**CHAPTER-VIII**

**HEALTH AND HYGIENE**

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**SECTION-1**

**STRUCTURE AND FUNCTION OF THE HUMAN BODY**

1. The human body is the greatest of all complex machineries. In order to carry out first aid, a, first aider should have basic idea of structure and function of every part of human body.

**Structure of the Body**

2. Human body consists of :-

 (a) Skelton (Bones of the body) - see Fig 1

 (b) Muscles.

 (c) Blood Circulatory Organs.

 (d) Respiratory Organs.

 (e) Digestive Organs.

 (f) Excretory Organs.

 (g) Nervous System Organs.

**Functions**

3. (a) **Skeleton**. Bones of the body (See Figure-1) gives shape and firmness to the body. It protects the important organs of the body like brain, heart, lungs, spinal chord and so on. There are 206 bones in the body. Bones are either long, short, flat or irregular in shape. Long bones are found in the upper limb. Femur, Tibia, Fibula are in Lower limb and Sternum and Ribs on the chest. Short bones are found in wrist and ankles, flat bones, are found in cranium, shoulder and hips. Irregular bones are found in the vertebral column. Joints are places where two or more bones meet which permit the movement of the body.

(b) **Muscles**. They are attached to the bones and are responsible for body movement. They are of two types, voluntary and involuntary.



 (c) **Blood Circulatory System**

(i) Heart is most important organ of blood circulation. It lies on the left side of the chest and is of the size of a closed fist. It is an in-voluntary hollow muscular organ which functions without the control of our will. Pericardium, Myo Cardium and Endo Cardium are its three layers. It is divided into two compartments, right and left. Right side contains impure blood while left side contains pure blood. Each side is again divided into AURICLE and VENTRICLE. Auricles are the receiving chambers. Heart circulates blood to all parts of the body through arteries and receives it back through veins. This is done by pumping action of the heart contraction and dilation.

(ii) **Blood.** Blood is an essential fluid which circulates in our body. It carries oxygen and nourishment to the body tissues without which we cannot survive. It also removes all waste products like carbon- di-oxide. Blood circulation is brought about by function of the heart and blood vessels.

(iii) **Blood Vessels**

(aa) **Arteries.** These are the Blood vessels which carry pure blood from the heart. Aorta is the biggest artery from where the branches of other arteries take the pure blood to each part/organ.

(ab) **Veins**. These blood vessels collect and carry impure blood to the heart. Main veins are superior and inferior Vena Cava.

(ac) **Capillaries.** Tiny blood vessels which connect the small arteries and veins. The exchange of oxygen and nutrition with carbon-oxide by the tissue takes place in capillaries.

(d) **Respiratory System**. Two lungs ‘Right’ and ‘Left’ are the important organs of respiration. During breathing in, fresh air goes in to the lungs, the blood absorbs the oxygen from inhaled air and distributes it to all parts of the body. Oxygen is most essential for living. Carbon-di-oxide , a poisonous waste product is removed from the lungs during breathing out. Thus we see that the process of `breathing in’ and `breathing out’ are most important for the continuation of life process.

(e) **Digestive Organs**. Stomach and intestines help in the digestion of flood we eat, through a number of gastric juices and secretions from the liver, pancreas and intestines and the nourishment is carried to all parts of the body by blood. The unabsorbed food passes via intestines and is evacuated as faeces.

(f) **Excretory Organs**

(i) **Kidneys**. Waste material in the form of urine is removed by kidneys.

(ii) **Skin**. Waste matter in the form of sweat is removed through perspiration by skin.

 (g) **Nervous System Organs**

 (i) **Brain**. It is a compact nerve tissue structure which controls

 and coordinates all body functions through nerves.

(ii) **Nerves**. They control all the organs and their function. They are silvery wire like fibres which are connected with brain.

**SECTION -2**

**HYGIENE AND SANITATION**

**Introduction**

1. Hygiene is the science which seeks to preserve and improve the health of the individual and of the community as a whole. Its study is aimed at making the cadets aware of the many health hazards and to enable them to look after themselves more efficiently. It seeks to develop in them the concepts of healthy living. Hygiene has nothing to do with religion or social customs but it is simply based on scientific requirements. Personal hygiene involves all aspects of the health of an individual. Responsibility for the maintenance of personal health, therefore lies with the individual. Every person must remain in perfect physical, mental and social health, only then can he serve the community and the country well. The basic factors which make a person healthy are enumerated in the subsequent paragraphs.

**Personal Hygiene**

2. **Sleep**. Sleep means the periodical rest of both body and mind. The amount of sleep one requires varies with individuals and age. Older people sleep less than the young. The average requirement of sleep is from 7 to 8 hours a day.

3. **Bathing**. Keeping the Skin clean and in healthy condition is essential for good health. A warm bath in winter and cool one is summer and use of soap are essential for body cleaning.

4. **Eating and Drinking**. Properly cooked food with its full nutritive value is beneficial for health. Eat slowly and chew well. Do not swallow hastily. Avoid strenuous exercise after a heavy meal. Drink plenty of water between meals.

5. **Care and Cleanliness of Skin, Hand, Hair and Teeth.** Our skin keeps on secreting sweat and hence it is necessary to keep it clean through bathing and by removing dust and dirt. Constant use of soap is required otherwise the clothing would get a foul smell and attract vermin. Regular changing and cleaning of clothing is essential to keep the body fit. Hands and finger are to be kept clean and washed before taking meals and after a visit to the lavatory. Nails should be kept trimmed to keep them free from dirt. The hair should be kept clean by regular washing and combing. Care of teeth plays an important part in keeping fit. Digestive and other disorders take place when decayed teeth and unhealthy gums bleed giving foul smell in the mouth. Teeth should be regularly brushed after the last meal at night and early in the morning. In-sufficient vitamins C &D are the cause of dental decay.

6. **Food and Rest**. Properly balanced diet is essential for physical well being. Food should be hygienically and properly cooked. It should be chewed well and taken in proper proportion. Sufficient rest, recreation and sleep are essential for mental and physical fitness.

7. **Exercise**. Organized games and physical exercise are necessary for proper development of the body and mind.

**Water Supply and Its Purification**

8. **Source of Water Supply**. These are:-

 (a) Rain Water.

 (b) Surface Water.

 (c) Underground Water.

9. **Rain Water**. Life on land depends on rain. It fills the rivers and lakes, it lets seeds germinate and grow, and provide us with drinking water though it is unfit for drinking as it comes through suspended impurities in the atmosphere.

10. **Surface Water**. Rivers and streams get polluted by discharge of human, animal and industrial waste into them. Lakes and ponds provide good water source if kept away from pollution. This can be achieved by:-

(a) Providing fence all round the water point to keep away the animals.

(b) Prohibiting animal grazing and human habitation in the vicinity of the fenced area.

 (c) Prohibiting washing of clothes.

(d) Ensuring no draining of dirty/industrial waste water is allowed from the surroundings.

11. **Underground Streams**. Wells are a good sources of water supply which can be protected as under:-

(a) Avoid soakage pits, latrines, urinals, sewerage or any leaking drains within 100 ft of a well.

(b) The well should be protected with stones or bricks set on concrete or cement lining. Construction of a parapet is necessary to stop waste water going into the well.

(c) Cover the well with a dust proof top.

(d) It is desirable to have a pump, if facilities are available or alternatively a bucket and a chain.

(e) Use of fence all around is necessary.

12. **Purification of Water**. Safe drinking water comes only from an authorised source. Purification provides good and safe water by eliminating the following:-

 (a) Suspended matter.

 (b) Harmful salts in solution, bad taste, smell and undesirable colours.

 (d) Disease germs.

13. **Method of Purification**. The following methods are used:-

(a) **Boiling and Distilling Water**.

(b) **Clarification**. Removal of suspended matter through filtration by passing it though filter beds of gravel and sand or through properly sterilized filters.

 (c) **Sterilization**. By using chlorine gas or bleaching powder.

(d) **Pinking**. During cholera epidemic potassium permagnate should be used for pinking of wells.

(e) **Precipitation**. By adding alum or some similar chemical to water which carries all impurities to the bottom with it and leaves pure water. Water is then passed through a filter.

**Latrines**

14. These are of various types:-

(a) **Water Carriage System**. It implies ample supply of pipe water available to carry the faeces away. It is simple, hygienic but require a lot of money and time.

(b) **Aqua Privy Latrines**. Nominal cost, used where construction of water carriage system is not possible.

(c) **Removal System**. It implies collection of faeces and subsequent removal for final disposal. The method is not very hygienic.

(d) **Deep Trench Latrines**. A pit three feet wide, atleast eight feet deep and of a length suitable to the requirement is constructed and wooden seats placed over it with proper partitions and curtains. Soil may necessitate reverting of sides with sand bags, bamboos or wire netting.

(e) **Shallow Trench Latrines For Temporary Camps**. For camps of less than a week’s duration dig a row of trenches in parallel, each trench being 3 feet long, 1 foot wide and 2 feet deep. Each trench should be 2 feet apart. The ratio is 5 trenches for the first hundred users and three for each subsequent hundred. After defecation cover the excreta with loose earth by providing a shovel or a scoop. Fill the trenches after 24 hours and get new trenches dug in.

**Urinals**

15. (a) **Trough Urinals**. Made of corrugated plain galvanized iron bent in the form of a gutter and mounted on four wooden legs. It slopes slightly towards one end where a vertical drain pile runs down in a soakage pit.

 (b) **Funnel Urinals**. For temporary camps funnel urinals can easily be constructed over a simple soakage pit.

**Soakage Pits**.

16. Essential for the disposal of liquid refuse like greasy water from kitchen and waste water from bathrooms. Dig a pit 4 feet by 4 feet and 5 feet to 6 feet deep. Fill with small stones and broken bricks. Cover the top with oiled sacking and put earth or sand 6 inches above. In the centre keep a perforated empty tin of kerosene oil. Fill this tin with layers of gravel or sand and gravel. In this, fit in a bucket, filled with straw, grass or some other grease retaining material. Remove the strainer daily and replace with fresh one.

**Disposal of Garbage**.

17. Disposal of solid refuse like kitchen garbage, bones etc, be done by burial or burning. The household refuse should be deposited in a covered bin placed outside. Improvised kerosene/ oil tins are not advisable. Further disposal should be done under municipal arrangements.

 **SECTION-3**

 **PREVENTABLE DISEASES**

**Introduction**

1. Many of the deadly diseases can be prevented from spreading to healthy persons if proper precautions are taken by checking infection and contagion of several diseases and by killing carriers of several other diseases.

