Module I :

1.1.Basic concepts of Physical Education

Meaning;

- The word Physical education is derived from two separate words –`**Physical**` and `**Education**`. The word `**Physical**` means **relating to body** and `**education**` means **systematic instructions** or training. **So the word Physical education means systematic instructions relating to body**.

- **Physical education means the education through physical activities for the development of total personality of a person**

Definitions:

1. **Physical Education is the education through physical activities for the development of total personality of the child to its fullness and perfection in body mind and spirit.- CABPER**

(**C**entral **A**dvisory **B**oard of **P**hysical **E**ducation and **R**ecreation)

2. Physical Education is that part of education which has to do with the development and training of the whole individual through physical activities –**Wayman**

3.Physical Education is defined as "an education of and through human movement where many of educational objectives are achieved by means of big muscle activities involving sports, games,gymnastic,dance and exercise".- Barrow

Aim and Objectives of Physical Education

Aim : The ultimate goal.

Aim of Physical Education

- Physical Education aims at the **all-round development of the personality of the individual.**
- Thus Physical Education aims at **making an individual physically fit, mentally alert, emotionally balanced, socially well adjusted, morally true and spiritually uplifted.**

Objectives of Physical Education

- **Physical development Objective**.
  -**Development of physical Fitness**
  -Development of organic systems (Respiratory, circulatory, digestive systems etc..)
- **Motor development Objective.**
  -**Development of motor qualities** like **strength, speed, endurance, flexibility, and co-ordination**
  - Development of neuromuscular co-ordination
- **Mental development Objective.**
- -Development of thinking and interpretive abilities.
- **Social development Objective.**
- -Physical activities provide opportunities to develop co-operation, respect to others, loyality, self confidence etc**.**
- **Emotional development Objective**.
- Develop the ability to control the emotions like love, anger, jealousy, aggression, anxiety etc...

Benefits/Need and importance of physical education

1. Physical Education is needed **for proper growth and development**
2. Beneficial **to maintain good health and fitness**
3. Physical Education is important **to prevent and treat various ailments and diseases**
4. **Provide knowledge of our body** from musculo-skeletal, physiological, and biochemical point of view.
5. **Teaches the values of ethical behavior** in life.
6. **Teaches various physical activities** that can be practiced in the later stages of life.
7. **Teaches the value of physical fitness and how to become fit.**
8. **Improves the posture and physical appearance**
9. By participating in physical activities, **one can maintain an ideal body weight**.
10. **slows down the aging process** and **motivates towards a positive lifestyle.**
11. **Improves the quality of life** and **helps to relax and sleep better at night.**
12. **Helps in preventing and managing diabetics**.
13. Participation in physical activities **strengthens the bones and muscles**.
14. Participation in physical activities **improves the efficiency of various systems of the body.**
15. Participation in physical activities **develops the ability to think and interpret the knowledge.**
16. **helps to develop social qualities like co-operation, respect to others, loyalty, self-confidence etc..**
17. Participation in physical activities **helps to control their emotions, temperament** and become more tolerant to situations.
18. Participation in physical activities **helps in character development.**
19. Sports and games **bring about national integration and international understanding**.
20. Knowledge of physical education **helps in treating and managing common injuries.**
21. Knowledge of physical education **helps to know the importance of food, nutrition and balanced diet.**
22. **Provides knowledge of different types of exercise and their benefits.**
23. Provides **knowledge about the dimensions and determinants of health**.
24. Helps to know the **importance of vitamins, minerals, and water for the proper functioning of the body.**
25. Provides **knowledge about the caloric intake and expenditure**.
26. Physical Education contributes to the constructive use of leisure time.

1.3 BODY TYPES

- Body classification is essential **for understand the individuals positive and negative qualities s**o that **one can able to choose suitable area of sports and schedule their training programme.**
- Individuals could not be classified into just two or three body types because nearly all individuals are having mixed characteristic traits.

- **SHELDON`S Classification**

1. ENDOMORPH-Extrovert
2. ECTOMORPH-Introvert
3. MESOMORPH-Ambivert

1.ENDOMORPH

- **They have better digestive system**.
- **Short and thick neck,**
- **Large abdomen (Pot belly).**
- **They have heavy buttocks and heavy legs.**
- **Large rounded head with a broad face, squared jaw and small ears.**
- **Broad palms with short fingers.**
- **Feet with low arch.** Skin is thicker and less hair
- Often there is excessive fat throughout the body

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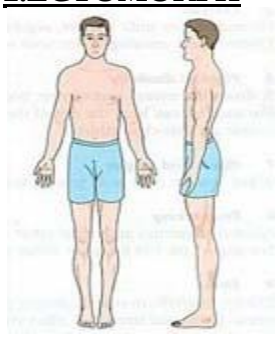
- **They are very social and enjoy social gatherings**
- **They act first and think afterwards.(In them action is preceded by reflection)**
- **They always overestimate their abilities.**
- **They remain in relaxed mood** and do not feel irritated over small issues
- They have a butterfly tendency and cannot stick to one job

- .**Sports benefits**
  - Size benefits sports such as **Rugby.**
  - **Power lifting**, **heavy weight wrestling, and throwing events.**
  - **strong in leg exercises** like the squat
  - **Have large lung capacity** which makes them **suited to sports such as rowing.**

2.ECTOMORPH



- **They have delicate (thin) body structure**
- **Have little muscle and fat.**
- **Their face is small, chin is narrow and nose is sharp.**
- **long slender neck, dropping and hanging shoulders with long arms**
- **They have thin buttocks, long thin legs and arms**

- **palms are small but fingers and toes are long.**
- **Long feet with high arch**
- The skin is soft with more hair. Their abdomen is flat. High forehead

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- **They always under estimate their abilities**
- **They feel irritated, over-tensed over small issues**
- **They are very slow in action but quick in reflection**
- **They are one track minded**
- want to be left alone

- **Sports benefits**
- Sports activities like **basketball, volleyball and long duration events**.
- Their body is better at **thermoregulation, important in endurance based sports and gymnastics**

3.MESOMORPH

- **medium type of individuals i.e. athletic type**
- **They have well modeled face with its chin has the shape of a long oval**
- **neck is strong and long**
- **broad shoulders and narrow hips**
- **torso is of moderate length and breadth**
- muscled arms and legs

- **They are psychologically fit and emotionally strong, bold and brave**
- **they have good self-control,**
- **they are showing sportsman spirit in their activities,**
- **they are very energetic persons and lovable to take risk**

Sports benefits

- **Gymnastics, endurance activity.**
- **Size benefits almost any sport.**
- **weight training**

1.4.POSTURE AND POSTURAL DEFORMITIES

Posture:

1. **Posture means alignment of body segments.**
2. **Posture means the way a person carries himself while sitting, standing, walking , sleeping or during any other body action**

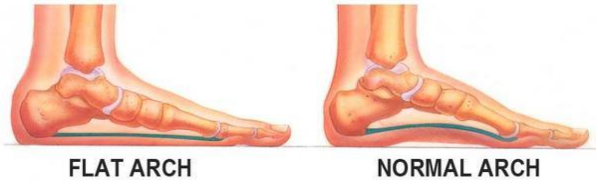
Good posture of an individual reflects the good impression of his well-being.
Bad posture causes many problems.

