Chapter 1
CHANGING TRENDS AND CAREER IN PHYSICAL EDUCATION

Topic-1 Concept, Aims & Objectives of Physical Education

Revision Notes

- The literal meaning of 'physical' is 'body' which directly relates to the physique (physical structure), health, strength, endurance (ability to bear pain or hardships/ sahanshakti), speed, agility (phurti), flexibility (lachak), and physical performance on the sports field.
- Physical Education includes the acquisition and refinement of motor skills, the development and maintenance of fitness for optimal health, getting knowledge about physical activities, exercise and development of positive attitude towards physical activity to improve human performances.
- Physical Education develops the body and mind. Moreover, it develops total personality related to the physical, mental, social and emotional development of an individual. Physical education helps to develop good health and lead the person's life towards progress and wellness. It leads to a balanced development of an individual.
- **Aims of Physical Education:** The aims of physical education are to enable the student to:
  - **(i)** Appreciate and understand the value of physical education and its relationship to a healthy and active lifestyle.
  - **(ii)** Work to the optimal level of physical fitness.
  - **(iii)** Become aware of movement as a creative medium connected to communication, expression and aesthetic appreciation.
  - **(iv)** Develop the motor skills necessary to participate successfully in a variety of physical activities.
  - **(v)** Experience enjoyment and satisfaction through physical activity.
  - **(vi)** Develop social skills that demonstrate the importance of teamwork and co-operation in group activities.
  - **(vii)** Demonstrate a high level of interest and personal engagement showing initiative, enthusiasm and commitment.
  - **(viii)** Show knowledge and understanding in a variety of physical activities and evaluate their own and others performances.
  - **(ix)** Demonstrate the ability to critically reflect upon physical activity in both local and inter-cultural context.
  - **(x)** Demonstrate the ability and enthusiasm to pass on the knowledge, skills and techniques that have been learned, to others in the community.
- **Objectives of Physical Education -** The objectives of physical education are as follows:
  - **Physical Development**
    - It is one of the foremost objectives of physical education.
    - Development of organ systems such as circulatory system, digestive system, nervous system and muscular system.
    - Development in size, shape and efficiency of all body parts including muscles and bones.
  - **Mental Development**
    - It is related to the mental development of a person.
    - Participation in various activities enables an individual to learn to draw certain conclusions.
    - Various physical activities require alertness of mind, deep concentration and calculated movements.
  - **Social Development**
    - It is related to the development of social traits essential for better adjustment in life.
    - Players get to know each other inspite of different culture, domiciles and backgrounds.
    - It is one of the sources to attain leadership qualities like fair play, team spirit, cooperation, tolerance, sportsmanship and courtesy.
  - **Neuro-Muscular Coordination**
    - Develops better coordination between the nervous system and the muscular system.
    - Physical activities provide ample opportunities for a better neuro-muscular system.
    - Reaction time becomes less through participation in physical activities.
    - Accurate and smooth functions of the body.
  - **Emotional Development**
    - Emotions are vital for every individual but excess is always bad.
    - One of the major objectives is that it helps to develop/control various emotions like fear, pleasure, hope, anger, jealousy, etc.
    - By participating in various physical education programmes, an individual starts having control over his/her emotions.

Topic-2 Changing Trends in Sports- playing surface, wearable gears and sports equipment, technological advancements, Development of P.E. In India-Post Independence

Revision Notes

Development of Physical Education in India-Post Independence:

As we know India got its independence in 1947, so after a few years of independence government of India has taken some measures to promote or develop sports and awareness towards the importance of physical education in life. Various institutes and organizations were setups to improve the condition of physical education in our country.

- **Various organizations and institutes are:**
  - National Credit Corps (NCC).
  - Auxiliary Credit Corps (ACC).
  - Central Advisory Board of Physical Education and Recreation.
  - Lakshmi Bai College of Physical Education., etc.
- **The main objectives of these different organizations and institutes are:**
  - To optimum utilization of sports equipment and facilities.
  - To provide the best knowledge about physical education all over the country.
  - To prepare our youths to represent our country in competitions.
  - To increase the efficiency and effectiveness of the youths.

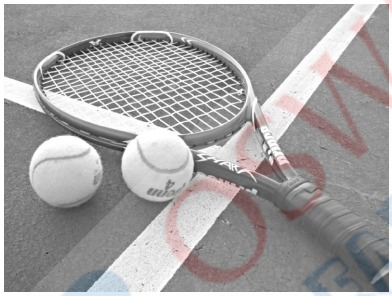
Changing trends in Sports

Changing trends in physical education have increased its importance, as modern physical education stresses that balanced development of our body and mind.

- **Playing Surface**
  - There are different playing surfaces like grassy, muddy and artificial turf. These different surfaces have a significant impact on the player's experience. Some surfaces provide a higher level of comfort for the players and others make some playing much more difficult. This is because different surfaces have different purposes.
  - Traditionally, sports were played on natural grass surfaces but grass surfaces need high maintenance activities like mowing, irrigation and control of weeds, pests and diseases. Thus, in 1960, artificial turf was used by some sporting organizations.
  - These new surfaces provided more durability and versatility with the intention of providing a relatively easy to maintain indoor surface.
  - But artificial grass has its limited downside: limited life, periodic cleaning requirements, petroleum use, toxic chemicals from infill, and some heightened health and safety concerns for children.
  - Artificial turf has gained recognition from several respected sporting bodies. The areas in which improvement is needed include player's comfort, the potential impact on player's health, and the visual and physical similarities to natural pitches.
  - Once these issues have been tackled, synthetic sporting surfaces will probably become more popular as their benefits will outweigh their weaknesses. They can be used to boost your performance, provide a useful surface in difficult climates and reduce the cost of maintenance.

- **Wearable gears and sports equipment**
  - Technology has changed all sports apparels and equipment including balls, bats, rackets, skates, even wheelchairs. Sporting equipment is now more hi-tech and high-functioning.
  - Sports industry is making advances with wearable technology by each passing day. For example, smart watches are now preferred by professional athletes and amateur fitness enthusiasts for a variety of activities, such as calorie count, heart rate monitoring, daily step count, distance and pulse.

- Other more specialised wearable technology examples include things like smart clothing. These items can be designed with specific activities in mind. Advanced medical technology can take the form of everything from smart rings to sensor-field shirts and leggings.
- Wearable technology has uncountable benefits. It can be used to prevent injuries by indicating the danger zones and risky movements or patterns. In many sports, new clothing is being designed to wick sweat away from the body by evaporation instead of absorbing it.
- **Clothing:** Instead of using lycra and nylon which allows swimsuits to be more form-fitting and less water absorbent. However, nowadays, new suits are designed to increase performance.
- **Shoes:** Lighter shoes with flatter heels are being designed to find the perfect balance of optimal grip and comfort.
- **Tennis Rackets:** Earlier, wooden rackets were used. In the 1960s, metal rackets were introduced which increased racket lifespan and stiffness although not increased weight. In the 1980s, wooden rackets became obsolete and brands instead made graphite rackets which became lighter and lighter also improving performance.



- **Protective Equipment:** From helmets to cleats, new technology in sports equipment has revolutionised the way the manufacturers keep athletes safe from injury. Helmet manufacturers have produced helmets with technologically advanced materials to produce safe and more comfortable helmets.

Technological Advancement

Sports industry is becoming digital day by day. Technology not only makes tasks easier, it also makes everything safe for the players and easier to record data for the sporting organisations. Using advanced technology, many difficult goals can be attained. For example, more fans can be engaged and world records can be tracked. Following are the technological advancements that have been introduced:

1. **Faster Replays:** Re-examination of what happened during a play is essential in all sports to make the results fair. Instant replay is one of the best examples of fair play and it became possible only with technological advances. Officials are now capable of getting second perspective and catch the details that might go missed by on field referees. Faster replays are used in almost all sports today.
2. **Sensor Tools:** These tools are used to provide exact information on whether movement occurred in the field when the movement is so subtle that it becomes invisible to the naked eye, or a player committed a foul and analysing whether a goal is valid or not.