**Classification**

2. Communicable diseases can be classified as follows :-

(a) **Excremental Diseases.** The germs pass out of the body of a sick man suffering from the diseases along with excreta (urine and faeces). The excreta can contaminate food, water or hands of cooks and thus pass the infection. Thyphus fever, dysentery, diarrhoea, jaundice and intestinal worms are some of the important diseases belonging to this group.

(b) **Droplet Infection.** The germs are sprayed out from the nose, throat or lungs in the air in small droplets of saliva during coughing, sneezing or even while talking. These germs are inhaled by a healthy man if he happens to be near the sick. Common cold, tonsilitis, influenza, diphtheria, meningitis, (inflammation of the brain) and tuberculosis are the common diseases in this group.

(c ) **Contact Diseases.** The germs move pass from the sick to the healthy by actual body contact. Veneral diseases i.e. syphilis, gonorrohoea and skin infection are common examples. Complete segregation of patient can prevent the spreading of the diseases.

(d) **Inset Borne Diseases.** The germs move from a sick person to a healthy person through blood sucking insects known as `Carriers’. These insects first bite a sick person and then a healthy person leaving the germs of the diseases in the blood of the healthy person. These germs multiply in the blood of the healthy person during the period of incubation, at the end of which he starts showing symptoms of the disease carried by the inset. These are:-

 (i) Carried by Mosquito – Malaria, Dengue and Filariasis.

 (ii) Carried by sand fly - Sand fly fever, Kala Zar, Oriental sore.

 (iii) Carried by lice - Typhus, Relapsing fever.

 (iv) Carried by flies - Diarrhoea, Dysentry, Cholera, Typhoid.

 (v) Carried by fleas - Plague, Typhus.

 (vi) Carried by ticks - Relapsing fever, Typhus.

(e) The preventive steps that can be taken to stop spreading of these diseases are to destroy all these insects by draining out all stagnant water, puddles and by spraying drains and muddy places with anti-mosquito emulsion. Mass drives should be organized to kill all files, fleas, ticks and lice through sanitation. All heaps of dirt and refuse should be removed. Anti- rat campaigns ought to be organized. All casualties ought to be segregated.

(f) **Water Borne Diseases**. Certain diseases spread due to infection carried through water. These are cholera, dysentery, diarrhoea, jaundice etc. These spread as water gets contaminated through vomits or faeces passing into it. Epidemics are likely to spread if immediate steps are not taken to disinfect water and to properly dispose off the excreta through efficient conservancy arrangements. All sources of the diseases ought to be segregated.

 (g) **Animal Borne Diseases**. The germs are transmitted through the agency of animals by drinking milk or through the agency of insects. Rabies, plague, anthrax and tuberculosis are some of the common diseases.

**Preventive Measures**

3. The following preventive measures are necessary to ward off these diseases:-

 (a) Segregate the patient

 (b) Destroy agents (germs) causing infection.

 (c) Dis-infection.

 (d) Control of the food and drink.

 (e) Inoculation and Vaccination.

**SECTION-4**

**FIRST AID IN COMMON MEDICAL EMERGINCIES**

**Introduction**

1. There will be a number of occasions on which we may be faced with situations where we may be required to provide First Aid to the injured because of an accident or due to any calamity. Therefore it is very important for all cadets to have knowledge of providing First Aid in common medical emergencies. In the succeeding paras we will deal with certain medical emergencies and discuss about the method of First Aid to be provided.

**Injuries to Internal Organs**

2. These injuries cannot be seen but can only be suspected where bleeding instead of coming to surface, occurs into the cavity of chest or abdomen wherein important organs like Heart, lungs liver or Spleen might get ruptured . The following symptoms are observed in case of internal injuries:-

 (a) Cold clammy skin.

 (b) Weak thready rapid pulse.

 (c ) Shallow sighing and breathing.

 (d) Face pinched and pale.

 (e) Eyes deeply sunken with dark rings around them.

 (f) Patient usually restless and anxious and may lose consciousness

3.  **First Aid Treatment**.

 (a) Keep the patient warm and lying down with feet raised up and head kept low.

 (b) Apply cold application on the suspected injured region.

 (c) Cheer up the patient.

 (d) Arrange medical attention as soon as possible.

**Burns and Scalds.**

4. Burns may be caused by heat, either dry as by contact with fire or flame. Burns caused by moist heat such as hot water, hot fluids and steam, is called a scald. Chemical burns may be caused by strong acids or alkalies. If the burn is chemical let water from a pipe or hose flow freely on the burn so that the chemical flows off.

5. **First aid Treatment**

(a) Protect burnt area by applying bandage or cover exposed part with clean towel or cloth.

 (b) Give complete rest and plenty of fluids to the patient.

 (c ) Re-assure the patient.

 (d) Give him morphia if available.

 (e) Evacuate patient to the nearest hospital or dispensary.

**Snake Bite**

6. In Snake bite the poison is injected by the snake through a pair of hollow and deeply grooved biting fangs. The majority of bites occur on parts of limbs which are exposed like hands, feet and lower legs.

7. **First Aid Treatment**. All cases of Snake bite should be treated as being bitten by poisonous snakes. The first aid treatment will be as follows:-

 (a) Make the victim lie down comfortably.

 (b) Give convincing reassurance against fear of death.

 (c ) Apply a light constricting tourniquet with handkerchief, bandage or shoe lace above the knee for a bite on the leg and above the elbow for a bite on the arm. So that the poison does not flows to all part of the body.

 (d) Wash with soap and water. Use water freely.

 (e) Incise into the skin 2” x ½” across the fang mark with a blade.

(f) Suck the blood either with mouth or with a suction pump. Be careful that there is no cut or ulcer in the mouth.

 (g) Evacuate the patient quickly to the nearest dispensary or hospital.

 (h) If breathing fails, start artificial respiration.

**Scorpion Bite**

8 Bite by a scorpion should be treated as snake bite.

9. **First Aid Treatment**

(a) If blood has been drawn , the wound should be cleaned well with antiseptic lotion.

 (b) Evacuate casualty to the nearest dispensary or hospital.

**Rapid Dog Bite**

10. Rabies is a very dangerous disease transmitted by a rabid dog. The disease is preventable by giving anti- rabies vaccine.

11. **First Aid Treatment**

 (a) Immediately wash with water and soap.

 (b) Wound should be cleaned with available antiseptic.

 (c) Patient should be sent to hospital for an anti- rabies injection course.

 (d) Dog and the patient should be kept under observation for at least 10 days.

**Foreign Bodies in Eye, Ear and Nose**

12.  **Foreign Body in Eye.** Particles of coal or dust may lodge on the eye-ball or inside the eye lid causing discomfort and damage to the tender structure.

13. **First Aid Treatment**

 (a) Ask the patient not to rub the eyes.

 (b) Wash the eye with water repeatedly for a minute or two.

(c ) Search for the foreign body by lifting the upper eyelid and parting the lower eyelid down. The patient should face the light. If the foreign body is seen, it can be wiped off with the moistened corner of a handkerchief, cloth or cotton swab.

 (d) If foreign body is fixed to the eye-ball, patient should be sent to the hospital with a light eye bandage.

14. **Foreign Body in Ear.** This is common with children. They often put beads, peas, nuts and other objects into the ear or an insect may get into the ear.

15. **First Aid Treatment**. Do not try to remove the foreign body with the help of a pin or forceps as this may push the foreign body further in, causing damage to the ear drum. The patient should be sent to the hospital.

16.  **Foreign Body in Nose**. This is a common occurrence among children. They might put peas, beads, etc in the nostril.

17. **First Aid Treatment**

 (a) Blowing the nose and sneezing may expel the foreign body.

 (b) Make the casualty breath through the mouth.

 (c ) Do not try to remove the foreign body.

 (d) Send the patient to the nearest hospital.

**Respiration: Natural and Artificial, Asphyxia and Insensibility**

18. The tissue and organs of the body are supplied with oxygen through respiration, essential for the functioning of body. Respiration consists of inspiration, expiration, and a pause. During inspiration air is drawn inside causing the lungs to expand. During expiration the lungs contract and air is pushed out. The respiratory system consists of the air passage known as respiratory tract and lungs. The actions of muscles concerned with respiration are controlled and regulated by the respiratory centre of the brain.

**Asphyxia**

19. Any thing which interferes with respiration producing irregularities in breathing produces a condition known as Asphyxia.

20. **Causes**

 (a) Drowning – Due to water entering the air passage.

 (b) Hanging and Strangulation due to obstruction to entry of air

 (c ) **Suffocation**

 (i) Due to obstruction to entry of air through the air passage.

 (ii) Foreign body obstructions in air passage.

 (iii) Inhalation of poisonous gases e.g. carbon monoxide.

 (d) Over dosage of drugs such as sleeping pills, morphine, pathedine.

 (e) Electric Shock.

 (f) Diseases e.g. tetanus, epilepsy, rabies.

21. **Sign and Symptoms**

(a) Dizziness and weakness.

 (b) Shortness of breath - rate of breathing increases.

 (c) Rapid pulse.

 (d) Partial loss of consciousness.

 (e) Swelling of the veins of the neck.

 (f) Face, lips, nails, fingers and toes turn blue.

22. **General Rules for Treatment of Asphyxia**

 (a) Remove the cause if possible or the casualty from the cause.

 (b) Ensure that there is a free passage for air.

 (c ) Lay the individual on his back. Press the head back- wards supporting the neck on your palm, lift the tongue clear of the airway. Give mouth to mouth breathing.

23. **First Aid for Special Cases: Drowning**

 (a) Wet clothes should be loosened.

 (b) Mouth, throat and nostrils should be cleaned of mucus and of any foreign body.

 (c ) Patient should be made to lie down over his belly , face down , head turned to one side , arms stretched beyond the head, tongue pulled out.

 (d) Artificial respiration should be given till he starts breathing.

 (e) Cover the patient with a blanket.

24. **First Aid in case of Strangulation or Hanging**

 (a) Cut the constriction.

 (b) Clear the air passage.

 (c ) Start artificial respiration.

 (d) Give inhalations if possible.

 (e) Make the patient warm and comfortable.

25.  **First Aid in case of Choking**. Bend the casualty’s head and shoulders forward, to dislodge the obstruction. In case of a small child hold him upside down, and thump his back hard between the shoulder blades or encourage vomiting by passing two fingers to the back of the throat.

26. **First Aid in Case of Suffocation by Poisonous Gas**. Protect yourself and remove the casualty from the gas as early as possible.

27. **First Aid in Case of Electric Shock**

 (a) Switch off or break the current if possible.

 (b) Remove the casualty from contact with the current, if possible. Stand on some insulating material such as rubber soled shoes or boots or piles of newspapers.

