering software on PC to protect children from pornography, gambling, hate speech, drugs and alcohol.

There is also software to establish time controls for use of limpets (for example blocking usage after a particulars time) and allowing parents to see which site item children have visited. Use this software to keep track of the type of activities of children.

GENERAL INFORMATION:

- Remember that all other Internet users are strangers; you do not know who you are chatting with. So be careful.
- Be extremely careful about how you share personal information about yourself online.
- Do not share personal information in public space online; do not give it to strangers.
- Be extremely cautious about meeting online introduced person. If you choose to meet, do so in a public place along with a friend.

PREVENTIVE STEPS FOR ORGANISATIONS AND GOVERNMENT

PHYSICAL SECURITY: Physical security is most sensitive component, as prevention from cyber crime Computer network should be protected from the access of unauthorized persons.

PASSWORD: The use of passwords is the most common security for network system including servers, routers and firewalls Password should be changed with regular interval of time and it should be alpha numeric and should be difficult to judge.

USING INTRUSION ALERT PROGRAMS: As it is important to identify and close existing security holes, you also need to put some watchdogs into service. There are some intrusion programs, which identify suspicious activity and report so that necessary action is taken. They need to be operating constantly so that all unusual behaviour on network is caught immediately.

ENCRYPTION: Encryption allows sending confidential documents by E-mail or save confidential information on laptop computers without having to fear that if someone steals it the data will become public.

CYBER LAW

India has enacted the first I.T. Act, 2000 based on the UNCIRAL model recommended by the General Assembly of the United Nations. Chapter XI of this Act deals with offences/crimes along with certain other provisions scattered in this Acts .The various offences which are provided under this chapter are shown in the following table: -

Offence Section under IT Act

Tampering with Computer source documents Sec.65
Hacking with Computer systems, Data alteration Sec.66

Publishing obscene information Sec.67 Un-authorized access to

protected system Sec.70 Breach of Confidentiality and Privacy Sec.72

Publishing false digital signature certificates Sec.73

Computer Related Crimes Covered under IPC and Special Laws Offence Section

- Sending threatening messages by email Sec 503 IPC
- Sending defamatory messages by email Sec 499 IPC
- Forgery of electronic records Sec 463 IPC
- Bogus websites, cyber frauds Sec 420 IPC
- Email spoofing Sec 463 IPC
- Web-Jacking Sec. 383 IPC
- E-Mail Abuse Sec.500 IPC
- Online sale of Drugs NDPS Act
- Online sale of Arms Act

The instances of cyber crimes are increasing in our country hence special cyber police stations have set up in some of the metropolitan cities like Mumbai, Hyderabad and Chennai.

Check your Progress

1. State the two ways in which Atomic energy can be obtained.

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2. What are the harmful effects of nuclear technology on environment and health.

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3. What do you understand by professional hackers.

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4. Can cyber crime be committed by close friends and relatives. If yes, in what manner can it be committed.

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5. In what way can parents take protective measures against cyber crime.

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15. 6 Summary

The progress made by science and technology has its good effects but at the same time it has also resulted in adverse effects. The adverse effects is felt in the domain of health, environment and wellbeing of individuals and also of mother earth. Sonography and sex determination test, genetic modified food, nuclear technology and cyber crime are the adverse effects and though laws have been framed to check its misuse an awareness on the part of general public is also very essential.

15.7. Unit End Questions

1. What is meant by sonography and state the effects of sex determination test.

2. Do you feel that the sex determination test is adversely affecting the male female ratio and state the measures taken by government to check its adverse effect.

3. What is meant by Genetic modified food and state its advantages and disadvantages.

4. Define nuclear power and state its disadvantages.

5. What is cyber crime and who are the parties to commit cyber crime.

6. State the various ways in which cyber crime are committed.

7. List the measures taken to control cyber crime.

SYLLABUS
S.Y.B.A./B.Com
Foundation Course
Paper - II

Human Rights:

- Human Right Constituents: With special reference to the Fundamental Rights in India.
- Laws related to human right : Protective and Repressive.
- Mechanisms to protect and promote human rights in India: The National Human Rights Commission ,State Human Right Commission, National Commission for S.C.S, National Commission for S.T.S, commission for Women at national and State level.
- The role of Non-Governmental Organisations such as People's Union for Civil Liberties and Movements such as Chipko, Narmada Bachao Andolan in protecting human right.

Nature and Development of Science:

- Introduction to Science: Nature of Science, Science and Religion, Science and Philosophy, Science and Astrology, Science and Technology.
- Theories, discoveries and inventions of renowned scientists towards growth of science :

Contributions of Galileo, Newton, Einstein, Charles Darwin, Dr. C. V. Raman, Dr. Homi Bhabha.

Ecology :

Nature of Ecology :

- Definition, meaning and scope of Ecology as a Science.

Environment degradation.
Environment Ethics: Meaning and Scope.

Environment and Health:

- The relationship between Environment and Community Health- Food, Air and Water-related health problems: such as Typhoid, Cholera, Malaria, Hepatitis B, Dengue, Chickungunya, Bird Flu, Conjunctivitis, Leptospirosis.
- Impact of Developmental projects on Health and Environment: Dams, Nuclear Power Plants, Thermo-electric Projects.

Environment Protection:

- Waste Management.
- Carbon Bank : Meaning and need for Carbon Bank in India Metro cities.

- Response to Natural and Human Induced calamities: Role of NGO'S.
- **D. Technological Advancement and Applications: Various forms of recent Technological Advancement:**
- Meaning, Significance, Advantages and Disadvantages of (a) Space technology,(b) Laser Technology,(c) Information Technology,(d) Biotechnology,(e) Nanotechnology.
- **Misuse of Science and Technology:**

Sonography and sex determining tests.
Synthetic food and Genetically Modified Food – use of Pesticides and Insecticides.
Cyber Crime
Nuclear Power.

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