   Different sports use varying sensor tools. For example, cricket's Hawk-eye technology analysis is used to determine if the ball smashed into the bat before it was caught.
3. **Timing System:** When timing a race, the stopwatch has been replaced by more accurate timing systems; this means that differences in reaction time no longer affect the precision and consistency of racing events.
4. **RFID Chips:** This is one of the best examples of technology in sports. RFID chips are used to time individual contestants in an event. They are tiny devices with built- in antennas that relay wireless signals to tracking stations. RFID chips are often used in long-distance races to help broadcasters and viewers track the exact location of contestants during a race.
5. **Equipment Development:** One of the biggest improvements in sporting tech is smart helmets. New helmet technology offers sensor and magnet tech built-in, which is able to detect and disperse force, thus decreasing the chances of head injury.

Topic-3 Career Options in Physical Education

Revision Notes

Career Options in Physical Education:

Physical education is a fast-growing discipline in India. To educate individuals in the field of physical education, numerous courses are offered by different education institutions.

- **Physical Education Teacher:** Physical education teacher teaches health education and physical

education in the schools. Coaching of different games and sports is also one of the duties of physical education teacher in schools. Apart from this, the physical education teacher has the responsibility for monitoring of students, lunch, hall, attending faculty and parent-teacher conferences, organising annual sports, etc.

- **Assistant Professor, Associate Professor and Professor:** Can work as Assistant Professor, Associate Professor and Professor in colleges and universities as per the qualification to teach physical education in various specialised area of subjects.
- **Sports Officer, Director of Physical Education and Sports:** Can work as Sports Officer, Director of Physical Education and Sports in colleges and universities. They are assigned to look after the various developmental aspects in the field of Physical Education and sports, organising various sports competitions, etc.
- Inspector of Physical Education in Government Dept. and Private sector.
- Manager /Instructor of Health Club and Fitness centre.
- Sports Commentator
- Police and paramilitary officers
- Officers in Indian Defense Service
- **Chiropractor:** Chiropractors diagnose and treat patients whose health problems are associated with the muscular, nervous and skeletal system, especially the spine. They take the patient's medical history. They can specialise in sports injuries, nutrition, etc.
- **Exercise Therapist:** Exercise therapists provide services that help to restore function, improve mobility, relieve pain and prevent or limit permanent physical disabilities of people suffering from injuries or diseases.
- **Occupational Therapist:** Occupational therapists help people to improve their ability to perform tasks in their daily living and working environment. They work with individuals who have conditions that are mentally, physically, developmentally or emotionally disabled. They are also known as counselor.

Topic-4 Khelo India and Fit India Programme

Revision Notes

- Playing sports inculcates team spirit, develops strategic and analytical thinking, leadership skills, goal setting and risk taking.
- India has made steady progress in the field of sports.
- **The Khelo India programme** has been introduced to revive the sports culture in India at the grass-root level by building a strong framework for all sports played in our country and establish India as a great sporting nation.
- The programme has been divided into 12 verticals:
  - Play Field Development
  - Community Coaching Development
  - State Level Khelo India Centers
  - Annual Sports Competition
  - Talent Search and Development
  - Utilisation and Creation / Upgradation of Sports Infrastructure
  - Support to National / Regional / State Sports Academics
  - Physical Fitness of School Children
  - Sports for Women
  - Promotion of Sports Amongst People with Disabilities
  - Sports for Peace and Development
  - Promotion of Rural and Indigenous / Tribal Games
- Talented players are identified in sports disciplines by the High-Powered Committee.
- Such players are provided annual financial assistance of INR 5 lakh per annum for 8 years.
- Under-17 athletes are invited under Khelo India School Games to participate across 16 disciplines:
  - Archery
  - Athletics
  - Badminton
  - Basketball
  - Boxing
  - Football
  - Gymnastics
  - Hockey
  - Judo
  - Kabaddi
  - Kho-Kho
  - Shooting
  - Swimming
  - Volleyball
  - Weightlifting
  - Wrestling
- **Fit-India Program**
- Honorable Prime Minister launched **Fit India Movement** on 29th August, 2019 with a view to make fitness an integral part of our daily lives. A committee

consisting of government officials, the Indian Olympic Association (IOA), national sports federations, private bodies, and fitness promoters were developed under the name of "Fit India Movement".

- Kiren Rijiju is the Chairman of this 28-member committee to advise the government on the Fit India Movement. The Fit India Movement will be a 'multi-ministerial effort' involving the Ministry of Sports, Ministry of Human Resource Development (HRD), Panchayati Raj, and Rural Development Ministry.
- The aim of this committee is to make sports a part of life of all Indians by bringing a behavioral change in their way of living.
- The special focus of the **Fit India Movement** will be on rural India, which lacks basic facilities to improve physical health and create fitness awareness. Under the campaign, awareness programs, sports activities, and other such events are being planned through the participation of celebrities in Tier 1 and Tier 2 cities. It will also be used to promote **Yoga** in a big way.
- Fit India proposes to undertake various initiatives and conduct events to achieve the following objectives:
  - To introduce fitness as easy, fun and free.
  - To spread awareness on fitness and various physical activities that promote fitness through focused campaigns.
  - To encourage indigenous sports.
  - To make fitness reach every school, college/ university, panchayat/village, etc.
  - To create a platform for citizens of India to share information, drive awareness and encourage sharing of personal fitness stories.

- **Benefits of Fit India movement:**

  There are the following important benefits of the Fit India Movement:
  - Inclusion of sports and physical activities would result in generating health awareness among the people and distancing them from many diseases, at the same time there would be savings in the expenditure due to these diseases.
  - It is expected that India will see a 1.4% increase in GDP if the health of Indians improves through the Fit India Movement. There will be an increase in productivity and income, as money will be saved by reducing the expenditure on diseases due to improvement in health.
  - The biggest advantage of this campaign is that people will be able to use their efficiency properly. It is said that a healthy mind resides in a healthy body and a healthy mind helps in building a healthy nation.
  - By living a healthy lifestyle, many diseases, such as stroke, diabetes, high blood pressure, obesity, etc., can be overcome or avoided. Regular physical activities also reduce the chances of a heart attack.

Chapter 2
OLYMPISM VALUE EDUCATION

Topic-1 Ancient and Modern Olympics

Revision Notes

- Olympic movement is a wide term. It gives us the understanding of Olympic participation in past and present along with development of games and sports for competitions. It has provided us healthy platform for competitive games and sports activities. Olympic movement is related with the link between Ancient Olympic Games with Modern Olympic Games and development of competitive sport activities. It has promoted the development of physical and moral qualities to bring together the athletes of the world in great cardinal festival of sports.
- **Olympic Games:** The International Sports Festival of Olympic Games began in ancient Greece. Initially, these games were organised every fourth year. Later on, these were abolished in the early Christian era. The Olympic Games were revived in 1896, and since then, these have been organised every fourth year, except during World War I (1916) and World War II (1940 and 1944).
- **Ancient Olympics:** The historians estimate that the Olympics were being organised since the beginning of the Greek Civilisation. However, the earliest recorded

date for the first Olympics is 776 BCE during the midsummer at Olympia on the eastern coast of the erstwhile Peloponnesian peninsula. In honour of the most important Greek God, Zeus, all regional wars were suspended during these games. According to the earliest records, only one athletic event was held in the ancient Olympics — a foot race of about 183 m (200 yd.). Coroebus of Elis is the first recorded winner. A second race of 366 m (400 yd.) was added in the 14th Olympics, and a still longer race was added to the 15th Olympics. The 18th Olympics included wrestling and a pentathlon consisting of running, jumping, spear throwing (the javelin), discus throwing, and wrestling. Boxing was included in the 23rd Olympics, and the Games continued to expand, with the addition of chariot racing and other sports. In the 37th Olympics held in 632 BCE, the format was extended to five days of competition. In 394 CE, the Games were officially ended by the Roman emperor Theodosius I, due to conflict with Christian sentiments.