 (c ) Give artificial respiration.

 (d) Treat for shock and burns.

**Insensibility or Unconsciousness**

28. It is due to interruption of the action of the brain through some interference with the functions of the central nervous system.

29. **Stage of Unconsciousness.**

(a) Ist Stage- Delirium – When the restlessness of body and mind are present.

 (b) IInd Stage- Patient responds to loud commands, gives maximum response to minimum stimulus.

 (c) IIIrd Stage- Semi - Coma- Patient responds to painful stimuli only (minimum response to maximum stimulus).

 (d) IVth Stage- It is a stage when the patient makes no response to any stimulus.

30. **Causes of Unconsciousness of Coma**

 (a) Head Injury.

 (b) Hemorrhage from brain.

 (c) Heart failure.

 (d) Diabetic coma , Hepatic coma , Uraemic coma.

 (e) Excessive narcotic e.g. sleeping pills, morphine.

 (f) Intracranial or brain infections like meningitis, encephalitis.

 (g) Physical agents such as heat strokes, electric socks.

 (h) Epilepsy.

 (j) Hysteria.

31. **General Rules of First Aid in Casualties of Unconsciousness**

 (a) Make the patient lie down with head turned to one side, pull out his tongue.

 (b) Loosen the clothing, ensure fresh air.

 (c ) If breathing has stopped or is irregular, start artificial respiration.

 (d) Keep the air passage clear.

 (e) Nothing should be given by mouth. Remove false teeth, if any.

**Artificial Respiration**

32. If there is any irregularity in breathing or a cardiac arrest, artificial respiration is given. If it is given correctly and in time, the patient’s life can be saved.

33. **Type of Artificial Respiration**

 (a) Holger–Nielson Method.

 (b ) Schaefer’s Method.

 (c) Mouth to Mouth Breathing.

34.  **Holger-Nielson Method.**  Keep the casualty in prone position.

(a) **Movement -1**. Go down on the left opposite the casualty’s head, placing the right foot on the ground. Place the casualty’s arm carefully above his head and keep them there during the turn. Grasp his right upper arm and turn his face to one side. The mouth and nose must be unobstructed. The operator should be 6” to 12” from the top of his head. Place the hands on casualties back with the heel of the hand on the lower part of the shoulder blade, the thumb on spine and fingers pointing to casualty’s feet. Keeping the arms straight rock gently forward until the arms are almost vertical, depending on the build of the casualty using no special force. The movement takes 2 second counting one, two. This pressure causes expiration. This is called movement 1.

(b) **Movement -2.** The operator now rocks back counting 3 for one second and slides his hand and grips the upper arms near the elbow. He raises and pulls on the arms for 2 second counting 4,5. He should take care not to raise the chest from the ground. This movement causes inspiration. Counting 6 the operator lowers the casualty‘s arm. The movements should be rhythmic in character and continued until breathing recommences. When the casualty begins to show signs of breathing the operator should continue with movement 2 only. For children the pressure on the shoulder blade should be considerably reduced or applied with fingers. The ratio should be 12 times in a minute.

35.  **Schaefer’s Method.** Position of the casualty: Lay the casualty in prone position with hand one over other under his head, the head turned to one side, mouth and nose unobstructed.

(a) **Position of the Operator**. Face the casualty’s head, kneel on both knees at the side of casualty just below his hip joint. Sit back on your heels, place your hands on the loins of the casualty, one on each side of back bone with wrists almost touching, and thumbs as far forward as possible with out strain, and fingers together.

 (b) **Movement -1**. With out bending your elbows swing slowly forward by unbending the knees until the thighs are in almost upright position, allowing the weight from your body to be communicated to the casualty’s loins. This causes abdominal organ compression against the ground and up against the diaphragm. Air is forced out of the lungs, thus expiration takes places.

(c) **Movement -2**. Swing back slowly on to your heels, thus relaxing the pressure. This causes the abdominal organs to fall back and the diaphragm to come down thus inducing inspiration. These 2 movements must be carried out smoothly and rhythmically and should take 5 second (i.e. 12 times per minutes). Artificial respiration must be continued until natural breathing is restored, or unless a doctor decides that further efforts will be of no use.

36.  **Mouth to Mouth**

 (a) Casualty should be in supine position.

 (b) Clean the mouth and throat to maintain clear air passage.

 (c) Extend the neck to straighten the air passage.

 (d) Cover the patient’s mouth with clean gauze and blow directly and slowly into it (10-12 times per minute).

**SECTION -5**

**DRESSING OF WOUNDS**

**Definition and Classification of Wound**

1 **Definition**. It is the brake in continuity of the skin or muscles membrane. It is caused by violence.

2. **Classification**. Wound can be classified as follow:-

(a) **Inside Wound**. It is wound caused by sharp instrument like knife, razor and so on. Its edges are clean.

(b) **Lacerated Wound**. It is caused by blunt instrument. The edges are torn or uneven.

(c) **Punctured Wound**. It is a deep narrow wound caused by a pointed instrument like knife, bayonet. The wound is small on the surface but may be very deep injuring internal organs.

(d) **Gun Shot Wound**. It is caused by a bullet. The bullet may lodge in the body and the wound become infected. It may have both an entry and exit, The entry is usually very small and exit may be very large and lacerated. It may become complicated with fracture if bullet strikes a bone.

(e) **Shell Wound**. It is caused by splinters of a shell or grenade wound is lacerated and fragment may lodge in the body .

(f) **Contusion**. A contusion is an injury or a bruise in which some of the tissues or a part is irregularly torn or ruptured but the skin, may not be broken. It is caused by a blow or blunt instrument.

**First Aid**

3. (a) Place the patient in comfortable position.

 (b) Stop the bleeding, if any.

 (c) Remove any foreign body if it is easily visible and can be easily removed.

 (d) Prevent the entry of germs by applying sterilized dressing like first field or shell dressing.

 (e) Give rest to the part by sling.

 (f) Immobilize the part, if wound is large or complicated by fracture.

 (g) Treat the patient for shock.

1. Send the patient to nearest hospital.

**Dressing of Wounds**

4. A wound is to be cleaned with anti septic lotion and covered with cotton or Gauze piece with medication before applying bandage.

5. **Aim**. Aim of dressing of wound is manifold**:-**

 (a) To protect the wound from infection.

 (b) Reduce swelling and early healing.

 (c ) To support the effected part.

 (d) Enable the individual to carry out his day to day routine.

 (e) Stop the bleeding.

6. **Articles Required**.

 (a) Anti septic (A/ S) lotion.

 (b) Cotton.

 (c ) Gauze piece.

 (d) Bandage of different size and band aid.

 (e) A/S ointment or powder.

 (f) Scissor.

**Procedure**

7. (a) Reassure the patient and place him in comfortable position.

(b) Stop the bleeding, remove foreign body and clean the wound with A/S lotion and cotton.

(c ) Apply A/S ointment or powder and cover it with gauze. Select suitable bandage, Start bandaging clock wise from outer aspect to inner aspect by covering 1/3 of previous lining.

 (d) Put the knot away from the wound.

 (e) Bandaging should not be either too tight or loose.

**SECTTION-6**

**YOGA: INTRODUCTION AND EXERCISES**

**Introduction**

1. Health is not merely considered by absence of disease or infirmity in a person but who has complete state of physical, mental and social well being. Fitness of a person strictly relates to his ability to meet the demands of the environment. Yoga fulfills all needs to be in a state of complete fitness. Sage Patanjali was founder and father of yoga. Yoga of Patanjali is Ashtanga or has eight fold path.

(a) Yama.

(b) Niyama.

(c) Asana.

(d) Pranayama.

(e) Pratyahara.

(f) Dharma.

(g) Dhyana.

(h) Samadhi.

2. Yoga is a science for right living. Yoga not only relieves pain, rigidity and tension but it gives much more to acquire peace and mental tranquility. Yoga calms and clears the mind and rejuvenates it. Yoga helps in purifying the disrupted natural rhythm and harmony of the body, bestows grace, heals and makes one free from all ill effects.

**Holistic Approach of Yoga**

3. One undergoes through various degrees of stress, strain, tension, anger, sadness and other emotional upsets in day to day life. This adversely affects the physical, mental and spiritual power of a person. Yoga harmonises all disturbances in the body and eradicates ill effects completely. For better management of stress, strain and other disorders, Yoga approach is more holistic, which brings efficiency and mental clarity. A person who develops his power of thoughts through Yoga has charming and dynamic personality.

**Stress Management by Yoga**

4. Today no one can escape stress due to high expectations and pressures from the environment, be it industrial sectors or students or Armed Forces. Revolutionary changes in attitude, living pattern, work design, transport and communication methods have all transformed the environment and work culture. However, body response has remained same which gets exposed to psychological, organizational and societal stress. Yoga provide physical, mental and spiritual strength, thus help in overcoming the stressors.

**Asanas**

5 There are innumerable asanas. Some of the asanas useful for curing ailments and maintain good health are as follows:-

(a) **Padmasana**.Sit on the asan. Spread the legs forward, place your left foot on the joint of your right thigh, and right foot on the joint of left thigh in such a way that both heels touch each other below your navel in the middle of abdomen. Place your hands on your knees. Keep the head and spinal column erect. Keep your eyes close or open. Stay in the final position for 1 -2 minutes in the initial stage. Later increase the time gradually. This asan is useful for Jaap, Dhyana and Samadhi. This asan also helps in curing diseases like asthama, hysteria and insomnia.





(b)  **Baddha Padmasana.** Sit in padmasana. Try to project the feet as far as possible. Take the hand behind your back. Catch the right toes with your right hand and left toe with your left hand. Keep the back bone straight and fix your eyes on the tip of the nose. This asana improves nervous system and the abdomen. It also cures drowsiness, sleepiness, laziness and night discharge.



 (c) **Siddhasana.** The main function of this asana is to awaken the power of kundalini. Sit on the carpet. Place the heel of left foot under the testis on the prostrate gland in such a way, that the sole of your foot should be placed at root of genitals. Place the hand on the knees so that palm face upward. This asana helps the mind to be firm, attentive and alert.

(d) **Gyan Mudra.** Sit in Padmasana or Siddhasana. Put your hands on your knees with palm facing upwards. Bend your index finger and place them at the root of your thumbs. Spread the remaining three fingers forward, all joined together. This asana is most suitable for pranayam and dhyana.





(e) **Trikonasana.** Stand erect keeping the distance between the feet 60 - 75 cm. Raise your right hand towards the sky and look towards its palm. Then bend the truck to the left side and try to touch left toe with the left hand without bending your legs. Repeat this process with your left hand up and right hand down. This asana is useful to the eyes, spinal cord, neck and mental power. Timings 3 - 6 sec. 4 - 6 times.