Causes of bad posture

- Injury or Accident
- Habit
- Heredity
- Lack of Exercise
- Occupation
- Obesity
- Improper diet

Some of the common postural deformities are:

1.Flat Foot:



- **Flat feet is a medical condition in which the arch of the foot collapses, with the entire sole of the foot coming into complete or near-complete contact with the ground.**
- **flat foot means absence of arches in the foot**
- It is **also called fallen arch**
- **It is easy to detect by walking on sand or by walking on the floor with wet feet**
- It result in injuries like shin splints, back problems, and knee pain due to over-stressing of the knee and leg.

Preventive measures/corrective exercises/Treatment

- **Raising on toes**
- **Climbing stairs on the toes**
- **Rope skipping**
- **Cycling**
- **Wearing special shoes** properly fitted with arch support
- Going barefoot in beach where muscles are given a good workout

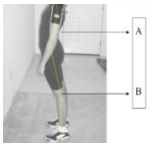
2.kyphosis

- **Kyphosis also called round back**
- **Kyphosis is a condition of over-curvature of the thoracic vertebrae (upper back).**
- That is Outward curvature of the spine with round shoulders and head dropped forward, resulting in a hump towards the back.
- kyphosis can cause severe pain and discomfort, breathing and digestive difficulties, cardio vascular irregularities.

Preventive measures/corrective exercises/treatment

- **Strengthening the extensor muscles** through regular and appropriate exercises
- **By re-alignment of head, arms and shoulders or by variety in occupational positions**
- **Swimming**
- **Chakrasana and bhujangasana**
- **surgery**
- Advice of a physician should be obtained before starting the corrective exercises

3. Lordosis

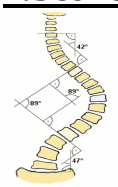


- ***Lordosis* is an inward curvature of spine above the lumbar region.**
- **Cause: Imbalances in muscle strength and length.**
- **Relaxation and poor tone of the abdominal muscles is also a cause.**
- High degrees of lordosis can cause severe back pain and discomfort.

Preventive measures

- Strengthening the hip extensors and hip flexors on the thighs.
- **Exercise to Strengthen the abdominal muscles**
- **Sit on a bench against a wall and pushing the trunk backward so at touches the wall in the lumbar region**.
- **Lying on the back on the floor with the hips flexed, feet vertically over the face, and from this position move the feet in a circle as large as one can as in bicycling.**
- **Halasana**
- Advice of a physician should be obtained before starting the corrective exercises

4.Scoliosis



- Scoliosis is a medical **condition in which a person's spine is curved from side to side**

- **It is an exaggerated lateral curvature of the spine ie.sideward deviation of the spine**, with the shoulder lower and hip higher on one side.
- **. The spine might look like the letter "C" or "S."**
- lateral curvature lessens the ability of the spine to support the body weight.
- As most of the people are right handed, the muscles of the right side of the body are generally stronger and the convexity tends to develop on the left side.
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Prevention and remedial measures/(Corrective exercises)

- **By hanging oneself from hands, using body weights**, **developing strength in spinal extensors through corrective exercises.**
- **eg;Trikonasana, vrikshasana**
- **Bracing**
- **Surgery**
- Advice of a physician should be obtained before starting the corrective exercises

. 5. Knock-knee

"knock-knee", is a condition where the knees angle in and touch one another when the legs are straightened.
It result in injuries like shin splints, back problems, and knee pain

- Individuals with severe knock-knee are typically unable to touch their feet together while simultaneously straightening the legs.

Treatment/preventive measures/corrective exercises

- **leg straightening exercises**
- **hamstring curls**
- **seated quadriceps contraction**
- **Try to ride a cycle and try to move it by opening your knees in "v" shape.**
- **When you are sleeping, try to place a pillow between the legs**

BOW LEG

- A condition in which the knees stay apart even when standing with feet and ankles together.

Causes

- Vitamin D Deficiency
- Fracture
- Bone tumor

Treatment/preventive measures/corrective exercises

- Kneel on one knee, placing your other foot in front of you.Lift your torso upright. Lift your torso upright as you tuck your pelvis and contract the gluteal muscles.
- Udarakarshanasana
- Padmasana
- Bracing
- Surgery

MODULE 2

❖ HEALTH

- **Health is a state of complete physical, mental, and social wellbeing and not merely the absence of disease or infirmity (Infirmity=physically weak).**

-WHO 1946 (World Health Organization)

- It is the quality of life that enables one to live most and serve best.- J F Williams

DIMENSIONS OF HEALTH (Dimension=Structure)

- **Physical dimension**
  -Refers to the ability of human body structure to function properly.
  .
- **Mental dimension**
  -Refers to the ability to respond to many varied experiences of life with flexibility and a sense of purpose. That is the ability to process information and act properly.
- **Social dimension**
  - Refers to the quantity and quality of an individuals interpersonal ties and the extent of involvement with the community.
- **Spiritual dimension**
  -Refers to that part of an individual which reaches out and strives for meaning and purpose in life.
- **Emotional dimension**
  -Refers to the ability to cope, adjust and adapt to varied situations.
- **Vocational dimension**
  -When work is fully adapted to human goals, capacities and limitations, work often plays a role in promoting both physical and mental health.

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DETERMINANTS OF HEALTH(Factors that influence the health of an individual)

The influencing factors and the Determinants of health are ,

1**) HERIDITY**
2) ENVIORNMENT
3) LIFE STYLE
4) SOCIO ECONOMIC CONDITIONS

- Education
- culture
- population
- Nutrition
- employment
- housing
- political system

5)HEALTH AND FAMILY WELFARE SERVICES

1) OTHER FACTORS

- Food and agriculture, education, industry, social welfare, rural development
- Aging of population
- Adoption of policies

FITNESS

Fitness is defined as the quality or state of being fit.