- **Modern Olympics:** In 1892 a young French baron, Pierre de Coubertin, seriously proposed reviving the Olympics as a major international competition that would occur every four years. At a conference on international sports in Paris in June 1894, Coubertin again proposed the idea, and the 79 delegates from nine countries unanimously approved his proposal. The International Olympic Committee (IOC) was formed, and the first Games were planned for 1896 in Athens, the capital of Greece. On April 6, 1896, the Olympic Games were reinstated in Athens after being banned for around 1,500 years. At the opening ceremony of the Athens Games, King Georgios I of Greece and a crowd of 60,000 spectators welcomed athletes from 13 nations to the international competition. The track-and-field events were held at the Panathenaic Stadium, which was originally built in 330 BCE and restored for the 1896 Games. Americans won nine out of 12 of these events. The first marathon competition was also introduced in the 1896 Olympics in commemoration of the 25-mile route run by a Greek soldier who brought news of a victory over the Persians from Marathon to Athens in 490 BCE. The first marathon at the 1896 Athens Games was won by Spyridon Louis of Greece.
- The first truly successful Olympic Games were held in Paris in 1924, involving more than 3,000 athletes, including more than 100 women, from 44 nations. The first Winter Olympic Games were also held that year.
- **Summer Games:** The first Olympic Summer Games took place in Athens in 1896. The programme of the Summer Games is limited to a maximum of 28 sports, 301 events and 10,500 athletes.
- **Host Cities:** Since its reinstatement, Olympic Games have been conducted in various cities across the world. Some of these are:
  - **Athens, Greece, 1896**
  - **Stockholm, Sweden, 1912**
  - **Berlin, Germany, 1936**
  - **Tokyo, Japan, 1964**
  - **Los Angeles, California, USA, 1984**
  - **Athens, Greece, 2004**
  - **Peking, China, 2008**
  - **London, Great Britain, 2012**
  - **Rio de Janeiro, Brasilia, 2016**
  - **The IOC has selected Tokyo, Japan to host the 2020 Summer Olympics and Paris, France to host the 2024 Summer Olympics.**
- **Summer sports –** The summer sports include:
  - **Aquatics**
  - **Swimming: freestyle, backstroke, breaststroke, butterfly and individual medley style**
  - **Diving / synchronised diving: 10 m platform, 3 m springboard**
  - **Water polo**
  - **Synchronised swimming**
  - **Athletics**
    - **Running:** 100 m, 200 m, 400 m, 800 m, 1,500 m, 5,000 m, 10,000 m, 100 m hurdles (women) /110 m hurdles (men), 400 m hurdles, 3,000 m steeplechase (men only), 4 × 100 m relay, 4 × 400 m relay, marathon
    - **Walking:** 20 km (men and women) and 50 km (men only)
    - **Jumping:** high jump, pole vault, long jump, triple jump
    - **Throwing:** shot put, discus throw, hammer throw, javelin throw
  - **Badminton: Men's singles, women's singles, men's doubles, women's doubles, mixed doubles**
  - **Baseball**
  - **Basketball**
  - **Boxing**
  - **Canoeing: Slalom racing, flat-water racing**
  - **Cycling: Road, track, mountain bike, BMX**
  - **Equestrian: Dressage, jumping, eventing**
  - **Fencing: Foil, epee , sabre**
  - **Football**
  - **Gymnastics: Artistic, rhythmic, trampoline**
  - **Handball**
  - **Hockey**
  - **Judo**
  - **Karate**
  - **Pentathlon: shooting, fencing, swimming, riding, cross-country running**
  - **Rowing and Sailing**
  - **Shooting**
  - **Softball (women only)**
  - **Table Tennis**
  - **Taekwondo**

- **Tennis: Men's singles, women's singles, men's doubles, women's doubles**
- **Triathlon: swimming, cycling, running**
- **Volleyball: volleyball, beach volleyball**
- **Weight-lifting**
- **Wrestling**

- **Winter Games:** The Winter Olympics sports are conducted on snow and ice. The first Winter Olympics, were held in Chamonix, France in 1924. The original five sports were bobsleigh, curling, ice hockey, Nordic, skiing and skating. The Games were held every four years from 1924 until 1936. After the end of the World War II, the Olympics resumed in 1948 and were again held every four years. 1992 was the last year in which the Winter and Summer Olympic Games were held in the same years. In accordance with a decision by the International Olympic Committee (IOC) in 1986, the Summer and Winter Games were decided to be held in separate four-year cycles in alternating even-numbered years. So, the next Winter Olympics after 1992 were organised in 1994.
- The Winter Olympics have been hosted in three continents by eleven different countries. The Games have been held in the United States, France, Austria, Canada, Japan, Italy, Yugoslavia and Russia. The IOC has selected Pyeongchang. South Korea, to host the 2018 Winter Olympics and Beijing, China, to host the 2022 Winter Olympics.
- **Winter Sports**
  - **Alpine Skiing**
  - **Biathlon**
  - **Bobsleigh**
  - **Cross Country Skiing**
  - **Curling**
  - **Figure Skating**
  - **Freestyle Skiing**
  - **Ice Hockey**
  - **Luge**
  - **Nordic Combined**
  - **Short Track Speed Skating**
  - **Skeleton**
  - **Ski Jumping**
  - **Snowboard**
  - **Speed Skating**

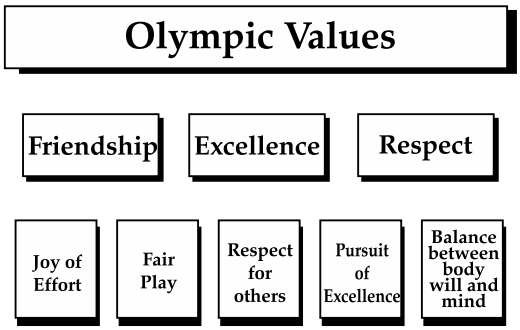
Topic-2 Olympism: Concept and Olympics Values (Excellence, Friendship & Respect)

Revision Notes

- **Olympism:** The philosophy of the Olympics is known as Olympism. It aims at creating a way of life by blending sport with culture, education and international cooperation. It is based on the joy of effort, the educational value, social responsibility and respect for universal fundamental ethical principles. The goal of Olympism is to place sport at the service of the harmonious development of humankind, with a view to promote a peaceful society concerned with the preservation of human dignity.

- **Olympic Values:** Olympics operate on three values. These are excellence, friendship and respect. These values constitute the foundation on which the Olympic Movement builds its activities to promote sport, culture and education to build a better world.
  - **Excellence:** The Olympics want every player to strive for their best and excellence and motivate people to be the best they can be. The important thing is not winning, but taking part, making progress and enjoying the healthy combination of body, will and mind.
  - **Friendship:** Promoting friendship is the biggest goal at the heart of the Olympic Movement. It encourages us to see sport as an instrument for mutual understanding between individuals, and between people all over the world. It allows players from different cultures and ethnic groups to bond with each other, bringing more peace and harmony in the world.
  - **Respect:** The rules and regulations are supposed to be respected by every player and committee members of the Olympics. It also includes respect and integrity for oneself so that the players do not get involved in any malpractices.
- **Respect includes:**
  - knowing that we can offend or hurt someone by not letting them join in our game (respect of others).
  - listening to and asking for the ideas, opinions and beliefs of everyone–boys, girls, people living with a disability (respect for others).

- helping others to feel safe from violence–teasing, bullying, and verbal, physical and sexual violence (respect for others).
- taking care of ourselves by choosing to eat healthy food, while getting enough rest and exercise (self-respect).
- being confident in ourselves to share and defend our ideas and opinions (self respect).



- **Olympic Value Education:** Joy of Effort, Fair Play, Respect for Others, Pursuit of Excellence, Balance Among Body, Will & Mind
- **Olympic Value Education:** Olympic Value education refers to the program organized in every school, college, and institute to promote valuable knowledge and ethics about the Olympics.
- **The Joy of Efforts:** The Joy of Effort means a sense/feeling of satisfaction and fulfillment which comes from planning for some goals and putting effort to achieve them after achieving the planned goals gives satisfaction.

  In the sports field or in the Olympics the Joy of Efforts encourages the athletes to perform better and to achieve the desired goals.
- **Fair Play:** Fair Play is an important principle of the Olympic Value, it refers to following or respecting the rules and regulations of sports, also respecting opponents, and officials, and maintaining the spirit of sportsmanship.

  In the Olympics, Fair Plays an important role as it encourages the athletes to compete in a fair manner or with the spirit of sportsmanship and respecting others.
- **Respect for Others:** Respect for others means to treat opponents, coaches, spectators, and other officials with dignity, respect, understanding, and compassion.

  In sports or in the Olympics Respect for Others plays an important role as it encourages the athletes to treat everyone equally which shows their positive sportsmanship, which is a plus point for them.
- **The Pursuit for Excellence:** The Pursuit of Excellence means pursuing the best knowledge, and skills to improve performance.