(f) **Ardha Chandrasana**. Stand erect. Raise your both hands and join them above your head. Bend towards left from the waist. After some time bring the body back in straight position. Repeat this by bending the body towards right. This asana improves the functioning of heart, liver, intestine, stomach, lungs and make the body flexible. Timings 4-6 sec, 4-5 times.

(g) **Suryanamaskara.** Suryanamaskara is a com- bined sequence of 12 positions. By this sequence of 12 positions, the whole body is well exercised. While practicing Surya-namaskara recite the different names of Sun God at each position.

**4**



**5**



**Stage 1** :- Stand in attention. Fold your hands in the centre of your chest. Now recite the first of the twelve mantras.

**Stage 2** : - Stretch your hands up and take the body backwards from the waist as far as possible. The hands must remain straight and touch your ears.

**Stage 3** :- Now bend down without bending the knees. Try to put the palms on the ground and touch the nose with knees without bending knees.

**Stage 4** :- Take left leg back. Bend your right knee, the knee will remain between the two arms, with the hands sticking to the ground, Now bend the neck backward as for as possible. Look forward and hold the breath.

**Stage 5** :- Take right leg back. Put both the toes and the knees together and pull your body up in such a way that it looks like inverted ‘V’. Look backward through your legs keeping the head, the waist and the arms in a straight line.

**Stage 6** :- Bend down your body in such a way that your forehead, chest and knees should touch the ground except your hips which should be slightly raised from the ground.

**Stage 7** :- Stretch the arms, Inhale, put the chest forward and move back your neck as much as you can. Look up and hold the breath.

**Stage 8**:- Maintain same position as in Stage 5.

**Stage 9**:- Maintain same position as in Stage 4.

**Stage 10**:- Maintain same position as in Stage 3.

**Stage 11**:- Maintain same position as in Stage 2.

**Stage 12**:- Maintain same position as in Stage 1 and then take your hand down. Make the rest posture.

(h) **Shavasana.** The main aim of this asana is releasing the mind from the body. By this asana we can achieve relaxation in the shortest possible time. This asana provides relief in disease like blood pressure, weakness of nerves and other ailments. Lie on your back and let your body be relaxed completely. Your feet should be 30-45 cm apart, arms in sides with palm upwards, eyes gently closed with attention on breathing. Keep body in a straight position. For proper blood circulation in the body, the legs, hand and neck should have no curves or bend. Take a long and deep breath then concentrate on each and every part of your body, putting it in a relaxed state. Timing 5-10 minutes.



(j) **Gomukhasana.** Sit on the seat comfortably. Place your left foot heel under your left hip. Now take the right leg over the left buttock in such a manner that the heel of your right foot is placed near your left hip. Take right arm behind back from above and left arm from below, so that fingers of the both hands are interlocked behind the back. Stay in this position for sometime. Then repeat this with opposite side. Timings 20-30 seconds, 4-6 times.

(k) **Vajrasana.** Bend the legs and sit on knees. Place the heels at the sides of the anus in such a way that thighs rest on the legs and the buttock rest on the heels. Stretch the arms and place the hands on the knees. Keep the knees close by. Sit erect. This asana can be done immediately after eating food. This helps digestion and eliminates gas troubles. Timing 1-3 minutes.





(l) **Dhanurasana.** Lie down on the chest, legs should be folded at the knees and the feet should be grasped with both the hands near the ankles. The thighs and the chest should be raised, making the body appear like a bow. This asana provides good exercise to the abdominal muscles, lower back and thighs, Timing 10-30 seconds, 4-5 times.

(m) **Bhujangasana.**  Lie down on the chest. The hands should be below the shoulders with the fingers pointing forward. The legs are kept straight with the feet touching each other and the soles facing up. Raise the head, giving a backward bend to the spine. Try to keep the spine bent backward as much as possible without raising the navel. This asana is good for the spine, the chest, the neck and the head. Timings 20-30 sec. 4-6 times.



(n) **Chakrasana.** Lie down on the back. Bend the legs at the knees. Heels are close to the hips and sole touching the ground. Bend the arms at the elbows and place them on the ground on either side of the head. Place them in such a way that palms should rest on the ground and the direction of the fingers should be towards your feet. First raise your hips and waist, keeping the legs straight. Raise the back as far as possible. This asana helps in making the spine supple. Timing ½ -1 min, 1-2 times.





(o) **Sarvangasana.** Lie down flat on the back. Raise legs from the hips, push the trunk up until legs are in vertical position. The chin should press against the chest. The hands are giving support to lower ribs. Hold this position upto 2-10 minutes. Come back as slowly as possible. Do not give any jerks to the body. This asana improves circulatory, respiratory and alimentary systems of the body. Timings: ½ - 1 minute.

(p) **Halasana.**  Lie down flat on the back. Place the arms by sides along the hips, palm facing the ground. The legs are raised up in a single motion and put down behind the head keeping knees unbent. The chin should touch the chest. In this exercise, the legs will remain straight and breathing should be normal. Hold this position for 30-50 seconds. This asana stimulates blood circulation and makes the spine flexible and elastic.



**Conclusion**

6. Perfect state of health means attaining physical, mental and spiritual health. Yogasanas are simple activities for keeping the internal and external parts of the body in good health. However, Yogasanas must be learnt from qualified instructor to gain maximum benefit.

**SECTION-7**

**PHYSICAL AND MENTAL HEALTH**

**Introduction**

1. Earlier doctors defined health simply as ‘an absence of disease or illness’. However, after the formation of World Health Organization (WHO) in 1948, health is defined as ‘a complete state of physical, mental and social well being and not merely the absence of disease or infirmity’. The mind and body are actually single system. Charak a renowned physician of ancient India has said that health is vital for artistic, ethical, material and spiritual development of man.

**Physical Health**

2. Physical health is absence of disease and infirmity and it is assessed by taking health state measurements of the body.

**Mental Health**

3. Mental health refers to the successful performance of mental function, resulting in productive activities, fulfilling relationship with other people, ability to adopt to change and cope up with adversities.

**Elements of Good Health**

4. Good health is essential condition for a purposeful existence. The main elements of good health are:-

 (a) Absence of disease.

1. Ability to work hard with efficiency and enthusiasm.

 (c) Ability to endure stress and strain.

 (d) Cheerfulness.

1. Courage.

 (f) Freedom from anxiety.

 (g) Self control and self confidence.

 (h) Sense of well being.

 (j) Wholesome mental attitude.

**Objectives of Health Education**

5. Objectives of health education formulated by WHO are:-

 (a) To ensure that health is regarded as an asset in the community.

1. To promote the development and proper use of health services.

**Scope of Health Education**

6. The scope of health education are:-

 (a) Emergency and first aid.

1. Food and its significance in the development of body.

(c) Physical exercise.

 (d) Recreation, rest and sleep.

1. Various ailments and disease.

(f) Sex hygiene.

**Importance of Mental Health**

7. It is of paramount importance to lay due emphasis to the development of mental health of children. Any disregard to this may lead to mental disorder and conflicts which ultimately may bring frustration, misery and unhappiness. Parents and teachers play a major role in providing an environment in which children develop healthy mental attitude.

**Characteristics of Healthy Mind**

8. Characteristics of healthy mind are:-

(a) Normal appetite.

(b) Calmness.

(c) Cheerful outlook.

(d) Good temper.

(e) Socially acceptable habits.

(f) Well regulated instincts.

(g) Normal physical vitality.

(h) Receptivity to new ideas.

(j) Sex consciousness.

**Mental Disorder**

9. Following causes mental disorder:-

 (a) Undue anxiety.

 (b) Embarrassment in presence of others.

 (c) Lack of courage.

 (d) Undeveloped habits and will.

 (e) Low intelligence.

 (f) Irritability.

 (g) Depressed and pessimistic outlook.

 (h) Moodiness.

 (j) Bad temper.

 (k) Full of prejudice.

**Measures to Secure Mental Health**

10. Following measures will help in securing mental health:-

(a) Favourable home and school environment.

(b) Regular medical examination.

(c) Provision of educational and vocational guidance.

(d) Provision of co-curricular activities.

**Health and Socio Economic Development**

11. The relationship between health and socio economic development is very important. Health component has an important bearing on the overall economic development of a nation. Health not only affects the individual but also the community in which he/she lives. Healthy people make a happy society and happy societies make the nation economically and militarily strong.

**SECTION-8**

**FRACTURES, TYPES AND TREATMENT**

**Definition**

1 Fracture is a discontinuity or break in a bone, resulting in the dissolution of the supporting frame work of the body.

**Causes**

2. The fracture can be caused due to the following:-

(a) **Through Direct Violence**. The bone breaks on the spot where direct violence is applied by a kick, bullet, blow etc.

(b) **Through Indirect Violence**. The bone breaks at some distant place from the spot of violence i.e. fracture of clavicle, base of skull etc, when the force is on out stretched hands or other extremities.

(c) **Through Forcible Muscular Contraction**. Fracture of patella (knee cap) by contraction of thigh muscle. Fracture of ribs may be caused by violent coughing.

(d) **Diseases of Bones**. Certain diseases of bones make them weak and easily breakable.

**Varieties**

3. A fracture is broadly classified into the following three categories:-

 

**Fig 2**

**Fig 1**

(a) **Simple or Closed**. The broken bones are covered with skin (Fig 1).

(b) **Compound or Open**. Skin overlying fracture is broken or ruptured and sometimes the broken piece may protrude through it (Fig 2).

(c) **Complicated**. The broken bone damages the under lying structure like blood vessels nerves, lungs, brain etc.

**Symptoms & Signs**

4. The Symptoms and signs are:-

(a) Pain, swelling and tenderness over the part and around it.

(b) Loss of power.

(c) Abnormal mobility.

(d) Deformity and irregularity of bones.

(e) Grating sound due to broken bones.

**First Aid Measures for Fractures**

5. The first aid measures to be adopted are:-

(a) Reassure the patient and make him comfortable.

(b) Apply splints to immobilise the fracture with any common article like stick, rifle etc.

(c) Relieve him of discomfort and pain. Keep the patient warm.

(d) Do not meddle with the fracture.

6.  **In Case of Compound Fracture**. The first aid measures in Compound Fractures are:-

(a) Bleeding should be stopped.

(b) Remove foreign objects, if any, but do not meddle too much.

(c) Cover the wound with a clean pad and light bandage.

(d) Apply appropriate splints.