Physical fitness is a general state of health and well-being. It is the ability to perform occupations and daily activities and various types of sports activities.

Physical fitness is generally achieved through proper nutrition, moderate-vigorous physical exercise, and sufficient rest.

WELLNESS

Wellness is generally used to mean a healthy balance of the mind, body and spirit that results in an overall feeling of well-being.

Wellness is the quality or state of being healthy in body and mind, especially as the result of deliberate effort.

Difference between Fitness and Wellness

The word "fitness" means the ability to perform physical activities. This includes discussions on the strength of your muscles, joints and ligaments; the state of your endurance etc..

Wellness," covers all areas of health: mental health, emotional health, physical health, spiritual health, social health, and so on. Basically, these are all the different components in a person's life that can affect their overall "well-being."

2.2.PHYSICAL FITNESS COMPONENTS

Physical fitness:

- **Physical fitness is the ability to carryout everyday activities without undue fatigue and able to deal with an unexpected emergency.**
- Physical fitness is the ability to perform daily tasks vigorously and alertly with energy left over for enjoying leisure time activities and meeting energy demands.

Components of physical fitness

Physical fitness is mainly classified in to two categories.

A. Health related physical fitness components

B. Performance related physical fitness(skill related Physical fitness) components

A. Health related physical fitness components

2) **Cardio-vascular endurance**
3) **Muscular strength**
4) **Muscular endurance**
5) **flexibility**
6) **Body composition**

B. **Performance related physical fitness components**

1. **Speed**
2. **Agility**
3. **Power**
4. **Co-ordination**
5. **Balance**
6. **Reaction time**

A. Health related physical fitness

1.Cardio-vascular endurance

- **It is the ability of the heart, lungs and blood vessels to supply sufficient amount of oxygen and nutrients for sustained/ prolonged exercises.**
- Jogging, swimming and cycling helps to improve cardiovascular endurance.
- Cooper test(12 km run/walk) is used measure the cardio-vascular endurance.

2.Muscular strength

- **It is the ability of the muscles to generate maximum force for a short period of time.**
- **The amount of force a muscle can apply, in a single effort.**
- Exercises like the lifting weights or resistance exercises helps to improve muscle strength.
- More weight with less repetitions will promote muscular strength.
- Measured by using Dynamometer.

.Muscular endurance

- **It is the ability of the muscles to keep working (generate force) over a long period of time.**
- **It is the ability of the muscle to perform a continuous effort without fatigue.**
- **Exercises like the lifting weights with less weight and more repetitions helps to improve muscle endurance**
- **Eg: Push up, Pull up and sit up.**
- **Push up, Pull up and sit up tests are often used to measure muscular endurance**

3.Flexibility

- **It is the ability of a joint to move freely through thei full range of motion.**
- the **sit and reach test** is a good measure of flexibility of the lower back and backs of upper muscles
- Stretching is the safe way to improve flexibility

4 .Body composition

- It is the **ratio of lean body mass (bone and muscles) and fat (adipose tissue)** found in the human body.
- **Underwater weighing** is used to measure body composition.

B. Performance related physical fitness

1.Speed

- **Ability to perform a movement or cover a distance in a short period of time.**

- Ability to do motor actions under given conditions in minimum of time.
- For speed, we use our anaerobic energy supply system
- **Eg: short runs like 100 meter race**

2 .Agility

- **Ability of the human body to change direction quickly and effectively** while the body is in motion.
- Eg: zig-zag run, running in kho kho, dribbling in, football etc

3 .**Power**

- **Ability to produce maximum force in a short period of time.**
- **Ability to perform strength activity quickly.**
- **It is a combination of strength and speed**
- Eg: weight lifting,shot put, high jump etc..

4. **Co-ordination**

- **Ability to carry out a series of movements smoothly and efficiently**.
- Ability to use your **senses together with your body parts or to use two or more body parts together.**
- **Eg: smashing in volleyball, dribbling in basket ball, aerobic dancing etc**
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5.**Balance**

- **Ability to keep an upright posture while standing still or moving**
- Ability of the body to maintain equilibrium (movement control) under static and dynamic conditions.
- **Gymnastics, skating, surfing etc..**

6..Reaction time:

- **It is the ability to react or respond quickly to a signal.**
- **Eg: Start in athletics sprint events and swimming**

Activities for developing physical fitness

The following are some of the popular exercises /activities that develop physical fitness.

- **Callisthenic exercises:**
- Involves freehand exercises and exercises performed with apparatus for general body fitness.
- **Cycling**
- Cycling is an aerobic exercise which develops physical fitness specifically cardio vascular endurance
- **Jogging**
- Jogging means easy running which develops general fitness particularly cardio-respiratory fitness.
- **Walking**
- Walking is purely aerobic, it improves the functional capacity of the lungs and heart.
- It is very safe and done to the best of advantage even at higher age.
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- **Rope skipping**
- Promotes general fitness of the body.Good means for exercising the whole body
- **Swimming**
- It is an aerobic activity.
- It improves the functional capacity of the heart and lungs and also improves circulation.
- It helps to maintain overall physical fitness.
- **Circuit training**
- **It is a training method by which exercises of various kinds are performed in sequence** with or without apparatus .
- Helps to develop strength and endurance.
- **Weight training**
- Mainly improves muscular strength and endurance
- **Participation in sports and games**
- Sports and games involving big muscle groups improve physical fitness.

2.3. PHYSICAL INACTIVITY/MODERN LIFE STYLE AND HYPOKINETIC DISEASES

- Hypo means 'lack of' and kinetic means 'movement.'
- **Hypo kinetic Diseases are the conditions that occur from sedentary life style** .
- **So hypo kinetic diseases are the result of decreased physical activity.**

Major Hypo kinetic diseases are,

- Heart Diseases
- Hypertension (High Blood Pressure
- Obesity
- Diabetics
- Respiratory disorders
- Some forms of cancer
- Back problems
- Osteoporosis
- Depression, anxiety

Reasons for hypo kinetic diseases

- **Decreased participation in physical activity**
- **Rapid changes in diet and life styles**
- **Shift away from traditional diets to high density diets** with high levels of fats, sugar and salts.
- Western education, white color job and pleasure seeking life

Preventive measures

All life style disease are preventable by

- **Exercising regularly**
- **giving up bad habits ,**
- **changing the life styles ,**
- **Eating sensibly ,learning to relax,**
- **Educating about the health aspects** from the childhood onwards

Miss concepts in fitness training

1. Warm-up and warm-down is not necessary
2. It is possible to see the result instantly
3. Muscles turns in to fat and fat in to muscles
4. If you want to be strong, you need to be big
5. Weight training is for men
6. Women who lift weights will bulk-up.
7. "I am not over weight. So I don't need to exercise".
8. Doing the same workout everyday will improve performance
9. If you do cadio, you won't gain muscle
10. Sweating is directly related to fat burning
11. "I will get lean by eating no cabs" (carbohydrate)

2-4.Nutrition and health

Concept of food and nutrition

Nutrition

Nutrition is the science that deals with food and nourishment, especially in human.
The science that deals with food and its uses by the body.