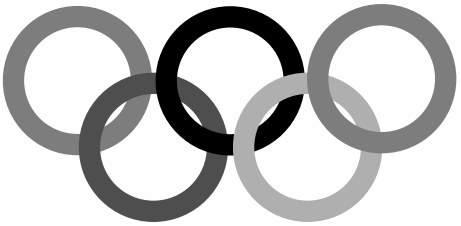
  In the field of Sports and the Olympics pursuing the best knowledge and skills improves the performance of athletes and motivates them to perform better and achieve the desired goals.
- **Balance Among Body:** Balance Among Body refers to maintaining a healthy body and lifestyle for better physical health and mental health.
- In the Olympics or Sports, this value plays important as it helps to increase strength, stamina, flexibility, endurance, agility, speed, etc., which helps the player to perform better in the sports.
- **Will & Mind:** The value of Will & Mind refers to developing mental toughness, determination, discipline, and confidence to overcome challenges.

  In Sports, Will & Mind helps to face any challenges or problems that come between the match and also encourages the players to compete better and in a disciplined manner and it also shows a positive attitude.

Topic-3 Olympics Symbols, Motto, Flag, Oath and Anthem

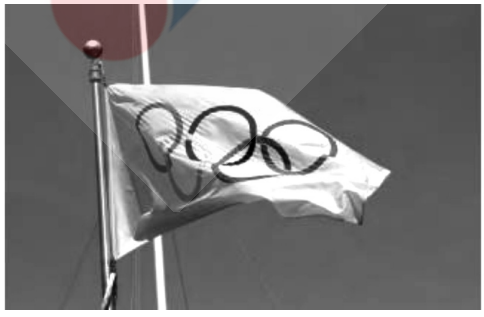
Revision Notes

- **Olympic Symbols**
  - **The Rings:** The five Olympic rings represent the five continents of Africa, America, Asia, Australia and Europe. They are interlinked to symbolise the universality of Olympism and the meeting of the athletes of the world during the Olympic Games. These rings appear on a white background on the Olympic Flag. In this way, the six colours of the Olympic flag (blue, yellow, black, green, red for the rings and white for the background) represent all the nations. Pierre de Coubertin, the father of the modern Olympic Games, explained the meaning of the flag in 1931 as "The Olympic flag has a white background, with five interlinked rings in the centre: blue, yellow, black, green and red. This design is symbolic; it represents the five continents of the world, united by Olympism, while the six colours are those that appear on all the national flags of the world at the present time."



- **Motto:** The Olympic motto is made up of three Latin words - Citius, Altius, Fortius - meaning Faster, Higher, Stronger. These three words encourage the athlete to give his or her best during competition.

- **The Olympic Flag:** The Olympic flag was created by Baron Coubertin in 1913 and was released in 1914. It has a white background without any border. The Olympic symbol of the five interlocked rings is placed in the centre. In the words of Pierre de Coubertin, "The Olympic flag has a white background, with five interlaced rings in the centre: blue, yellow, black, green and red. This design is symbolic; it represents the five continents of the world, united by Olympism, while the six colours are those that appear on all the national flags of the world at the present time (1931)." The flag was hoisted for the first time in 1920 in Antwerp, Belgium.



- **The Olympic creed:** The most important thing in life is not the triumph, but the fight; the essential thing is not to have won, but to have fought well. Together, the Olympic motto and the creed represent an ideal and promote an important life lesson. It is a lesson that can be applied not just to athletes but to each one of us. The three Latin words became the Olympic motto in 1894.
- **Flame:** The Olympic flame is one of the best-known features of the Games. From the moment the flame is lit, a very precise ritual is laid down. In memory of the modern Olympic Games' ancient origins, the flame is lit in Olympia (Greece) some months before the opening of the Games. The Olympic flame is lit by the sun's rays.
- **The torch:** A new torch is created for each edition of the Games. Each relay runner carries his or her own torch: it is the flame which is passed from runner to runner and which cannot be extinguished.
- **Oath:** Olympic Oath is taken by an athlete of the host country. He holds the corner of the flag on behalf of all competitors. The oath is as "We swear that we shall take part in these Olympic Games, respecting and abiding by the rules which govern them, in the true spirit of sportsmanship, for the glory of sports and the honour of our country".
- **The Olympic Anthem:** The Olympic anthem, is a musical work composed by Spiro Samara, and is played when Olympic flag is raised in the opening of Olympic Games.

The Olympic anthem

"Immortal spirit of antiquity,
Father of the true, beautiful and good, Descend, appear, shed over us thy light
Upon this ground and under this sky
Which has first witnessed thy unperishable fame
Give life and animation to those noble games! Throw wreaths of fadeless flowers to
the victors In the race and in the strife!
Create in our breasts, hearts of steel!
In thy light, plains, mountains and seas
Shine in a roseate hue and form a vast temple
To which all nations throng to adore thee, Oh immortal spirit of antiquity!"

- **Olympic Awards:** Modern Olympics are rewarded with medals and certificates. First position receives gold medal, second position receives bronze medal, up to first six positions they also get certificates.

- Any rules and regulations regarding games are set by International Olympic Committee.
- **Symbolism**
  - **The motto:** embodies excellence by encouraging athletes to strive to do their best.
  - **The flame:** symbolises friendship between people with the torch relay.
  - **The rings:** represent respect, bringing all nations and all the five continents together without discrimination.

Topic-4 Olympic movement structure-IOC, NOC, IFS, Other members

Revision Notes

The Olympic Movement

- The Olympic Movement is composed of three main constituents: the International Olympic Committee (IOC), the International Sports Federations (IFs) and the National Olympic Committees (NOCs).
- The goal of the Olympic Movement is to contribute to building a peaceful and better world by educating youth through sport practiced in accordance with Olympism and its values.
- Belonging to the Olympic Movement requires compliance with the Olympic Charter and recognition by the IOC.
- In addition to its three main constituents, the Olympic Movement also encompasses the Organizing Committees of the Olympic Games ("OCOGs"), the national associations, clubs and persons belonging to the IFs and NOCs, particularly the athletes, whose interests constitute a fundamental element of the Olympic Movement's action.
- As well as the judges, referees, coaches and the other sports officials and technicians. It also includes other organizations and institutions as recognised by the IOC.

International Olympic Committee (IOC)

- The International Olympic Committee (IOC) is the supreme authority of the Olympic movement formed in June 1894. The headquarters of IOC is at Lausanne, Switzerland. It is the authority which organizes the modern Summer and Winter Olympic Games.
- The IOC is the main governing body of the National Olympic Committees (NoC). The international sports federation, the athletes, the sponsors, the broadcast partners and united nation agencies.

The Role Of IOC

- To encourage and support the promotion of ethics in sports as well as education of youth through sports.
- To dedicate its effort to ensure that in sports the spirit of fare plays prevails.
- To encourage and support the organization, development and coordination of sports and sports competitions.
- To ensure the regular celebration of Olympic Games.
- To cooperate with the competent public or private organization and authorities.
- To take action in order to strengthen the unity and to protect the independence of Olympic movement.
- To act against any form of discrimination affecting the Olympic movement.
- To encourage and support the promotion of women in sports at all levels.

Indian Olympic Association (IOA)

- IOA was formed in 1927 by Sir Dorabji Tata as it's first president, D.G. Noehrem as it's secretary and G.D. Sodhi as assistant secretary. It is affiliated with IOC. The head office of IOA is in New Delhi.

The Functions of IOA

- **To deve**lop and promote Olympic movement and amateur sports.
- To promote and encourage physical, moral and cultural values among youth for development of good health and good citizen.
- To enforce all rules and regulations of games and sports at National level competitions.
- To provide training and preparation of players for participation at international level competitions.
- To provide technical help for conducting National Level Competition.
- To observe and check the smooth working of national sports association.
- To provide official sponsorship to players for participation at International Level Competition.
- To supervise the sports development in the country.
- To arrange funds for Sports program for training of players, infrastructural development and sponsorship of players, etc.

- To promote Olympic games at every level in India.