1. Transfer to the nearest hospital immediately.

**Treatment of Fracture**

7. **Fracture of Jaw Bone**

(a) **Apply Barrel Bandage**. Place the centre of a narrow bandage under the patient’s chin. Tie a single hitch on the top of the head. Draw one loop forward and one loop backward until they form a horizontal turn round the head, meeting the half hitch in front of the ear. Take the free ends and tie them on the top of the head.

(b) Warn the patient not to speak.

(c) Instruct the patient to sit.

(d) In lying cases, place patient on his chest, his head projecting outside the stretcher canvas, properly supported with bandages secured on stretcher handle.

 

8.  **Fracture Clavicle**. In fracture of the clavicle we need to:-

(a) Support the arm of injured side, around the centre of each arm pit, pass a narrow fold bandage and tie it on the back of the shoulder, leaving one end of the knot longer than the other. Pull the longer end towards the other, thus drawing back the shoulders and tie them together.

(b) Put a pad in arm pit, apply greater arm sling and fix the arm with a narrow fold bandage tied across the elbow to lower chest.

9. **Fracture Ribs**. When ribs are fractured following action is taken:-

(a) **Uncomplicated**. Restrict the movement of chest on fracture side with broad-fold bandage, one above and one below the fracture side, half over lapping each other. Support the arm of injured side with greater arm sling.

(b) **Complicated**. Put the patient on the affected side and support the position by long fold blankets. Send the patient immediately to the nearest hospital.

10. **Shoulder Blade and Fracture of the Upper Limb**. Fix the elbow to the affected side and put the finger in a position touching the opposite shoulder. Secure the hand in position by cuff sling. Secure the limb firmly to the chest by two broad bandages one on shoulder and the other at the elbow level and knot on opposite side.

11. **Fracture Lower Limb**.

 (a) Fix the injured limb to the sound limb with four narrow folds.

(b) Apply long wooden splint from axilla to just beyond foot on each side. Secure them by seven broad folds bandages tied at chest, pelvis, ankles, both thighs below the fracture, both legs, and knees. The bandage on the ankles should be tied in figure 8.

(c) In case of fracture of pelvis, apply Thomas splint if available, otherwise the methods described in (a) and (b) should be used for immobilization of lower limb before evacuation of injured person to the nearest hospital.

12. **Fracture of the Spine**. Fractures of Spine are to be very carefully handled, We have to:-

 (a) Treat any case of back injury as a fracture of the spine. There will be severe pain and shock in all cases.

 (b) Make the patient still. Do not allow the patient to move about.

 (c ) If unconscious see that the tongue does not fall back and choke the patient.

 (d) Get medical aid at the earliest.

 (e) Apply broad bandages for thigh and knees.

 (f) Carry patient face downwards on a board placed lengthwise on the stretcher.

13. **Fracture of the Skull.** It may injure the brain, nervous system or the arteries and cause concussion and compression. It may be caused by direct or indirect blow.

 (a)  **If Breathing is Normal.** Lay the casualty on back with shoulders and head raised with cushions. Turn the head to one side.

 (b) **If Breathing is Abnormal**.Lay the casualty in a three quarter prone position. Apply pads under the chest and draw up the upper knee.

 (c) Do not give anything to drink.

 (d) Do not disturb the patient.

 (e) Keep air passage clear.

 (f) Treat for shock.

**Dislocation**

14. Dislocation means displacement of one or more bones at a joint. The joints more frequently dislocated are shoulder, elbow, lower jaw, thumb and finger.

 (a) **Signs and Symptoms**

 (i) Severe pain at or near the joint.

 (ii) Fixity of the joint or loss of power.

 (iii) Deformity of joint and un-natural position of the limb.

 (iv) Swelling at the joint.

 (b) **First Aid**

 (i) Do not try to reduce the dislocation.

(ii) Tie sling or bandage to immobilize the joint, apply cold compress to reduce the swelling.

 (iii) Send the patient to the nearest hospital for early treatment.

**Sprain**

15. A Sprain is the wrenching of the ligaments and tissues around the joint.

 (a) **Signs and Symptoms**

 (i) Pain at the joint.

 (ii) Inability to use the joint.

 (iii) Swelling and later bruising.

(b) **First Aid**. Place the joint in a comfortable position and apply a firm bandage . Prevent movements. Keep the bandage wet with cold water to avoid swelling. Later gently massage over the muscle and apply a crepe bandage. Analgesics should be given. Whenever you are in doubt whether an injury is a sprain or dislocation or fracture, treat it as a fracture.

**Strains**

16. A strain is the over stretching of a muscle.

(a) **Signs and Symptoms**.

(i) There is sudden sharp pain.

(ii) There may be swelling or severe cramp.

(iii) Further exertion is difficult or impossible.

(b) **Treatment**. Place the patient in the most comfortable position. Support the injured part. Give cold compress.

17. **Crepe Bandage**. A crepe bandage is made of elastic material which stretches and binds firmly around the joint to which it is applied. It thus helps in reducing swelling and movements at the affected joint, thereby minimising pain and giving it rest. It is used in sprains and strains around joints. It can be washed and used agains.

**SECTION-9**

**EVACUTION OF CASUALTIES**

1. **Introduction.** Natural calamities like earthquake, cyclones, tsunami, floods, land and snow slides occur unannounced leading to large scale causalities. More often than not people in a large numbers become victim to train, aircraft and ship accidents. Keeping in view of these facts, plans and preparation be made in advance to combat any of such eventuality. Medical authorities make preparation with assistance and cooperation from voluntary organizations like Red Cross Society, Saint Johns Ambulance Association, Home Guards and Civil Defence and NCC cadets for evacuation and treatment of casualties.

2. The first Aider plays an important life saving role when there is an accident or a raid. It is their presence of mind, intelligence, resourcefulness, dexterity, alacrity and determination which can minimize danger to the casualties.

3. On hearing of an accident or air raid having taken place, send a rescue party by transport if available, to the scene of the incident to have the casualties immediately brought to the First Aid Post.

**Preparation**

4. Before the casualties begin to arrive the following should be done:-

(a) If no First Aid Post is available transform a sheltered place, away from the main road, into a first aid post.

(b) Collect as many First Aid Boxes as possible from the nearby offices or institutions. Collect sterilized cloth and cotton from shops or nearby house. Collect as much dressing material as can be collected from the nearby resources. Collect some even twigs, sticks, umbrellas strings etc. to be used as splints and tourniquets, whenever required.

(c) Collect some blankets, cots and durries.

(d) If possible, arrange for some clean drinking water and hot drinks, tea or coffee, if available.

5. After a casualty arrives diagnose quickly and correctly by observing and promptly take the following action:-

(a) The details of the site and the history of the accident, i.e is it a scooter or motor accident or has a building or pillar fallen upon the person or if there has been a fire, and so on.

(b) The signs of the suffering-whether the person looks pale or there is bleeding, or swelling of the injured parts and deformity of a bone or the person has fainted.

(c) The symptoms of the suffering i.e., the casualty complains of pain, shivering , or has fainted.

6. Having quickly diagnosed the nature of the ailment, treat in the following manner:-

(a) Reassure the patient, cheer him up and let him not get worse due to worries.

(b) Ask on-lookers not to crowd and disturb the patient. Tell the relatives, tactfully, not to upset the patient by making a fuss about the event.

 (c) If bleeding profusely, plug and dress the wound and press the nearest pressure point and give the patient lots of fluid.

 (d) If bones are broken, apply splints and immobilizes the portions. Let the patient rest.

 (e) If it is a case of asphyxia, give artificial respiration.

 (f) If it is a case of burning, cover the wounds with sterile dressing, treat the patient for shock and give fluids.

 (g) If it is a case of poisoning, try to remove the poison.

7. The First Aider should make all efforts to revive the patient so that the condition does not get worse. Do not perform the functions of a doctor and must quickly dispose off the casualty by sending it to the nearest hospital.

**Prioritization of Casualties**

8. All casualties to be classified into three following priorities for treatment and evacuation:-

(a) **Priority I** – cases requiring resuscitation and urgent surgery.

(b) **Priority II** – cases requiring early surgery and possibly resuscitation.

(c) **Priority III** – All other casualties who require minor treatment.

**CHAPTER-X**

**ENVIRONMENT AND ECOLOGY**

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**SECTION-1**

**WHAT IS ENVIRONMENT**

**Introduction**

1. The earth is the only planet in the solar system that supports life. Life on earth exists in the biosphere, a narrow zone made up of land, water and air extending up to a few kilometers above and below the earth’s surface. The conditions in which an organism exists make up its environment. The physical components of the environment include materials such as rocks, soil, water and air.

**Factors that Influence Human Beings**

2. (a) **Physical Factors**. Earth, water, mountains and climatic conditions.

 (b) **Biological Factors**. Plants, animals, micro-organisms and man himself.

 (c) **Cultural Factors**. Economic, social and political.

**Human Activities and the Environment**

3. To meet his various needs, man alters his natural surroundings. Sometimes such changes disturb natural processes and worsen the living conditions of human beings and other organisms. For example, untreated wastes are often dumped into the rivers. This affects the health of all organisms such as fish, that live in the water and man who drinks that water. This amounts to environmental degradation.

**Depletion and Deterioration**

4. Environmental degradation takes mainly two forms. One is resource depletion i.e., a decline in the quantity of resources. The other is resource deterioration or pollution i.e decline in the quality of resources. Overuse and wastage are the main reasons for the depletion of resources. In India, forests are rapidly being cleared to provide firewood and agricultural land for the large population.

**Deforestation**

5. Large scale felling without planting trees has led to deforestation or the complete removal of forests. Deforestation also disturbs the balance of gases in the atmosphere, causes global warming, reduces rainfall and increases soil erosion. Such changes in the environment directly or indirectly harm living organisms.

**Forest and Wildlife**

6. Presently, forests cover about one third of the worlds land area. But at one time, they covered about double the area that they cover now. The land is denuded of forests largely as a result of human activities, although natural occurrences such as volcanoes and forest fires also destroy forests. As the human population is growing, the need for more crop fields, pastures, settlements, mines and so on, is causing more trees to be felled and more forests to be cleared. Like deforestation and environmental damage, reckless hunting by humans is also a threat to the world’s wildlife. The Indian tiger, hunted for its hide is near extinct. Whales have been hunted to near its extinction for their meat and fat. Wild life forms an important link in the balance of ecology and must be protected.

**Water Resources**

7. We use water in agriculture and industries and for transportation, power generation and domestic purposes. Agriculture accounts for most of the water used. The groundwater level is sinking because users are pumping out water faster than nature can replace it. The dams built in rapid successions to provide facilities for irrigation, flood control and power generation disrupt the natural flow of water and harm the life forms that thrive in flowing water.