Functions of food:

- Growth, repair,
- Energy
- Protection from diseases

Nutrients:

- The **chemicals in the food** which our body needs are called nutrients

Nutrients from food are classified into;

- **Macronutrients:** Nutrients needed in large quantities. (Carbohydrate, fat, protein)
- **Micronutrients:** Nutrients needed in small quantities. (Vitamins and minerals)

Functionally food is classified into:

- Energy yielding (Carbohydrate and fat)-Rice, Wheat, Potato, Sugar.
- Body Building (Protein)-Egg, Fish, Milk, Meet etc.
- Protective food (Protein, vitamins and minerals)-Green leafy vegetables.

The nutrients are:

- **Carbohydrates**
- **Fat**
- **Proteins**
- **Vitamins**
- **Minerals**
- **Water**

Carbohydrate: (contains carbon, hydrogen and oxygen)

- **Main source of energy in all activities i.e. It** provides 75% of our energy requirements
- **Provides quick energy to the body**
- **Not stored in the body for a long time.**
- **More needed in endurance activities**
- Eg: sugar, wheat rice, vegetables, pulses

Fat :(contains carbon, hydrogen and oxygen)

- **Fat is the most concentrated form of energy**
- **Since our body stores fat, they are called stored energy food.**
- **The energy is provided when there is a need(after 30 minutes of normal physical activity)**
- If we eat more carbohydrate than required by our body, the body convert the extra amounts in to fat and stores.
- Our body stores fat mainly under the skin (adipose tissue) and in the regions of kidney and liver.
- Needed for the absorption and use of vitamins
- **Helps in controlling BP, blood clotting, and other body functions.**
- **It maintains skin and hair.**
- **Eg, Meet,egg, ghee**

Protein: (Contains carbon, hydrogen, oxygen and nitrogen)

- **Proteins are made up of amino acid**
- **Needed for growth and body building. So they are called building blocks.**
- **Needed for strengthening muscle fibers and repair damage tissues.**

- **Needed for the formation of hormones, enzymes and haemoglobin.**
- Protein is the main component of muscles, organs and glands
- It work as a source of energy in starvation (hunger). Otherwise it is not a source of energy

Vitamins

- compounds of carbon
- **Essential for the normal working of the body**
- **They are required in very small quantities**
- Vitamins do not contain energy but are essential for the metabolism of carbohydrate, fat and proteins

If our diet is lacking in any vitamin, we suffer from certain diseases called deficiency diseases

Types of vitamins

Fat soluble: vitamin A, D, E, K

Water soluble: vitamin B Complex and C

Vitamin A

- Vitamin A is needed for the normal growth especially for **keeping the eyes and skin healthy.**
- **Deficiency cause night blindness**(inability to see in dim light), Source: milk, egg, butter, carrot, tomato, green leafy vegetables.

Vitamin D

- called **sunshine vitamins**
- Important for the formation of strong bones and teeth.
- Deficiency causes **rickets in children** (Bones become soft and out of shape), osteomalacia (soft bones) in adults.
- Source: exposure of skin to sunlight, cheese, butter, milk,green vegetables,

Vitamin E

- **Important to the protect the cell membranes** and important in the **formation of RBC(Red Blood Cells),**
- Helps in recovery of muscle cramp.
- **Deficiency causes muscle dystrophy, prevents normal growth.**
- Source: vegetable oils, butter, milk, nuts, seeds, green leafy vegetables.

Vitamin K

- **Helps in clotting blood**
- **Deficiency causes excessive bleeding from wound**
- Source: cabbage, cauliflower, soya been, green leafy vegetables, also formed in the intestine by bacteria.

Vitamin C

- **Needed for the maintenance of the ligaments, tendons, and other supportive tissue and strong blood vessels**.
- **Deficiency causes scurvy** (Gums swell up and bleed) .
- Source: tomato, green leafy vegetables, citrus fruits

Vitamin B complex

Vitamin B1 (thiamine)

- Necessary for changing carbohydrate in to energy.
- Deficiency causes **Beriberi**
- Source: milk, meet, cereals, green leafy vegetables

Vitamin B2 (Riboflavin)

- **Important for body growth and RBC (Red Blood Cells) production.**
- **Helps in releasing energy from carbohydrates.**
- **Deficiency causes skin diseases and retarded growth.**
- Source: egg, meat, peas

Vitamin B3(niacin)

- Important for healthy skin, digestion and nervous system
- **Deficiency causes pellagra**.(affects skin, nervous system and elementary canal)
- Source; meat, fish, cereals, tomato, potato

Vitamin B12

- Needed for forming RBC and for healthy nervous system.
- Deficiency **causes anaemia(deficiency of RBC)**
- Source; milk, egg and fish

Minerals

- Minerals are essential for proper growth and functioning of the body.
- Needed in small quantities

Important minerals are:

1. **Calcium**
2. **Sodium**
3. **Iron**
4. **Iodine**
5. **Phosphorus**
6. **Potassium**

Calcium:

- Needed for the **formation of strong bones and teeth**
- Needed for clotting of blood and muscle contraction
- Source: milk products, green leafy vegetables,

Sodium:

- Needed for the **formation of nervous system**
- Source: common salt, meat and milk products.

Iron:

- Important for the **formation of Haemoglobin** (oxygen carrying pigment in the RBC)
- RDA- 10 mg
- Source: meat, fish, egg, green leafy vegetables etc..

Iodine:

- Needed for proper thyroid function
- **Deficiency causes goitre.**
- Source: iodised salt, seafood etc..

Phosphorus:

- Needed for strong bones and teeth and also for making energy rich compounds in the cells
- Source:meat,fish, egg and whole grains

Potassium:

- Important for growth and keeping cells and blood healthy.
- Source: green leafy vegetables

Water:

- **About 70% of human body weight is water**
- **Life process cannot occur without water**
- **Water is necessary for digestion, absorption ,transportation, and, circulation**

Functions of water

- In digestion water helps to breakdown complex food molecules.
- Water transports food, wastes, chemicals and gases throughout the body
  - Carries waste products from the body through urine and sweat.
  - Body is cooled by the evaporation of water in the form of sweat from the skin.
- Normally we need 2.5 litter or 8 glasses of water every day.