- **National Olympic Committees (NOC)**
  - The mission of the National Olympic movement is to promote, protect and develop the Olympic movement in their respective countries, in accordance with Olympic charter.
  - NOC encourage the development of sports as well as sports for all while also providing training of sports administrator based on the fundamentals of olympism.
  - There are 206 NOCs. The IOC is the sole authority to recognise a NOC together with the International Sport Federations, the NOCs are a constituent of the Olympic Movement under the leadership of the lOC.
  - The mission of the NOCs is to develop, promote and protect the Olympic Movement in their respective countries, in accordance with the Olympic Charter.
- **The International Sports Federations (IFS):**
  - The International Sports Federations (IFs) establish the rules that govern their sport and ensure that they are applied. They are responsible for the technical aspects of their sport at the Olympic Games. The IFS ensure that their sport is developed worldwide and disseminate the values of Olympism through their activities.
  - **Role of the IFs in relation to the Olympic Games:**
    1. Each IF is responsible for the control and direction of its sport at the Olympic Games. All elements of the competitions, including the schedule, field of play, training sites and all equipment must comply with its rules. For all such arrangements, the OCOG must consult the relevant IFs.
    2. The OCOGs shall work closely with the IFs in the planning and delivery of each sport and agree upon specific responsibilities with the relevant IFs, under the direction of the IOC Executive Board.
    3. The OCOG must ensure that the various sports included in the programme of the Olympic Games are treated and integrated equitably.
    4. The final decision of the competition schedule and daily timetable of events is made by the IOC Executive Board.
    5. The IOC Executive Board determines the number and the method for selection of competitors for doping tests and all other anti-doping measures during the period of the Olympic Games after consultation with each IF.

Chapter 3
YOGA

Topic-1 Meaning and Importance of Yoga

Revision Notes

- **Meaning of Yoga:**

  The word 'Yoga' is derived from Sanskrit word yuj which means 'join' or 'unite'. Yoga is considered to be the union of body, mind and soul and is used both as an end as well as means. As an end, yoga signifies 'integration of personality' at the highest level. As the name means, yoga includes various practices and techniques which are employed to achieve the development of such integration.

- Yoga is a healthy way of life. Although, it originated in India, it has now been accepted as a form of science all over the world. The western culture is also accepting it as a healthy form of scientific exercise. Yoga for a common person contains the practices of yama, niyama, asana, pranayama, pratyahara, kriya and meditation, which are helpful to keep physically fit, mentally alert and emotionally balanced. This paves the path for the spiritual development of an individual.

  While in the West, Yoga is being acknowledged for its many physical and psychological benefits, such as improved muscle tone, lower blood pressure, stress relief, increased vitality, and mental clarity, yet the original purpose of yoga was — and its highest

purpose has always been — spiritual. Yoga is a science of experience which is meant for the upliftment of humanity. Yoga is the art and science of attaining true, lasting happiness. It is a science because it offers specific, practical methods for obtaining these benefits. It is an art, because its highest benefits come only through sensitive and intuitive practice; otherwise it yields only superficial results. Therefore, Yoga should not be misunderstood merely as a science for treatment of some diseases. In a broader sense it is a science which brings health and happiness on causal, astral and physical planes. All the religions of the world speak of the divine union of soul and spirit in one way or the other. Yoga (union of soul and spirit) can be achieved through any means, but yoga as propounded by Maharishi Patanjali is the fastest way.

- **Importance of Yoga**

  Good health is the right of every human being. But this right depends on individual, social and environmental factors. Health is a positive concept. Positive health does not mean merely freedom from disease, but it also includes an energetic feeling of well-being with an amount of general resistance and capacity to easily cultivate immunity against specific disease causing factors and allergic factors.

- Yoga is one of the most powerful systems of treatment free from any form of medication or drugs. Yoga can be adopted as lifestyle for promoting our physical and mental health.
- The aim of yoga, at the school level, is to encourage a positive and healthy lifestyle for physical, mental and emotional health of children. Yoga helps in the development of strength, stamina, endurance and high energy at physical level. It also increases concentration, calm, peace and contentment at mental level leading to inner and outer harmony.
- **Some important benefits of practicing yoga daily are:**
  - **Reduces mental tension**
  - **Cures and prevents from diseases**
  - **Beautification of body**
  - **Increases self-awareness**
  - **Spiritual development**
  - **Increases flexibility**
  - **Reduces stress and anxiety**
  - **Facilitates attainment of perfect equilibrium and harmony.**
  - **Promotes self-healing.**
  - **Removes negative blocks from the mind and toxins from the body.**
  - **Enhances personal power.**

Topic-2 Introduction to Ashtanga yoga and Pranayama and its Types

Revision Notes

- **Meaning of Asana**

  According to Patanjali, asana means, "Sthiram Sukham Aasanam" i.e., "that position which is comfortable and steady". In Brahamanopanishad, "To sit in a comfortable position or posture for everlasting period is called asana". Asana is that state of body in which it may be kept easily. The ability to sit comfortably for an extended period of time in any position is called asana. In asanas, body is kept in various positions in such a way, that the activities of organs and glands of body become more efficient and finally improve the health of mind and body.

- Asana is a means through which physical and mental development, prevention from old age and diseases, which are the desired effects of yogic practices, can be achieved.

- **Classification of Asanas**

  Asanas are classified mainly into the following three categories on the basis of their effects:

  1. **Meditative Asanas:** Padmasana, Sidhasana and Samasana are the main meditative asanas. By practicing these asanas, the meditation power of an individual is enhanced. Meditation is done by remaining constant in these asanas. It is beneficial to perform such asanas in complete peaceful environment.
  2. **Relaxative Asanas:** Shavasana and Makarasana are the main relaxative asanas. The practice of these asanas removes fatigue and relaxes an individual physically and mentally. An individual gets complete relaxation after performing these asanas.
  3. **Cultural or Corrective Asanas:** Sirsasana, Sarvangasana, Matsyasana, Halasana, Bhujangasana, Shalabhasana, Dhanurasana, Chakrasana, Mayurasana, Singhasana, etc., are the prominent asanas of cultural or corrective asanas. These types of asanas regulate and systematise the different activities of the body and finally provide energy to the body to perform pranayama, pratyahara and dharana, etc.

Meditative Asanas	Relaxative Asanas	Cultural or Corrective Asanas
Padmasana, Sidhasana, Swastikasana, Samasana, Veerasana, Gomukhasana, etc.	Shashankasana, Shavasana, Makarasana, etc.	Sirsasana, Sarvangasana, Matsyasana, Halasana, Bhujangasana, Shalabhasana, Dhanurasana, Chakrasana, Singhasana, Vajrasana, Paschimottanasana, Mayurasana, Gorakshasana, Mandukasana, etc.

- **Pranayama and its types.**

Pranayama is a combination of two Sanskrit words "Prana"which means breath or life force, and "Prana" meaning control or discipline. Pranayama is the process of gaining control over the breathing process. In practical terms, it refers to a set of breathing techniques that are used for relaxation, concentration, and meditation.

Four 4 phases Pranayama breathing cycle are:

Inhalation (Puraka): It focuses on controlling the intake of air.

Internal retention of air (antara kumbhaka) – it focuses on controlling the retention of air within the lungs after an inhalation.

Exhalation (Rechaka): it focuses on controlling the expelling of used air.

External Retention (bahya kumbhaka): it focuses on controlling the retention of empty lungs after an exhalation.

The ratio of puraka, kumbhaka, and rechaka should stay as 1 : 4 : 2.

According to the Hatha Yoga Pradipika, there are 8 types of pranayama they are:

1. Surya Bhedan – right nostril breath.
2. Bhastrika – Bellows breath.
3. Ujjayi – Victorious breath / psychic breath.
4. Bhramari – Humming bee breath.
5. Sitkari – Cooling breath.
6. Sheetli – Cooling breath.
7. Plavini – Gulping breath.
8. Murchha – Swooning or fainting breath.

1. **Survabhedan:**

'Surya' means the sun and bheda means to pierce/ awaken. In the body, Pingala Nadi represents the energy of the sun or vital energy. Therefore, it means that we pierce or purify Pingala Nadi.

Procedure:

(a) Sit in a comfortable position.
(b) Use the right hand's middle and index fingers to close to the left nostril.
(c) Breathe in slowly through the right side.
(d) Use the thumb on the right hand to stop air flow from the right.
(e) Breath out through the left side.

Contra-indications:

People suffering from high blood pressure, heart disease, epilepsy, ulcer, acidity, hyperthyroidism, anxiety, headache should not perform this pranayama.