**Environment**

8. Since ages man is related with the environment. He resides in the surroundings alongwith different plants, trees and animals. Long ago he lived with the environment without disturbing its components. But now man has started extensively changing the surroundings, thus transforming the environment and consequently affecting the delicate balance of the ecosystem which is so essential for life on this planet, due to his ever- expanding needs. People need food, water and space to live, air to breathe and energy to drive their machines. Increase in number of people, thus increase in consumption of food, water and space, leaves less and less space for other animals and plants which means that many environmental problems have been caused by people. Global warming, acid rain and holes in the ozone layer are just three such example.

(a) **Global Warming**. The carbon dioxide gas helps in maintaining the temperature of the earth’s surface at level that enables life to thrive. But if this natural carbon dioxide level increases even two fold, it would raise temperature by 5° to 6° making survival of life in earth difficult. Green house gases like methane, CFCs, nitrous oxide are chiefly the result of industrialization and excessive use of inorganic fertilizer. It is not an exaggeration to say that civilization is the ultimate cause of global warming. Green house gases are more efficient in absorbing infra red energy (the invisible radiation that ordinarily carries excess heat into atmosphere) than carbon dioxide. The global warming due to carbon dioxide and green house gases will have following effects:-

(i) Reduction in yield of food crops.

(ii) Rise in level of sea thereby submerging small island and coastal areas.

(iii) Increased and unpredictable rainfall.

(b) **Acid rain**

(i) Acid rain is a form of pollution in which the rain water contains greater than normal acidity (Technically the acid rain water will have a pH below 5.6).

(ii) Oxides of sulphur and nitrogen generated by burning of fossil fuels in power plants, pulp and paper mills, mining and smelting and other industrial processes are continuously released into the atmosphere. Tall chimneys in the industries release the gases high in the atmosphere and before they can drop to the ground they have enough time to combine with atmospheric moisture under the action of sunlight to become acid. Precipitation of such particles is acid rain.

(iii) Our environment is greatly affected by acid rain which causes exfoliation of marble and limestone buildings, kills fresh water fish, invertebrates and most plants. It leaches nutrients of soil such as calcium and magnesium. It draws toxic metals such as mercury out of sediments and into water. Acid rain can cause forest and crop damage.

(c) **Depletion of Ozone Layer**.Ozone layer is beneficial and protective layer in stratosphere. It filters ultraviolet rays radiating from sun. The ultraviolet rays are one of main causes of cancer. CFCs used in air conditioner as refrigerant, as cleaning solvents and as raw material for making plastic foam are persistent and remain in upper atmosphere for decades have destructive effect on ozone. It is responsible for hole in ozone layer. Ozone depletion is a consequence of insoluble inert CFCs from terrestrial sources reaching the troposphere and reacting with UV radiations. Chlorine is liberated in the process which catalyses the conversion of ozone into molecular oxygen.

**Environment Consciousness in India**

9. Indians have been very conscious of environment from time immemorial. For many Indians, the relationship with nature starts every morning, when they recite Gayatri mantra an invocation to the sun at sunrise and again in the evening. The Vedic Gods such as Agni (Fire), Surya (Sun), Pawan (Wind), Bhumi (Earth), Varuna (Water) and Indra (Thunder & Rain) together represent atmosphere, sunlight and energy. Much has been said about the importance of these elements and environment in general in the Vedas and the Mahabharata. In fact most of these texts were written in the sylvan surroundings of forests.

**Poverty, Population and Environment**

10. The real danger to man’s existence comes from two factors that have an overwhelming effect on the environment i.e. population and the amount of land available for agriculture. The state of the economy, poverty and environment are inextricably linked in developing countries where the entire economy is based on natural resources. Population growth also has an adverse impact on environmental resources. In the race for growth our environment has been subjected to constant damage. The basic approach to follow is sustainable development and an integrated approach to the problems of poverty, population and environment.

**Role of the NCC Cadet Towards Environment**

11. Every one is aware of the environmental problems. NCC Cadets are well organized to carry out environmental awareness campaign which is the need of the hour. NCC cadets can conduct tree plantation drives in order to curb the menace of environmental degradation. They should be the motivating and guiding force to friends and family members. As responsible citizens every one should plant trees and not cut them. Water conservation and proper disposal of the waste also leads to the safeguarding of the environment. Therefore, it should be the duty of every NCC Cadet to educate others towards this grave problem.

**Conclusion**

12. It is a fact that the interest of rapid economic development and environment conservation and preservation will have to be balanced and harmonized and needs no emphasis. Only on this will rest all our measures to see that the development process is suitable.

**SECTION-2**

**WHAT IS ECOLOGY**

**Introduction**

1. The word ecology was coined from the Greek word ‘Oikos’ which means home. Ecology, therefore, means the home of plants, trees and also the animals that survive on them. Ecology is the study of organisms and the inter-relationship among organisms and the environment. The destruction of our forests has led to the disturbance of the delicate balance in the entire ecosystem. It has given rise to grave risks for the very survival of life on earth. Only recently we have started correcting this dangerous situation. The concern for ecological conservation has come to dominate the world scene.

**Eco-System**

2. Eco-system is the basic functional unit which includes both the organisms and non-living environment, each influencing the properties of the other and each one is necessary for maintenance of life on the earth.

**Component of Ecological System**

3. Each ecosystem has two main components:-

(a) **Abiotic**. Heat, light, water, wind, soil, rocks, organic matter etc.

(b) **Biotic**. The biotic components of ecosystems are of the following order:-

(i) **Producers**. They are autotrophic green plants and some photosynthetic bacteria. They produce radiant energy and with the help of minerals derived from water, they manufacture complex organic substances as carbohydrates, proteins, lipids etc.

(ii) **Consumers**. They are heterotrophic which depend for their nutrition on the organic food manufactured by producers, the green plants. They are three types:-

(aa) **Primary Consumers**. These are herbivores feeding, directly on living plant residues e.g. Benthos, Zooplanktons, Cow, Deer etc.

(ab) **Secondary Consumers**. They are the carnivores which feed on the primary consumers. These are chiefly insects, fish, wolves, snakes etc.

(ac) **Tertiary (Top) Consumers**. They are some large fish or animals that feed on the smaller fish or animals.

(iii) **Decomposers**. They are chiefly bacteria, fungi, and actinomycetes. They bring about the decomposition of complex dead organic matter of both producers (plants) as well as macro consumers (animals) to simple forms. Thus they play an important role in the return of minerals and elements again to the soil.

4. **Food Chain**. The transfer of food energy from the producers, through a series of organisms (herbivores to carnivores to decomposers) with repeated eating and being eaten is known as a food chain. A food chain in a grassland ecosystem starts with grasses and goes through grasshoppers, frogs, snakes, hawks and so on.

5. **Development and Ecology**. A sweeping statement like all development is destructive would seek to convey the impression that the protection and preservation of ecology is the fad of a few freak groups who are out to run down development as the root cause of all our ills and irritations. Industrial development is often blamed for the destruction of ecology as it causes pollution, whether through the smoke being belched out by chimneys in the various factories etc or through effluents being constantly dumped into rivers. We need not forget the fact that our civilisation has traversed through several stages to reach its present position. However, progress has not been achieved only at the cost of ecology. There have been several other factors contributing to the modern scientific civilisation.

6. **Pure Environment**. Our long term survival depends on environment. We must not, therefore, ignore this fact. Mass poverty and ecological degradation are mutually harming our environment. Environment and economic developmental goals must consequently go hand in hand. After all it is the biosphere i.e the air and the water encasing our earth, besides the green cover and the wild life, that sustain life on this planet.

7. **Struggle for Preservation**. The struggle is now on for preservation and adequate renewal of these resources. Attempts are being made to check the reckless destruction of our precious environment. Scientists have warned that mankind may have to return to the much dreaded ice age if reckless destruction of trees, other greenways and natural resources continues at the present pace associated with progress, especially in industry.

8. **Environmental Degradation**. Environmental degradation is drawing phenol-menal attention of the academicians and policy makers. During the last two decades because of rapid and indiscriminate industrialisation all over the globe, the most precious heritage of man-the natural environment is in danger. Today it is realised that investments in environmental conservation and pollution control measures would enhance productivity in the long run, rather than be a stumbling block in the path of development.

9. **Changes in our Ecology**. Ecological changes are caused by increasing exploitation of underground water, increased use of fertilizers leading to degradation of soil content, rapidly increasing consumption of oil, petroleum and diesel, therefore depletion on a huge scale. All these factors cause imbalances in the physical and biological surroundings.

10. **Greenhouse Effect**. The greenhouse effect arising due to increased carbon dioxide content and increase in global temperature and depletion of ozone layer due to chlorofluorocarbons used, poses the greatest threat to the very existence and survival of human beings and flora and fauna around the globe. The greenhouse effect, acid rain, ozone depletion and nuclear winter all these reflect human interference in the environment and all have become synonymous with catastrophe. Respect for ecology is, therefore, a vital part of any responsible strategy. Investment in conservation and pollution control measures would be beneficial in the long run.

11. **Study of Ecology**. From a small beginning ecology has emerged in to a frontline service. By the turn of the 20th century widespread environmental degradation and catastrophic episodes have generated serious concerns and environmental-friendly growth in agriculture, forestry, urban and industrial systems by holistic management methods.

**Conclusion**

12. The study of ecology and environment sciences has assumed great significance, particularly during the second half of the 20th century. While ecology deals with the study of structure and functions of nature, ecology must be at the core of any environmental science programme. Ecology provides the most scientific approach and methodology to understand and evaluate the present day environmental crisis and to find ways and means to resolve the crisis so as to ensure a better tomorrow for the human race. Resolution of burgeoning environmental problems is not possible without a thorough understanding of ecological principles and, therefore, requires trained ecologist for a deep and wide analysis, understanding and application of the principles.

**SECTION-3**

**CONSERVATION OF ENVIRONMENT AND ECOLOGY**

**Introduction**

1. Ecology has been defined as the study of organisms in relation to their environment. This covers the whole world of organic life-plants, including fungi, and animals, including microbes and humans. The environment in which all organisms exist includes not only the animate organisms that populate the bio-sphere but also the inanimate forces operating in nature. Thus agriculture, forestry, fisheries, soil, wildlife, forests, mountains, water bodies and water sources, rocks, air and forms of energy such as heat and light are essential physical components of the system that nature has, which ensure that living beings get every thing they need to survive from their surroundings. In order to live, all organisms must interact with the environment, not destroy it. However, to meet his many needs, man alters his natural surroundings. Sometimes, such changes disturb the natural process and worsen the living conditions of human beings and other organisms. In other words, they degrade the environment. Environmental degradation takes mainly two forms. One is the resource depletion, that is, a decline in the quantity of resources. The other is resource deterioration or pollution, that is, decline in the quality of resources. While Earth may survive environmental degradation, the depleted and deteriorated environment will be unfit for life on Earth

**Resource Depletion**

2. Over-use and wastages are the main reasons for the depletion of resources. In technologically advanced countries, the main cause of resource depletion is over-use e.g. enormous amounts of petroleum used. In less advanced countries sources get depleted due to excessive use to meet needs of large population and wastage due to absence of technology e.g. deforestation for wood and land space. While depletion of non-renewal resources like minerals and fossil fuels is irreversible, depletion of renewable resources like water, soil and forests is not immediately reversible if the depletion is faster than regeneration. They may also be permanently depleted if our activities create environmental conditions that are unfavorable for their regeneration just as large scale felling without replanting has led to deforestation.