Malnutrition:

- **Malnutrition is the condition that results from taking an unbalanced diet in which certain nutrients are lacking, in excess, or in the wrong proportions.**

Or

- A diet in which under consumption, over consumption, or unbalanced consumption of nutrients that leads to decreased or an increased susceptibility to disease is called malnutrition.

Or

- **Malnutrition refers to getting too little or too much of certain nutrients**.
- Eg; goiter (iodine deficiency)
  Night blindness (vitamin A deficiency)
  Marasmus (deficiency of protein)
  obesity

Balanced diet

1. **A diet containing all the essential nutrients in the correct proportion and adequate quantity to maintain health is known as balanced diet.**
2. A balanced diet is that contains the proper amount of each nutrient.

or

3. **A balanced diet is that contains variety of different types of food and providing adequate amounts of the nutrients necessary for good health.**

Elements of balanced diet

1. **Carbohydrate50-60%**
2. **Fat 30-35%**
3. **Protein--10-15%**
4. **Vitamins**
5. **Minerals and water**

Module III :

First Aid and Emergency Care

FIRST AID

- **First aid is the immediate treatment given to the victim of an accident or sudden illness before proper medical aid is obtained.**
- **First aid is the help given to an injured person until full medical treatment is available.**
- First aid is the provision of immediate care to a victim with an injury or illness.
- First aid is the provision of initial care for an illness or injury.

Qualities of a First Aider

- **Sympathetic and understanding**
- **Should have common sense**
- **Should have the ability to take decision and act quickly**
- **Should have the necessary knowledge**
- **Study the surrounding carefully**
- **Have initiative and a sense of leadership**
- **Reassure the patient by speaking encouragingly to him/her.**
- **Should be a keen observer**
- **Should be efficient**
- First Aider should be **a comforter**
- First Aider should be **a protector**

Aims and objectives of First Aid

1. **Preserve life**-This includes the life of the casualty, bystander and rescuer.
2. **Protect the casualty from further harm**-Ensure the scene is safe.
3. **Provide pain relief**-This could include the use of ice packs or simply applying a sling.
4. **Prevent the injury or illness from becoming worse**-Ensure that the treatment you provide does not make the condition worse
5. **Provide reassurance**- Comfort and reassure the casualty as in some cases all casualty needs is emotional support and reassurance.

. Aims and objectives of First Aid

1. Do first things first quickly, quietly and without panic.
2. Treat for shock by moving the casualty as little as possible and handling him gently.
3. Do not attempt too much
4. Reassure the causality and those around inorder to reduce tension
5. Give artificial respiration if breathing has stopped.
6. Stop any bleeding
7. Do not allow people to crowd around as fresh air is essential

8. Do not remove clothes unnecessarily.
9. Arrange for the removal of the causality to the care of a doctor as soon as possible.

ABC's of First Aid

The priorities of fist Aid are

A- Airway
B- Breathing
C- Circulation

A- Airway

The airway may be blocked when the tongue drops back and blocks the throat causing breathing difficulty in an injured person. For that place two fingers under the chin and lift the jaw, while placing the other hand on the forehead and tilting the head well back.

B-Breathing

Check for breathing by placing the head near the person's nose and mouth. Feel for breath on your cheek. If a person has just stopped breathing, use mouth to mouth ventilation.i.e about ten breaths per minute.

C-Circulation

check the pulse by sliding the fingers to the Adams Apple (carotid Artery).if the heart has stopped beating, use chest compression to restart the heart.

CPR (Cardio Pulmonary Resuscitation)

It is a life saving technique useful in many emergencies in which someone's breathing or heartbeat has stopped.CPR involves chest compressions and artificial respiration.

Artificial respiration

Provide breaths by either exhaling in to the subject's mouth or utilising a device that pushes Air in to the subject's lungs. Make sure the airway is open and head tilted back. Pinch the nostrils together. Take a deep breath and blow in to the mouth. Firmly sealing your lips around the mouth so air is not lost. Check the chest rise. Continue this giving about 10 breaths every minute until the help arrives or breathing begins.

Chest compressions

Place your hand just above the point where the ribs meet the breast bone. bring the other hand on top of it and lock your fingers together. Press down firmly on the breastbone, pushing it down by 4-5 cm. release the pressure and repeat the compression at a rate of 80 per minute.

Common injuries/emergencies and their treatment

1.Strain:

- **An injury to a muscle or tendon is called strain.**
- A **tendon** is a tissue that connects muscles to a bone.
- **a stretch or tear to a tendon or muscle by over use or stress is called strain**
- It is an injury to a muscle or tendon in which the muscle fibers tear as a result of overstretching.

2.Sprain:

- **An injury to the ligament is called Sprain.**
- **Ligament is a tissue that join one bone to another. Eg: knee joint**
- It is resulting from overstress which causes some degree of damage to the ligament fibers and their attachment.
- **It occurs when a joint is forced beyond the range of motion.**

First aidTreatment

RICE- is the principle you should follow for the initial treatment of any sprain and strain
R- Rest
I- Ice
C-Compression
E-Elevation

Rest:

- **Immobilize the injured area**
- The injured area should be in complete rest for 24-48 hours.

Ice

- Should be applied immediately, keeping a thin towel or plastic bag between the ice and the skin to avoid burns.
- The cold will reduce any internal bleeding and control inflammation.
- It will also minimize the swelling and pain.
- 20 minutes at a time
- Apply ice during the next 24- 48 hours at regular intervals
- For eg, every 2 hours, for 10- 20 minutes at a time.

Compression:

- A bandage or taping strapping should be applied as soon after the injury as possible.
- Compression will physically restrict movement in the injured area and constrict it, bringing down the swelling.
- The compression should not be so tight that it restricts the blood flow.
- Compression can be applied for several days after the injury first occurs.

Elevation:

- Elevate the injury site so as to reduce the blood flow to the injured area which helps in reducing swelling.