Benefits:

(a) Slows down the aging process.
(b) Purifies the blood.
(c) Digestion is improved.
(d) Energy and body heat are increased.
(e) Stimulates the sympathetic nervous system and the left part of the brain.
(f) Eliminates Vata-related trouble and helps to balance Kapha.

2. **Bhastrika Pranayama:**

'Bhastrika' is a Sanskrit word that means 'bellows.' This Pranayama resembles the blowing of bellows; hence it is called Bhastrika Pranayama. It is an excellent breathing exercise that we can practice slowly or fast as per our convenience. Basically, it is fast breathing.

Procedure:

(a) Take a deep breath through both nostrils and fill the lungs with air and then exhale with a hissing sound.
(b) Inhale deeply and exhale completely.

Contra-indications:

High blood pressure, any heart problem, hernia, vertigo, hyper-acidity, ulcer, any recent abdominal surgery, or if there is too much heat in the body, stroke, and hyperthyroidism. Practice note: One should stop practice immediately if he/she feels - fainting, dizziness, excessive perspiration, excessive shaking of the body, vomiting, etc.

Benefits:

(a) Bhastrika purifies lungs.
(b) It is very useful in asthma, tuberculosis, and bronchitis.
(c) It corrects bad breathing habits.
(d) It speeds up blood circulation.
(e) It optimizes the digestive system by vigorous massage of the digestive organs.
(f) Increases the flow of prana throughout the whole pranic body.

3. **Ujjayi Pranayama:**

Ujjayi means the ocean and this Pranayama is about mimicking the oceanic sound or the sound of the waves.

Procedure:

(a) Both inhalation and exhalation are through the nose. It is a diaphragmatic breath that fills the lower belly first, then the lower rib cage, the upper,chest, and the throat.

(b) The opening between the vocal cords is contracted/ narrowed, creating a rushing or hissing sound.

(c) This audible breathing has been linked to ocean waves or snoring of a baby.

(d) The contraction of the throat/ vocal cord should not be too strong. It should be gentle throughout the practice.

Contra-indications:

People who are introverted by nature or suffering from fluid retention or low blood pressure should not practice this Pranayama.

Benefits:

It soothes the nervous system and calms the mind.

It is beneficial in insomnia and hyperthyroid problems.

It relieves mental tension, stress, and anxiety.

It has a tranquilizing effect.

4. Bhramari Pranayama:

In this type of Pranayama, we exhale making a humming sound, the sound of 'm', as in the third letter of 'aum'. It resembles the typical humming sound of bees. That's why, it is called Bhramari Pranayama.

Procedure:

(a) Take a deep breath through both nostrils and fill the lungs with air.

(b) Exhale slowly and do not strain. The sound should be smooth, even, and controlled. It should be done under the guidance of an expert.

Contra-indications:

People suffering from a severe ear infection, ear ache, recent abdominal surgery should not perform it. While practicing if there is a feeling of faintness, dizziness, excessive perspiration, or vomiting sensation, it should be stopped immediately.

Benefits:

(a) Generates a cooling effect.

(b) it is good for treating insomnia (sleeplessness).

(c) Provides relief against tension, anger, and anxiety.

(d) Improves concentration and memory.

(e) Controls high blood pressure.

(f) Strengthens the throat and voice, useful for any throat problems.

5. Sitkari Pranayama:

Procedure:

(a) In Pranayama, we inhale through our mouth with the sound of 'Sitkari' which is produced on inhaling.

(b) Bring the teeth together lightly.

(c) Separate the lips so that teeth are exposed and then fold the tongue behind the teeth to touch soft palate.

(d) Inhale slowly through the teeth.

(e) Close the mouth and exhale slowly through the nose.

(f) Keep the breaths slow and relaxed.

Contra-indications:

People suffering from low blood pressure, respiratory disorder, excessive mucus, sensitive teeth, chronic constipation, hypothyroidism, and hypoacidity should not practice this Pranayama. It should not be practiced by the person having artificial teeth.

Benefits:

(a) It helps to cool the body and mind.

(b) Induces muscular relaxation and mental tran quility.

(c) Helps to reduce blood pressure and acidity.

(d) Controls hunger or thirst, and gives the feeling of satisfaction.

(e) Helpful for nausea.

(f) Removes excessive heat, therefore, it is beneficial in summer.

6. Sheetli Pranayama:

As the name 'Sheetl' suggests cool, calm, and soothing.

(a) Open the mouth and extend the tongue outside of the mouth.

(b) Roll the tongue from the sides to form a tube.

(c) Inhale through the tube.

(d) Exhale through the nose slowly and deeply.

Contra-indications:

People suffering from low blood pressure, respiratory disorder, excessive mucus, sensitive teeth, chronic constipation, hypothyroidism, and hypoacidity should not practice this Pranayama. It should not be practiced by the person having artificial teeth.

Benefits:

(a) It cools and reduces mental and emotional excitation.

(b) Very useful in developing resistance against heat.

7. Plavini Pranayama:

Plavini Pranayama is a method to regulate the Prana (Life Force) in such a way that can make a practitioner's body light enough to float on water like a leaf. As the body gets lighter by filling the air in the stomach like water, the gravitational effect remains undetected.

Procedure:

In this pranayama, the person consumes the air as one consumes water which makes the stomach a bit bloated & develops a feeling of floating over the water surface.

Contraindications:

Both Plavini and Murchha are advanced pranayama. They are performed by yogis who have reached a very high state after many years of disciplined and committed practice. Avoid doing Plavini under the following conditions:

(a) Persons having any heart problems and hypertension should not practice it, as it requires great attention of respiratory organs.

(b) In case of hernia and hydrocele, avoid doing it. Breath-holding can impose pressure on it.
(c) If you have any chronic disease or medical condition, do consult your doctor before practicing it.

Benefits:

One can experience following amazing benefits when mastering this technique of pranayama:

(a) As Plavini also called cleansing breathing, it removes impurities and toxins from our body by producing immense energy through retained air in the stomach.
(b) Plavini also helps a person to feel lighter as it smoothens the airflow and hence relaxes the brain cells.

8. **Murchha Pranayama:**

The literal meaning of the Sanskrit term 'Murchha' or sometimes also spelled as ' Murchha' is fainting. Holding mechanism of this breath stems the feeling of dizziness in the practitioner, so it's also known as 'swooning breath '.

Procedure:

(a) Sit in any meditative posture like lotus pose (padmasana) or easy pose (Siddhasana).
(b) Acquire 'kechari mudra ', then slowly start inhaling through both nostrils.
(c) Gently bend your head slightly back and accompany with Ujjayi breathing.
(d) Acquire 'Shambhavi Mudra' by bringing the gaze to the center of eyebrows.
(e) Keep your arms straight, lock the elbows, and press the knees with your hands.
(f) Do the internal retention of breath throughout the whole inhalation.
(g) Retain the breath and perform Jalandhar bandha by bringing the chin against the chest.
(h) Slowly start exhaling the retained breath when you feel the extreme dizziness.
(i) It is one round of Murchha pranayama. Repeat in the same manner after relaxation.

Contraindications:

Both Plavini and Murchha are advanced pranayama. They are performed by yogis who have reached to a very high state after many years of disciplined and committed practice. People suffering from following diseases should not perform this pranayama.

(a) High blood pressure.
(b) Low blood pressure.
(c) Epilepsy.
(d) Brain disorders, e.g., aneurysm.
(e) Heart diseases like Atherosclerosis.
(f) Glaucoma.

Benefits:

(a) This breathing provides mental tranquility and a sensation of euphoria.
(b) It increases mental efficiency by providing energy and removing distractions.

Meaning of Meditation

Dhyana is a process of complete constancy of mind. According to Patanjali, "The concentration of chitta (mind) on an impulse (vritti) without any divergence, is called dhyana". The stage, when perception starts directly, is called real Dhyanavastha. Dhyana is not a practice but it is a stage in which there is continuous dynamic consciousness without any obstruction. So, dhyana is not practiced but its stage is attained and is experienced.

Topic-3 Introduction to Yogic Kriyas (Shat karma)

Revision Notes

Yogic Kriyas

Human body is just like a machine. The way in which a machine requires inner and outer cleanliness for smooth and systematic functioning, similarly, human machine also needs inner and outer cleanliness for proper functioning. Generally, we do outer cleanliness which is very easy but inner cleanliness is slightly difficult. The inner cleanliness of our body can be done properly by shudhi kriyas which are called shatkarmas. According to tridosha theory (one of the fundamental theories of Indian medicine), the human body is made up of three basic constituents called tridoshas, which are Vata (mechanical functional constituent of the body), Pitta (chemical functional constituent of the body) and Kapha (material functional constituent of the body). Any imbalance in the constituents in the body leads to diseases. Yoga recommends six purification processes to get and keep the equilibrium of these tridoshas. They are called as Shat kriyas (six purification processes).