**Resource Pollution**

3. Pollution means deterioration in quality caused by the presence of undesirable or harmful substances called Pollutants. Pollution of the environment refers to pollution of land, water and air causing permanent damage to the environment, which cannot be repaired by the natural process. Non-biodegradable wastes such as polythene which cannot be decomposed by natural agents i.e. bacteria, chemical fertilizers and pesticides contaminating soil and crops, waste water from homes ,factories and hospitals carrying harmful micro-organisms and chemicals , oil spills into seas, industrial emissions sending fumes and various gases into the air (including automobile emissions) excessive carbondioxide, even nuclear or radioactive substances, rising into the air causing global warming , are some examples of resource pollution posing a serious threat to life on earth

**Environmental Damage**.

4. Deforestation disturbs the balance of gases in the atmosphere, causes global warming leading to the Greenhouse effect arising due to increased carbondioxide content in the atmosphere, therefore, increase in global temperature. Other damages are depletion of ozone layer (due to use of chlorofluorocarbons), acid rain (rainfall made acidic by pollution), nuclear winter (interference with the rays of the sun due to presence of radio-active waste materials from the use or reprocessing of nuclear fuel) and drought. Other factors contributing to environmental damage like deforestation, are reckless hunting leading to extinction of species (for example, extinction of the Dodo, a flightless bird) resulting in resource depletion and environmental damage (for example, extinction of flesh-eating species can lead to rise in the population of plant-eating species, this can, in turn lead to overgrazing, droughts and soil erosion) and invasion by plants and animals brought by man from other eco-systems (for example, choking of water bodies in Asia and Africa by water hyacinth introduced from tropical America). The ground water level is sinking because man is pumping out water faster than nature can replace it. Surface water, too, is getting depleted due to advancement e.g. river water to dams, large crop fields and power generation plants in such huge quantities that sometimes rivers run dry in hot season. In turn this disrupts natural flow thus affecting life forms that thrive in flowing water and again, water to dams submerge forests and wildlife habitats.

**Environment, Life and Ecology**

5. From the above, it is clear that there is an unmistakable relationship between all life forms and the environment with undisturbed ecological balance. The condition in which a living organism lives makes up its environment. Within the environment, materials are cycled, energy is passed on and living beings interact with each other and their surroundings in a fine ecological balance. Energy resources give energy in useful form for existence. While sunlight, wind and water are renewable energy resources, others like minerals, coal, petroleum and natural gas are non-renewable and are fast depleting. Wood is renewable but mindless deforestation can make depletion faster than renewal. With depletion of resources due to over-use and wastage, the problem of environmental degradation has started affecting the entire planet and needs to be tackled at all levels. Natural environment, man’s most precious heritage, has been suffering a tremendous onslaught by reckless development hinged on the criteria of technical feasibility and economic profitability only. All human developmental activities have impinged upon the natural environment and caused serious ecological imbalances.

**Conservation Measures**

6. Protection of natural wealth and conservation of nature and life in all forms is a matter of great concern. Checking environmental degradation is a crying need. While degradation is affecting the entire planet and conservation has the attention of all countries, each person has personal responsibilities in this. Following are some of the measures that must be co-ordinated or taken by each one as the case may be, for survival of life on earth.

(a) Keeping air, land, rivers, and water bodies clean and natural.

(b) Tree plantation and stoppage of indiscriminate felling of trees.

(c) Prevention of wastage and over-use of all natural resources.

(d) Re-using industrial wastes.

(e) Consumption of non-renewable resources by using renewable resources as far as possible.

(f) Modern sewage disposal techniques.

(g) Restrictions on using chemical substances and toxins harmful to soil, water and air.

(h) Fumes, smoke and exhaust gases to be rendered harmless by innovative design of machinery and technology.

(j) Treatment of effluents.

(k) Observing strict emission levels.

(l) Elimination of nuclear waste.

(m) All waste to be biodegradable.

(n) Non-biodegradable waste to be recycled.

(o) Water bodies to be kept chaste.

(p) Protection of nature in all forms.

(q) Protection of all life-forms.

(r) Strict policies, regulations and incentives for protection and conservation of nature and life-forms.

(s) Impetus to Research and Development for environment-friendly technology.

(t) All development involving the bio-sphere to be environment-friendly with ecological harmony or “Economic Development on Ecological Principles”

(u) Management of environmental pollution, at all levels including homes, such as smoke, use of sprays, garbage disposal, non-bio-degradable waste, water pollution.

(v) Protection of wild life.

(w) Checking human population explosion.

(x) Cleanliness drives for rivers, water-bodies and soil (to remove non-bio-degradable).

 (y) Ensuring environmentally rational behaviour in oneself and others.

(z) Developing environmental consciousness amongst common people through classroom instructions, posters and hoardings, public and media campaigns.

**SECTION-4**

**Pollution and its Control**

**Introduction**

1. Pollution means imbalance in the atmosphere caused by pollutants. Air gets polluted with the smoke from homes, factories and vehicles. Water gets polluted by city and factory wastes. Loud noises cause sound pollution. Pollution infact spreads diseases and makes life uncomfortable on earth. Man has played a very crucial role in destroying the very essence of life i.e. destruction of forests due to excessive urbanization. Due to increase in population and industrialization, the forests have been exploited for wood from trees and land space. Unscrupulous felling of trees has led to the destruction of the forest cover. Hence the air purifier i.e. the trees which give us oxygen to survive have been depleted. Depletion of greenery and forests and the pollution of the earth’s atmosphere have led to reduction of the protective ozone layer and increase in global warming.

**Types of Pollution**

2. (a) **Land Pollution**. Today’s industrialised society produces a huge amount of garbage, the disposal of such wastes is a major problem, especially in the urban centers. Non-biodegradable wastes such as polythene bags, which cannot be decomposed by natural agents like bacteria have become a menace to the environment besides being health hazards. Use of chemical fertilizers and pesticides containing harmful substances contaminates the soil. Soil may become deficient in nutrients due to excessive cultivation or if the same crop is grown repeatedly on the same plot.

(b) **Water Pollution**. Waste-water from our homes, hospitals and factories is usually discharged in to the water bodies. Such water contains excreta, disease-causing micro-organisms and harmful chemicals. It makes water unfit for drinking and may even kill aquatic plants and animals. Harmful substances seeping through earth rainwater contaminate groundwater. Plant nutrients derived from fertilizers and organic wastes like dead bodies thrown into water sometimes cause excessive growth of weeds. Many aquatic organisms die as a result of oil spills from tankers. Leaking pipelines also pollute water organisms. Many species of birds and fish die from contact with oil as it makes feathers and gills inactive.

(c) **Air Pollution**. Air pollution is caused mainly by harmful substances emitted into the atmosphere by industries and automobiles. It causes respiratory diseases and affects the skin and eyes. Some of the gases emitted by industries dissolve in rainwater to produce acid rain, which can damage vegetation. Atmospheric ozone which protects us from harmful ultra-violet rays is depleted due to release of certain carbon compounds called chlorofluorocarbons (CFCs) into the atmosphere. This also increases the risk of skin cancer and eye damage in humans.

(d) **Sound Pollution**. Sound produced from motor vehicles, trains, aero planes, factories, sound during religious and political public meetings, noise produced by the masses and other living creatures also plays an important role in producing sound pollution. It also affects the health of human beings. Loud sound affects the human heart; create auditory problems and causes mental stress.

**Causes of Environmental Pollution**

3. **Water Pollution**

(a) **Discharge of Domestic Waste**. The discharge of untreated domestic wastes like human excreta, urine, washing of kitchen and laundry wastes directly into reservoirs of water courses. The problem is particularly true of unsewered small towns or cities situated close to the flowing rivers.

(b) **Discharge of Industrial Wastes**. Industrial wastes comprise of organic and inorganic chemical substances in minute or colloidal suspension which undergo microbial decomposition resulting in products odoriferous or unacceptable in tastes or appearance and are harmful to human beings.

(c) **Discharge of Agricultural Wastes**. The agricultural wastes are primarily due to barnyard drainage or washing in of chemical fertilizers, insecticides, pesticides and herbicides into surface or ground water sources with the impetus on agricultural development. The increasing use of such chemicals without forethought of health hazard involved is bound to accentuate the pollution problems.

4. **Air pollution**

(a) Smoke is produced due to incomplete combustion of coal in industrial plants, locomotives, furnaces and hearths. About 45% of smoke comes from industrial plants alone.

(b) Dust, a salt particle from oceans, pollens, spores, rust etc remain suspended in air and is affected by large air movement, dispersing them into vast areas.

(c) Gaseous impurities from chemical manufacturing industries like sulphur dioxide, benezole, carbon monoxide acid vapour, fumes etc often combine with the aqueous vapour of the air and then intermingle with the smoke already present in the air.

(d) Chloro Flouro Carbons (CFCs) used in air conditioning is responsible for depletion of ozone layer of atmosphere.

(e) Automobile exhaust gases in particular, exhaust from trucks and buses, contain products of incomplete combustion, carbon monoxide, hydrogen, methane and unburnt carbon.

**Effects of Environmental Pollution**

5. **Water Pollution**

(a) The principal effect of pollution is to deplete through the excessive organic load, the dissolved oxygen content of receiving water to a point that stream becomes incapable of exercising the self purification process. The deoxygenation may be sufficient to destroy practically all the aquatic life.

(b) Pollution of stream by causing suspended solids to deposit on the stream bed causing silting, and the organic matter undergoing purification with the solid matters buoyed up by gas rising to the top thus resulting in floating masses of sludge.

(c) Use of polluted water downstream by communities for their daily requirements may cause the sporadic outbreaks of water borne diseases.

(d) Polluted waters are also difficult to be treated and it is found that treatment plants have to incur increased costs in handling such waters.

6. **Air pollution**

(a) Occurrence of diseases like silicosis (respiratory disease), rickets, dental caries.