3. Cramp

1. **A cramp is a sudden involuntary contraction of muscles.**
2. It is an involuntarily and forcibly contracted muscle that does not relax.

causes

- **Overuse** of a muscle,
- **dehydration**,
- **muscle strain** or simply holding a position for a prolonged period

First aid Treatment

- **Stop the exercise and relax the muscle**
- **Stretch and hold the affected part for a few seconds**
- **Massage the muscle after stretching.**
- **Hydrate with electrolyte**

4. Fracture:

- **A complete or incomplete break in a bone from the application of excessive force is called fracture.**
- **Fracture is a medical condition in which there is a damage in the continuity of the bone**

Signs and symptoms:

- **Pain**
- **Tenderness** or discomfort on gentle pressure over the affected area.
- **Swelling** in the injured area.
- The injured part **cannot be moved normally.**
- **Mis-shaped in the injured area** if it is a complete fracture.
- **Irregularity of the bone**.

First aid Treatment

- Keep the patient quiet.
- **Stop any bleeding**
- Immobilize the injured part.
- **Apply ice packs** to limit swelling and help relieve pain.
- Always move the patient to a hospital in a lying-down position.

5. Abrasion

An abrasion is a wound caused by dmage to the superficial layers of the skin.(Epidermis) It is most commonly occur when an exposed skin comes in to contact with rough surface causing rubbing away of upper layer of skin.

First aid Treatment

1. **Clean the injured area** with an anti-septic solution like betadine
2. **Don't scrub the area**
3. **Use antibiotics to prevent the infection**. eg: Neosporin
4. **Dressing the wound to prevent from infection.**

6. Shock

- **Shock is a medical emergency in which the organs and tissues of the body are not receiving an adequate flow of blood. This can result in serious damage or even death.**
- shock is an medical condition associated with a **fall in blood pressure**, caused by such events as **loss of blood, severe burns, allergic reaction, or sudden emotional stress**,

Symptoms

Cold, irregular breathing, enlarged pupils, low blood pressure , rapid pulse;, grayish-bluish skin; decreased urine flow and a sense of great anxiety

Firstaid for shock.

- **Lay the person down** and elevate the legs and feet slightly,
- **Keep the person still** and don't move him or her unless necessary.
- **Begin CPR if Necessary**
- **Keep Person Warm and Comfortable**
- **Loosen tight clothing** and, if needed, **cover the person with a blanket to prevent chilling**.
- **Don't let the person eat or drink anything**.
- If the person vomits or begins bleeding from the mouth, turn him onto a side to prevent choking, unless you suspect a spinal injury.

7.Electric shock

- Human body is a good conductor of electricity, and **contact with a live power source can cause significant burns.**

First aid treatment

- First separate the victim from the electric source.
- Turn off the power supply switch or turn off the main power supply or pull out the fuse.
- You could also use dry, nonconductive material such as a wooden broom handle or a chair to separate the victim from the live current.
- Once the victim has been separated, check breathing, if breathing has stopped or seems slow, administer cardiopulmonary resuscitation (CPR) immediately.
- Let his head slightly lowerthan the rest of the body and raise his legs.

Module IV:

4.1 Effect of exercise on body systems

Effect of exercise on Cardiovascular/ Circulatory system

It is the system that circulates blood through the body, consisting of heart and blood vessels.

As a result of regular training following changes in the circulatory system can be seen

1. **Hypertrophy of heart muscles.(hypertrophy= increase in size)**
   - Regular exercise helps to **improve the strength of the cardiac muscles.**
2. **Heart rate decreases**

Regular training **reduces the resting heart rate.**
Number of heart beats per minute is called heart rate.
The normal heart rate for adult is 72 beats per minute.

3. **Stroke volume increases**
   - **Due to training efficiency and strength of the cardiac muscles improves.So the stroke volume increases**
   - **Stroke volume** is the amount of blood pumped by the heart during a single contraction.
   - **Cardiac Output** is the amount of blood pumped by the heart in one minute.
   - That is cardiac output is the product of stroke volume and heart rate.
   - **.**
4. **Control of high blood pressure(Hyper tension)**
   - Regular exercises **increase the elasticity of the arteries**, which reduces the risk of getting various heart problems.
5. **Controls cholesterol level**
   - Regular exercise helps to **control and maintain lower level of fat.**
6. **Increase in the number and efficiency of capillaries**
   - Due to regular exercises, efficiency of already existing capillaries improves and new capillaries are formed so that **active muscles can get sufficient supply of blood** during activity.
7. **Number of RBC & WBC increases.**
   - Regular exercises **increase the number of RBC & WBC**.
8. **Delays the onset of Fatigue**
   - When an individual performs activities, various chemical changes takes place, due to which lactic acid, phosphates and carbon dioxide get accumulated, which causes fatigue in muscles.
   - **When an individual performs physical activities regularly, the muscles develops resistance against these chemicals which helps us in delaying the onset of fatigue**.
9. **Fast recovery.**
   - **Trained individuals recover fast in comparison to an untrained individual.**

- Fast recovery means how quickly an individual is able to regain his normal position after an activity.

Effect of exercise on Muscular system

It is an organ system consisting of skeletal(Voluntary), smooth(involuntary) and cardiac muscles

Following are the effect of exercises on **muscular system**:

1. **Muscle Hypertrophy**
   - **The size and shape of the muscle improves**
   - Strength of each muscle fiber improves which increases the strength of the muscles
   -
2. **Energy supply to muscle increases**
   - Due to training the **size of the mitochondria increases** which improves the energy supply to the muscles.
3. **Formation of more Capillaries**
   - By doing regular exercises**, the number of blood capillaries in the muscles increases** so that the working muscles get enough oxygen.
4. **Enhances Posture**
   - Regular exercise **enhances posture**.
5. **Strength and speed of the muscle increases.**
   - Regular exercise helps to **increase the strength and speed of the muscle**.
6. **Delays the onset of Fatigue**
   - When an individual performs physical activities regularly, the **muscles develops resistance against the chemicals(**lactic acid, phosphates and carbon dioxide) **which helps us in delaying the onset of fatigue**.
7. **Controls Extra fat**
   - Physical activities **reduce the amount of body fat** and fat around the muscles and helps to **increase the lean body mass**.
8. **Increases food storage**
   - Regular exercise **increases the reserves of ATP and Creatinephosphate(CP)**.
9. **Increases reaction time**
   - Regular exercise helps **to reduce the contraction time** and hence improves the reaction time.
10. **Muscle remains in tone position.**
    - Regular exercise makes the **muscles** to **remain in a partially contracted state**.

Effect of exercise on Respiratory system

It is a series of organs responsible for taking oxygen and expelling CO_2.