Following are the shatkarmas/shudhi kriyas:

1. Neti (nasal cleansing)
2. Dhouti (intestinal wash)
3. Basti (enema; colon cleaning)
4. Nauli (intestinal wash)
5. Trataka (candle gazing)
6. Kapalbhati (breath for "skull shining")

These six cleansing processes are excellent practices designed to purify the whole body and to get good health.

- **Neti:** It is a way of clearing and purifying nasal passage. While it is of natural interest to yoga practitioners, this technique is especially suited to the common man for its remarkable effects on treating sinus infections, allergies, headaches and even stress.
  - **Benefits:**
    - **(i)** Neti is a very effective method to provide relief from allergies, common colds and even asthma.
    - **(ii)** Neti helps in relieving headaches and facilitates in maintaining youthfulness.
- **Dhouti:** The washing up of the entire track of the body starting from the mouth to the digestive path at the beginning of the small intestines.
  - **Benefits:**
    - **(i)** Dhoutis are particularly beneficial in case of constipation, gastritis, dyspepsia, indispositions of the stomach and spleen, phlegm and bile disorders.
    - **(ii)** Dhoutis also increase digestive fire, improve kidney functioning and invigorate the liver by extricating parasites from within the system.
    - **(iii)** People suffering from obesity and those of a flabby and phlegmatic constitution will find these kriyas especially beneficial.
- **Basti:** It is the technique of washing and toning the large intestine.
  - **Benefits:**
    - **(i)** It cures pleeha, urinary disorders, gulma, myalga, dropsy, disorders of digestion, diseases of the spleen and bowels, diseases arising from the excess of wind, bile and phlegm.
    - **(ii)** By practicing Basti with water, the Dhatus, the Indriyas and the mind become calm.
    - **(iii)** It gives glow and tone to the body and increases the appetite. All the disorders disappear.
- **Nauli:** It is a method of massaging and strengthening the abdominal organs.
  - **Benefits:**
    - **(i)** Nauli massages, invigorates, and tones the abdomen and intestines aiding both digestion and elimination.
    - **(ii)** It massages all the organs in the abdomen.
    - **(iii)** Nauli and uddiyana bandha especially affect the manipura and swadhistana chakras. Always do nauli with mulabandha and after uddiyana bandh.
    - **(iv)** Traditional yoga therapy considers nauli to generate heat in the body, stimulating digestive fikre (Agni), helping to remove toxins, increasing digestive fire.
    - **(v)** It stimulates the immune system, removes lethargy and aids in the remediation of diabetes.
- **Trataka:** It is the practice of intense gazing at one point or object which develops the power of concentration.
  - **Benefits:**
    - **(i)** It is used to arouse the internal vision and to make that vision steady.
    - **(ii)** It eradicates all eyes disease, fatigue and closes the doorway, creating these problems.
    - **(iii)** The eyes become clear and bright.
- **Kapalbhalti:** The word kapalbhati is made up of two words, 'kapal' meaning skull (here skull includes all the organs under the skull too) and 'bhati' means shining or illuminating. It is the purification of frontal lobes and lungs. Due to the process, the organs under the skull mainly the brain and the small brain are influenced in a good manner.
  - **Benefits:**
    - **(i)** Helps in cleansing
    - **(ii)** Helps in invigorating
    - **(iii)** Helps in warming
    - **(iv)** Helps in preventing illness and allergies.

Topic-4 Active Lifestyle and Stress Management through Yoga

Revision Notes

- **Active lifestyle and stress management through Yoga**

  Hatha yoga is one of the most common styles of yoga, and its slower pace and easier movements make it more suitable for the beginners. However, all forms of yoga are beneficial for the physical, mental, emotional, and spiritual health of individuals, and one can choose to practice any form of yoga based on personal preference. Pranayama (breathing practice) is an exercise of concentration as it involves focusing on air that is breathed in and out. Consciously directed breathing has the following benefits: reduced stress, serene mind, sound sleep, lower blood pressure, proper digestion, clear sinuses, smoking cessation, improved sports performances, relief from constipation and headaches, reduced allergy and asthma symptoms, relief from menstrual cramps, and emotional stability. Yoga integrates the concepts of stretching, controlled breathing, imagery, meditation, and physical movement. Yoga is a way of life. It is

not merely a tool for stress management but it is also practiced to ensure good physical and mental health and to live a meaningful life. Yoga is a system of healing and self-transformation based on wholeness and unity.

Yoga is a discipline that relaxes and purifies the body, the mind, and the spirit. Yoga is a way of life, encompassing the philosophy of Karma Yoga (path of detachedaction), Jnana Yoga (knowledge of self), Bhakti Yoga (trust in the supreme order), and Raja Yoga (asana, pranayama, meditation, etc.). Hatha yoga practices, like asanas, bandhas, kriyas, mudras, and pranayama are mostly taught as physical practices with the aim of developing a certain type of awareness about self. This leads to a change in emotional and visceral functions which further facilitates a change in the intellectual and somatic functions of the individual. Thus, hatha yoga practices are known to be physical practices, whereas, various meditational techniques work at the mental level. The physical exercises (asanas) increase physical flexibility, coordination, and strength, while the breathing practices and meditation may relax and focus the mind to develop greater awareness and concentration, and reduce anxiety, thus resulting in a higher quality of life. It may also prove to be helpful in the reduction of distress, blood pressure, asthma, and improvements in strength, mood, and metabolic regulation.

Various forms of yoga facilitate improvement in focus, concentration, cerebration, self-control, and willpower of the individual. A person who is relaxed has a calm and composed mind. This state of mind helps to perform better at work.

Yoga has a positive effect on the parasympathetic nervous system and aids in lowering heartbeat and blood pressure. This reduces the demand of the body for oxygen. Yoga can also improve digestion, strengthen immunity, help in the effective elimination of toxic wastes, and also increase lung capacity. Effective use of this practice can also reduce the chances of stress culminating in anxiety and depression.

Stress is an emotionally disruptive and psychologically challenging condition that is mentally and physically demanding. Fast life, negative emotions, and outer, material development without a parallel development of our inner, spiritual resources result in an imbalanced personality that is easily stressed when faced with the demands of daily life. When there is demand and our ability to meet the demand is inadequate, we feel stressed.

When in stress the body prepares to fight or flee, pumping more blood to the heart and muscles and shutting down all nonessential functions. As a temporary state, this reaction serves the body well to defend itself. When the stress reaction is prolonged, however, the normal physical functions that have in response either been exaggerated or shut down become dysfunctional. It is not that stress itself makes us sick but its continuation creates the conditions for other ailments to make us ill.

The best way to manage stress is to strengthen our psychosomatic health so that we can efficiently resolve and overcome the stress. Yoga is a wonderful tool for calming the mind and promoting psychosomatic health. Improving physiological functions and mental health, it enhances our ability to face stressful situations. Yogic techniques influence our bodies as well as mind. Yogic philosophy and practice inculcate discipline, moral-ethical, values, and faith in Higher Power and improve our psychosomatic health. Relaxation is the fundamental and distinguishing feature of yoga. When practiced with awareness and breath-body coordination, every technique of yoga induces inner peace and relaxation. Shavasana, yoga Nidra and meditation are special yogic techniques that have been proven to induce deep psychosomatic relaxation. They also increase energy levelsand improve thinking and decision- making. Relaxation training improves autonomic balance and is effective in treatment of hypertension. Satvik diet promotes Satvik state of mind.

Slow stretch is an antidote for stress. Easy asanas performed slowly and with breath-body coordination and meditative awareness are very effective in producing relaxation. Slow, rhythmic pranayama produces a significant decrease in oxygen consumption and promotes psychosomatic relaxation. Through a holistic combination of movement, breathing, stretch, and meditative awareness, yoga encompasses several modalities that are capable of reducing the effects of stress.