(b) Deterioration of health in the form of nausea, headache, loss of appetite and irritation due to high sulphur dioxide content in air.

(c) The incidence of cancer is being increasingly related with the smoke and fumes from industrial plants.

(d) Smoke severely interferes with normal course of sunshine and visibility resulting in the possibility of untoward accidents.

**Measures to Control Pollution**

7. (a) To develop consciousness among common people to control all pollution. Plant more and more trees.

(b) The use of loud horns or mindless blowing of horns by motor vehicles should be banned.

(c) The water bodies should not be used as waste reservoirs.

(d) Various sources of drinking water, and water resources should be well protected so that dirty water does not enter these water bodies.

(e) Environmental education should be made compulsory in all educational institutions.

(f) Excessive use of pesticides and insecticides should be avoided.

(g) In all towns and cities there should be proper arrangement of dustbins to collect garbage being produced in the houses.

 (h) In the factories strict precaution should be instituted to avoid pollution of various types.

 (j) Running of old and pollution emitting vehicle should be banned.

(k) The pollution control Administrative Authorities must have independent powers to implement their decisions

**Role of the NCC Cadets in Curbing the Menace of Pollution**

8. NCC being one of the largest youth organisations has to play a significant role towards the pollution control. A youth can guide and contribute by educating others about the dangers of pollution. We have to respect our environment and natural resources and not pollute the same. Rivers and water bodies must be kept clean as water is an essential resource and it cannot be wasted. Infact every drop has to be saved. Cadets can visit villages and guide the farmers regarding the use of natural manure instead of chemical fertilizer produced after generating industrial waste.

9. Article 21 of the constitution guarantees the right to life, a life of dignity to be lived in a proper environment, free of danger of disease and infection. Further, Article 51A provides that it shall be the duty of every citizen of India to protect and improve the natural environment including forests, lakes, rivers and wildlife and to have compassion for all living creatures.

10. In order to stop the pollution menace, we need to take help from all. It is the duty of every NCC cadet to contribute towards this end through personal example and by educating others about various constitutional rights on the subject.

**SECTION-5**

**FOREST ECOLOGY AND POLLUTION**

**Introduction**

1. Forests are our natural resources. They have a vital role in maintaining a balanced ecological system. Forests help in global recycling of water, oxygen, carbondioxide and nitrogen in a balanced way. In controlling the environment and to maintain a healthy eco-system, forests have greater role to play.

2. Forestry is now a recognized subject and deals with establishment, development, care and reproduction of forest trees. The Ministry of Environment, Government of India has laid down a national forest policy for the improvement of our forest wealth. Programmes for forest development include the development of economic plantation, rehabilitation of degraded forests and forest protection measures. A healthy national economy requires that 33 percent of the total land area should be under forests.

**Importance of Forests**

3. Forests are a great national wealth. They provide fuel, wood, and timber for construction and pulp for paper, gums, resins, turpentine and allied materials as well as a variety of medicines. The loss of forest areas has resulted in the persistent loss of these valuable materials.

**Influence of Forests on Ecology and Pollution**

4. Forests have a great role in maintaining ecological balance on this earth. Along with other living organisms of the earth, the forests and our environment are dependent on each other and constitute an integral unit called ecological system or eco-system .The science which deals with the study of the eco-system is called ecology. Forest ecology is responsible for maintaining an adequate balance of carbon dioxide and oxygen in the environment. Heavy accumulation of greenhouse gases like carbon dioxide and related gases have affected the balance of the atmosphere which has resulted in an environmental problem of global warning. Forest cover utilizes a major portion of carbon dioxide of the bio-sphere and by the process of photosynthesis produces carbohydrates and release oxygen. Carbohydrates synthesised by the forest plants are a major source of energy consumed by herbivores feeding on plants and carnivores feeding on herbivores. The plants of the forest cover have the capacity to draw in carbon dioxide of the air and to release free oxygen into the atmosphere. All living organisms respire and release carbon in the atmosphere and this process goes on all the time. Only a wide-spread range of forest cover can absorb the unlimited load of carbon dioxide present in the environment.

5. Apart from absorbing carbon dioxide the forest cover helps in maintaining the oxygen cycle of the bio-sphere and the total oxygen budget of the earth. Due to inhaling of oxygen during respiration of man and animals the level of oxygen in the atmosphere is depleted. Plants of the forest cover are the major source of oxygen supplied to the atmosphere. Oxygen not only supplies life but plays a fundamental role as a building block of practically all vital molecules in the living organisms. Forests are, thus, not only augmenting our oxygen supply and make the air fresh but also reduce the total supply of carbon dioxide which is increasing to alarming dimensions.

6. In the present days there is increasing concern to check the environment pollution created due to soil erosion and persistent threat of drought and flood .Our forests prevent soil erosion and the degradation of hills. The roots of various trees of the forest hold the soil firmly to prevent the soil being blown away by air or washed away by water. Whenever the land is stripped of its plant cover, soil is inevitably lost by erosion. Top soil is an extremely valuable natural resource. If the surface layer of top soil is blown or washed away, the remaining sub soil can not support plant life. Forests, thus, play an important role in conservation of the soil.

7. Forests also stop floods. The roots of the forest trees have the property of absorbing water. Due to this property they quickly absorb flood water and control the flowing of flood water in the agricultural fields. Due to deforestation the washed out soil goes to the bottom of the rivers and raises water level to an increased threat of flood.

8. Due to global warming weather conditions in many areas of the world have become unpredictable. Forests control humidity of the environment and regulate the weather conditions. The water vapour generated by the forests due to transpiration serves as a major constituent of atmospheric humidity. The areas where monsoon does not reach or in the areas where there is no way for rain, the nearby forests regulate rains. Forests bring down the temperature and maintain favourable weather conditions.

9. Forests are cities of wild animals and house innumerable endangered plant species which are of great economic value. All wild animals, including those which are our national pride, get their food and, shelter from the forests. The forests protect the disappearing species of many wild animals and birds and keep the nature balanced.

10. Forests have potential role in protecting the environment from the deleterious effects of hazardous obnoxious gases like carbon monoxide, sulphur dioxide hydrogen sulphide and the heavy metal pollution like lead, cadmium, arsenic, mercury etc. Which are regularly released in the environment due to industrial activities. Forests help in absorbing these gases and metallic pollutants due to special glands present in the different parts of certain trees which serve as scavengers of these toxic chemicals.

**Conclusion**

11. In order to maintain a pollution-free environment, forests have a greater role. There is an effective need to conserve our natural heritage of forest resources not only to derive timber, fuel and other resources but to protect the eco-system, to ensure a balanced level of oxygen and carbondioxide to prevent soil erosion, to regulate the weather conditions, to rescue the environment from toxic pollutants and last but not the least to improve the quality of the environment in order to maintain a healthy eco-system.

**SECTION-6**

**WILD LIFE**

**Introduction**

1. Wild life comprises of nature and its inhabitants form the flora and fauna. Prior to the creation of life on the earth, the plants and trees were created for the survival of living beings. In the old ages, human beings were living in the forests in the company of wild animals. When the people felt the need to stay together as a group, society came into existence, which later gave rise to the villages, towns and cities. With the increase in the population, more villages are merging into the towns and cities at the cost of forests and wildlife and as a result the environment and biological equilibrium is disturbed. Therefore, the attention of the people all over the world is drawn towards the protection of forests and wild life.

**Importance of Wild Life**

2. India is a land with rich and varied wild life. Wild life in our forests, plains, hills and valleys includes such majestic animals as the tiger, the elephant, the lion, the cheetah, the wild buffalo and the rhinoceros. The majestic tiger has been declared as the National animal of India. On the plains and in the hills a large variety of deer and antelope are found. So are leopards, wolves, hyenas, jackals and foxes. Monkeys and langurs jump from one tree to another in our forests. Strange animals like the hedgehogs, scaly anteaters and porcupines play hide and seek in the bushy undergrowth of the jungles.

3. Anyone who cares to look around can see a large variety of birds fluttering about as well as soaring high. The kite, crow, pigeon, dove, sparrow, myna, bulbul, weaver bird are also common. The colourful peacock with its exotic plumage is known to every child. It is the national bird of our country, besides them, there are the ducks, cranes, herons, snipes, kingfishers and other birds of the waterside. Among the night birds, the owl is common.

4. The cheetah and the lion were once very common in Northern India. The cheetah is now almost extinct and the lion is confined to protected area in the Gir forest of Saurashtra. Man has meddled so much with the habitation of wild animals and hunted them so indiscriminately that many animals have already become extinct, while others are on the verge of becoming so.

5. Wildlife is indeed our national-wealth and the Government has set up several bird sanctuaries and national parks where birds and wild animals can live in peace in their own natural environment .The Corbett Park, named after the famous hunter Jim Corbett is a reserved area for the tiger. In Assam there is a park for the rhinoceros and at Bharatpur, we have a bird sanctuary. But laws alone are not enough to protect wildlife. What we need is to understand is that any imbalance of the natural cycle established by nature works only as a detriment to human progress. Felling trees indiscriminately leads to the land becoming almost a desert in course of time. Killing flesh - eating animals leads to the multiplication of grass-eating animals such as hares, rabbits and deer.

6. Recently the Government of India has declared big areas as bio reserves. They will help preserve both wildlife and rare varieties of plants. They are distributed in different climatic and vegetation zones such as the high Himalayas, the Rann of Kutch and the coastal waters of the Andaman and Nicobar islands, etc.

7. Some species of plants and animals have already become extinct and there are many facing danger of extinction. The basic reasons for extinction are as follows:-

 (a) Destruction of their natural habitats

 (b) Over-grazing by domestic animals

 (c) Poaching for meat, skin, fur, ivory, rhino horn etc.

 (d) Export of some species.

8. In India nearly 450 plant species have been identified as endangered or threatened. Similarly there are a large number of mammals, birds and reptiles which are endangered.

 **Wild Life Management in India**

9. Due to continuous increase in the number of endangered species of flora and fauna in wild life, steps have been taken to protect and manage wildlife in our country with an aim to :-

 (a) Protection of natural habitats through control of exploitation.

 (b) Maintenance of protected areas like parks, sanctuaries, reserve forests.

 (c ) Protection through legislation .

 (d) Impose restrictions on export of rare plants and animals.

(e) Encourage Non-Government Organisations to participate in protection of wild life.

 (f) General awareness among the public.

**Conclusion**

10. The protection of forest and wildlife has become essential for maintaining the human race on this earth. If the forests and wildlife become extinct from this world then there will be no human being on this earth. Therefore, it is the duty of every one of us to protect the forests and wildlife for our own survival.