Organs of respiration

- Trachea
- Bronchi
- Bronchioles
- Lungs
- Diaphragm

As a result of regular training following changes in the respiratory system can be seen

1. **Improved tidal volume**
   - Tidal volume is the volume of air inspired or expired in a single breath during regular breathing.
   - Regular training **improves the strength of the respiratory muscles**, **hence increases the lung volume.**
   - As a result of exercise, **tidal volume increases.**
2. **Improved vital capacity**
   - Vital capacity is the maximum amount of air a person can expel from the lungs after a maximal inspiration
   - . **As a result of exercisevital capacity increases**
3. **Decrease in respiratory rate**
   - Respiratory rate is the number of breaths taken in one minute.
   - Respiratory rate in a healthy adult at rest is usually 12-18.
   - When an individual becomes trained, then his **rate of respiration decreases** and he can **respire more easily**.
4. **Fast recovery**
   - Trained individuals recover fast in comparison to an untrained individual.
   - **Respiratory rate become normal quickly for trained individuals** whereas untrained individuals require more time for recovery.
5. **Unused alveoli becomes active**
   - As individuals starts taking part in various physical activities,the**passive alveolus become active** to meet the requirement of oxygen for the muscles of the body.
6. **Improved gas exchange**
   - Due to regular training **more capillaries will be opened in the alveoli**, which improve gas exchange capacity of the lungs.
7. **Smooth and regular breathing**
   - Due to training a trained person inspires more air in one inhalation than an untrained person.
   - Thus during rest the **respiratory rate decreases for a trained person**, that is why a trained individual has more smooth and regular breathing.
8. **Strength of respiratory muscles improves.**
   - Due to regular training, **strength of diaphragm and inter-coastal muscles(respiratory muscles) improves**

9. **Helps to avoid second wind.**
    - Second wind is a sensation characterized by sudden change of condition of distress or fatigue during the early part of prolonged exercise as compared to a less stressful feeling later in the exercise.
    - **Regular physical training helps to avoid second wind.**

4.4 Body Mass Index(BMI)

Body mass index (BMI) is a measure of body fat based on height and weight that applies to adult men and women.

$$BMI = \frac{\text{weight in kg}}{(\text{Height in Meter})2}$$

BMI	Classification
< 18.5	underweight
18.5–24.9	normal weight
25.0–29.9	overweight
30.0–34.9	class I obesity
35.0–39.9	class II obesity
≥ 40.0	class III obesity

On the basis of BMI we can adjust our food habits and exercise schedule

4.4(AAHPER Youth Fitness Test of 6 Items)

(American Association for Health,Physical Education and Recreation)

AAHPER Youth Fitness Test comprising the following items is used to assess physical fitness.

1. **Pull-ups (Boys)/ Flexed-arm Hang (Girls).**
2. **Flexed-leg(Bent Knee) Sit-Ups for one minute.**
3. **Shuttle run (10 yard X 4).**
4. **Standing Broad Jump.**
5. **50-Yard Dash.**
6. **600-Yard Run**

AAHPER Youth Fitness Test items along with the elements tested by each item.

Sl.No.	Test Items	Elements Tested
1.	Pull-ups(boys)or Flexed Arm Hang (girls)	Muscular strength and muscular endurance of Arm and shoulders.
2.	Bent Knee Sit-ups	Muscular strength and endurance of abdominal and lowerback muscles
3.	Shuttle Run (10x4 yards)	Speed and agility
4.	Standing Broad jump	Explosive strength of legs.
5.	50 yard dash	Speed and Explosive strength
6.	600-yard Run-Walk	Cardio-vascular endurance.

1. **a)Pull-ups for boys**:

- The bar is located at such a height so that the feet of the tallest subject do not touch the ground while hanging on the chinning bar.
- The boy subject is asked to hang from the bar by his hands with **forward grip** and to **chin up** by pulling himself up until chin is above the bar.
- Then he has to **lower the body until his arms are straight** and is asked **not to use kick or jerky motion.**

Scoring: **The number of complete pull-ups**

b).Flexed-arm Hang (Girls):

- First of all the height of the horizontal bar is adjusted so that it is approximately equal to the subject's standing height.
- **The subject is asked to grip the bar using the overhand grasp**.

- With the assistance of two helpers, one in front and one in back of the subject, the **subject's body is raised off the floor to a position where the chin is above the bar without touching it.**
- A stool(of 15" to 18") is used to help the subject to take chin up position.
- Once, a correct position is taken, the stool is removed from below the feet.
- Both the elbows are flexed and the chest comes close to the bar during the test. The subject holds the position for the maximum duration of time without any support.
- As soon as the subject attains the flexed arm position, the stopwatch is started and it is stopped as soon as anyone of the following conditions is noticed:

a) The subject's head tilts backwards for keeping the chin above the bar.
b) The subject's chin touches the bar.
c) The subject's chin comes below the level of bar.

Scoring: **The duration in seconds** for which the subject holds the flexed arm hang position correctly, is the score of the test.

2. <u>Flexed-leg Sit-Ups for one minute</u>:

- The subject is asked to lie on back with knees bent, feet on the floor with heels not more than 12 inches from the buttocks.
- The angle of the knee should be less than 90 degree.
- The subject is asked to put his or her hand on the back of the neck with fingers clasped and to place the elbows squarely on the mat or floor.
- The subject's feet are held by a companion to ascertain that the feet do not leave the surface and remain touching it.
- Then the subject is asked to tighten the abdominal muscles and to bring the head and elbows to the knees.
- The subject is asked to return to starting position with his/her elbows on the surface before sitting up again.
- The entire above process constitute one sit-up.
- The tester gives the above demonstration to all the subjects to be tested before the actual performance of the test.
- The timer gives the starting signal Ready? Go! At the word 'go' the timer starts the stopwatch and the subject starts the sit-up performance as quickly as possible with his or her best efforts.
- The tester starts counting the number of sit-ups performed.

- After 60 seconds, the tester records the number of correctly executed sit-ups performed by the subject in 60 seconds.
- This gives the score of the test.

3. <u>Shuttle run (10 yard X 4):</u>

- Two parallel lines are marked on the floor 10 yards apart.
- Two wooden blocks are placed behind one of the lines.
- The subject is asked to start from behind the other line.
- On the signal, Ready? Go!, the timer starts the stopwatch and the subject runs towards the block, picks up one block, runs back to the starting line, places the block, runs back to the starting line, places the block behind the starting line, runs back and picks up the second block to be carried back across the starting line.
- As soon as the second block is placed on the ground, the timer stops the watch and records the time.

Scoring: Two trials are allowed to each subject with some rest in between. **The time of the better of the two** trials is recorded to the nearest 10^{th} of a second as the score of the test item.

4. <u>Standing Broad Jump:</u>

- A demonstration of the standing broad jump is given to a group of subjects to be tested.
- The subject is then asked to stand behind the starting line with the feet parallel to each other.
- The subject is instructed to jump as farthest as possible by bending knees and swinging arms to take off for the broad jump in the forward direction.
- The subject is given three trials.

Scoring: The distance between the starting line and the nearest point of landing provides the score of the test. **The best (maximum distance) trial** is used as the final score of the test.

5. <u>50-Yard Dash:</u>

- Two lines are marked on the floor 50 yards apart.
- One line is used as starting line and the other as finish line. On the signal, Ready? Go! the subject start running at their best to reach the finish line at their earliest.
- The signal ‘go’ is accompanied with the downward sweep of the starter’s arm to give the visual signal to the timer /timers who stands/stand at the finish line.

Scoring: The interval between the starting signal and the instant subject crosses the finish line is the score of the test. The time is recorded correct up to tenth of a second.

6.600-Yard Run-walk:

- The subject is asked to take a standing start.
- At the signal Ready? Go! The subject starts running the 600 yard distance.
- The test is usually performed on 10-12 subjects together by paring off before the start of the event.
- Walking is permitted but the performer is to cover the distance in the shortest period of time.

  Scoring: The time taken to run 600 yards recorded in minutes and seconds is the score of this test item.

Yoga

- **A system of exercises practiced to promote control of the body and mind.**
- **Yoga combines physical exercises, mental meditation and breathing techniques to strengthen the muscles and relieve stress**

- It is a form of exercise that originated in ancient India. Yoga not only enhances your physical strength but also contributes largely towards your mental health and spiritual growth.
- *ogas chitta vritti nirodha"* —Patanjali
- *Yoga* literally means "union".

There are many different types of yoga, like Bhakti yoga, Karma yoga and Jnana yoga.

Benefits of yoga

1. Improves bone, lung and heart health
2. Improves your flexibility, strength and balance.
3. Increases blood flow, breathing
4. Lowers blood pressure and *blood sugar*
5. Reduces digestive problems
6. Weight management
7. Gives better posture
8. Protects your spine
9. Founds a healthy lifestyle
10. Boosts your immune system

1. ***Yoga improves your mental well-being.***
2. ***Yoga reduces stress, anxiety and depression.***

3. ***Yoga boosts memory and improves concentration.***
4. ***Helps you to relax and sleep better***
5. ***Gives you peace of mind***
6. ***Increases your self-esteem***
7. ***Helps you serve others***

RELAXATION

- A feeling of refreshing tranquility (An untroubled state; free from disturbances) and an absence of tension or worry.

TYPES OF RELAXATION TECHNIQUES

There are several main types of relaxation techniques, including:

- **Autogenic relaxation**.
  Autogenic means something that comes from within you. **In this relaxation technique, you use both visual imagery and body awareness to reduce stress**. **You repeat words or suggestions in your mind to relax and reduce muscle tension.**

  For example, you may imagine a peaceful setting and then focus on controlled, relaxing breathing, slowing your heart rate, or feeling different physical sensations, such as relaxing each arm or leg one by one.
- **Progressive muscle relaxation**.
  Focus on **slowly tensing and then relaxing each muscle group. Tense your muscles for at least five seconds and then relax for 30 seconds, and repeat.**

- **Visualization**.
- In this relaxation technique, you **form mental images to take a visual journey to a peaceful, calming place or situation.**

- **Other common relaxation techniques include**:
- Yoga
- Massage
- Meditation
- Hypnosis
- **Tai chi** (A Chinese system of slow meditative physical exercise designed for relaxation and balance and health)

Stress Management

The aim of stress management is to learn methods which can be used to help athletes to control stress and anxiety.

The following are methods of managing stress:

Progressive Muscle Relaxation:

This involves the deliberate contraction of muscles followed by a greater relaxation

Self-Directed Relaxation:

Relies on the athletes ability to isolate and relax individual muscle groups. This can be improved through practice

Deep Breathing:

This has calming effects on the mind as well as physiological effects such as reducing heart rate

Biofeedback:

Observing physiological measurements such as heart rate and breathing rate allow the athlete to focus their attention on reducing these measures

Imagery

Imagery is the use of mental images and scenarios to help relax the mind. This can be either internal (seeing your performance from within your body) or external (viewing your performance as if you are someone or somewhere else). Imagery can be used to relax by picturing a favorite place or calming scene or to rehearse the up-coming performance. Mental rehearsal is thought to be effective on three levels:

Neuromuscular:

Thinking through a movement produces the correct order and force of muscular contraction, much like a dry-run

Cognitive:

Thinking through and planning an event in the mind can help the athlete to deal with scenarios as they arise

Confidence building:

The certainty in the athlete's mind of what they are going to do during the event, game plans etc can help reduce anxiety and increase motivation

Goal Setting:

Goal setting is a highly useful and worthwhile technique. Having set goals helps the athlete to:

1. Direct their attention to the task in hand
2. Structure training to meet goals
3. Increase their confidence once goals are achieved
4. Evaluate their performance and progress

Additional notes

1. **Warm-up**
   - **The process of preparing the body through light exercise for more vigorous activity.**
   - A warm-up is usually **performed before participating in technical sports or exercising.**

Importance of warming up

- **Improves work efficiency.**
- **Prevent injuries**
- **Improves reaction time.**
- **Improves co-ordination, flexibility, concentration.**

2. **Warm-down/Cooling down**
   - **The process of making the body to gradually transit from an exertional state to a resting or near resting state through light exercises**.
   - A warm-down is usually **performed after participating in technical sports or exercising.**

Significance of warming down.

- **Helps to remove Lactic acid which can cause cramps.**
- **Reduces Stiffness**
- **Helps in recovery.**

3. **Oxygen Debt**
   - **The amount of oxygen consumed during recovery from exercise, more than that consumed at rest period.**

4. **Second Wind**
   - Second wind is **a sensation characterized by sudden change of condition of distress or fatigue during the early part of prolonged exercise as compared to a less stressful feeling later in the exercise.**
   - Second wind is **a condition in which an athlete feels fatigue during the early stage of prolonged exercise but suddenly shifts into a condition of comfort.**

Causes of Second Wind.

1. Due to the **slow ventilation adjustment**.
2. **Oxidation (removal) of lactic acid** accumulated early during the exercise.
3. **Inadequate warming up.**
4. Because of local **muscle fatigue**, particularly of diaphragm.
5. Due to **psychological factors.**