In yoga pranayama (breathing technique), in this technique an individual does slow and steady breathing steady- like inhaling through one nostril and exhaling through other. Besides there are breathing movements like intake of air through the nostrils and exhaling through the mouth, this way air is passed properly through blood capillaries and the person feels himself/herself in light mode she/she feels that there is no burden over their mind and soul.

Yoga, a mind-body practice, is considered one of many types of complementary and integrative health approaches. It converges physical and mental disciplines, thus helping an individual achieve harmony of body and mind. This helps relax and manage stress and anxiety.Various techniques in yoga have been documented to help in stress management. They help in relieving the physical as well as the psychological negative effects of the problem by ensuring a healthy and productive response to the stress stimuli.

Chapter 4
PHYSICAL EDUCATION AND SPORTS FOR CHILDREN WITH SPECIAL NEEDS

Topic-1 Concept of Disability and Disorder; Types of Disability, its Causes and Nature (Intellectual disability, Physical disability), Disability Etiquettes

Revision Notes

- The terms disability and disorder have different implications when it comes to several physical and mental conditions.
- **Concept of Disability**

  Disability is referred to the permanent deduction in the physical or mental capacity of an individual. The permanent loss of a bodily or mental function can be since birth or it can be acquired during a person's lifetime. This deprivation of normal functioning can occur on any level such as physical, mental, intellectual or reduction in the use of sense organs. Due to this loss of normal functioning, an individual's participation in various areas of life gets affected and a general sense of dissatisfaction arises due to the limited use of the body's structures and its functions.
- **Definition –** "A disability is defined as a condition or function judged to be significantly impaired relative to the usual standard of an individual or group".
- **Concept of Disorder**

  The major difference between a disability and disorder lies between their intensity, duration and frequency.

  Disorder is a malady that disrupts all aspects of an individual's life including health, occupational efficiency and spiritual beliefs. When a disorder grows, it is first manageable to some extent. However, a disorder can become a disability if a person has to deal with it for a long period of time.
  - **Definition – "Disorder can be defined as a blip in the usual functioning of a person."**
- **Types of Disability, Its Causes and Nature**
  - Disability is conceptualised as being a complex experience as it may affect the different components of the human body such as organs and body parts resulting in the obstruction of one's life in many ways.
  - **Types of Disability**
  - **There are two types of disabilities which are as follows:**

Intellectual Disability:

Cognitive Disability also known as Intellectual Disability

- Mental processes of all kinds such as thinking, organising, assessing, memory, implying logic, etc. are all known as cognitive processes. The nature of cognitive disability is purely mental.
- Cognitive disability is exhibited in intellectual functioning and adaptive behaviour.
- Intellectual functioning refers to all the above mentioned functions of the brain while adaptive behaviour refers to applying social and practical skills in everyday life. Children can be seen having cognitive impairments such as having a compromised intelligence quotient beyond the borderline level which is an I.Q of 70 or below or having difficulty in understanding mathematics, sustaining focus on one activity for a long period of time, difficulty in producing meaningful and coherent speech, etc.

Causes of cognitive disability are as follows:

- Cognitive impairment can be genetic or resulting from complications of pregnancy. It can also occur at the time of birth due to newborn's exposure to accidents such as head injury or other severe health conditions like pneumonia in some cases. Other severe conditions like meningitis, measles, etc., can also be the cause of cognitive impairment.
- Chromosomal abnormalities such as Down's syndrome, fragile X syndrome.
- Genetic abnormalities such as phenylketonuria, Hunter syndrome, etc.
- Prenatal drug and infections and exposure to alcohol.
- Lack of oxygen also known as hypoxia during labor pain or birth.

(ii) Physical Disability

The nature of this disability is physical since it relates to physical functioning of the body parts including sense organs. As physical disability relates to the functioning of different body parts, the nature of this disability is completely physical.

When suffering with physical disability, a person's entire bodily functioning, mobility, dexterity or stamina are limited. This includes upper or lower limb loss, poor manual dexterity, visual impairment, hearing loss or disability in coordination with different organs of the body. Apart from these, respiratory disorders, epilepsy and sleep disorders are also considered physical disability.

Causes of physical disability are as follows:

- Illnesses like cancer, heart attack or diabetes cause the majority of long-term disabilities.
- Back pain, injuries and arthritis are also significant causes.
- Lifestyle choices and personal behaviour that lead to obesity are also becoming major contributing factors.
- Musculoskeletal disorders also cause disabilities. Examples include spine/joint disorders, fibromyositis, etc.
- Genetic causes like gene inheritance can cause this disability.

Disability etiquette

Disability etiquette refers to respectful communication and interaction with people who have disabilities. The principles of disability etiquette are fairly simple. First and foremost, rely on common sense to guide the interactions with people with disabilities and behave in the same courteous and respectful way with individuals with disabilities as one would with anyone.

Some of the disability etiquettes are given below:

(a) When talking with a person with a disability, speak directly to that person rather than to a companion or sign language interpreter who may be present.

(b) When introduced to a person with a disability, it is appropriate to offer to shake hands. People with limited hand use or who wear an artificial limb can usually shake hands. Shaking hands with the left hand is an acceptable greeting.

(c) When meeting a person with a visual impairment, always identify oneself and others who are accompanying.

(d) When offering assistance, wait until the offer is accepted. Then listen to or ask for instructions.

(e) Treat adults as adults. Address people who have disabilities by their first names only.

(f) Never patronize people who use wheelchairs by patting them on the head or shoulder.

(g) Leaning or hanging on a person's wheelchair is similar to leaning or hanging on a person and is generally considered annoying. The chair is part of the personal body space of the person who uses it.

(h) Listen attentively while talking with a person who has difficulty speaking. Be patient and wait for the person to finish, rather than correcting or speaking for that person. If necessary, ask short questions that require short answers, a nod, or a shake of the head.

(i) Never pretend to understand if one is having difficulty doing so. Instead, repeat what one has understood and allow the person to respond.

(j) To get the attention of a person who is deaf or hard of hearing, tap the person on the shoulder or wave your hand. Look directly at the person and speak clearly. Not all people who are deaf or hard of hearing can "read lips." For those who do "read lips," be sensitive to their needs by facing the light source and keeping hands, cigarettes, and food away from the mouth when speaking.

(k) Be precise and thorough when you describe individuals, places, or things to people who are totally blind.

(l) Move away from a noisy source and try to find a quiet environment for communicating with the person who hasa speech disability.

Topic-2 Aims and Objectives of Adaptive Physical Education

Revision Notes

- **Adaptive Physical Education** (APE) is the art and science of developing, implementing, and monitoring a carefully designed physical education instructional programme for a learner with special needs, based on a comprehensive assessment, to give the learner the skills necessary for a lifetime of rich leisure, recreation, and sport experiences to enhance physical fitness and wellness. Adaptive physical education generally refers to school-based programmes for students between the ages of 3-21 years.
- The APE teacher is to provide adaptations or modifications that will allow the special needs child

to participate in age-appropriate physical education activities. Adaptations or modifications can be made in four areas:

1. **Instruction:** Lesson plans, strategies, etc. can be modified or included to help the child to be successful in physical education. For example, a Down's syndrome child may respond to one word signs as reminders for doing a somersault correctly.
2. **Rules:** A rule can be adapted or changed if it allows the special needs child to be successful. For example, if the students are working on volley ball skills, a wheelchair bound student is allowed to serve the volley ball from four feet ahead of the serving line.
3. **Equipment:** Standard gym equipment can be replaced with other objects that vary in shape, colour, size, etc. For example, when playing kickball, provide a large bright orange ball for a visually impaired child to kick.
4. **Environment:** The size of playing area can be changed or tape is used to define the area. For example, if the general physical education students are pitching softballs back and forth, work with a severely mentally handicapped child on rolling a ball back and forth by starting out being two feet apart and gradually increasing the space.

Importance of Adaptive Physical Education:

Adapted Physical Education can be provided to students with special needs and leads to the development of

1. Physical and motor skills which include development of gross motor skills like sitting, standing, crawling, rolling and stretching and fine motor skills like holding, picking, pulling, pushing and pinching.
2. Fundamental motor skills and patterns including activities like throwing, catching, walking, running, and swinging.
3. Skills in aquatics, dance, and individual and group games and sports including intramural and life time sports.

- **Aim of APE:** The chief aim of Adapted Physical Education (APE) is to provide every individual an opportunity to participate in Physical Education and sports and to make Physical Education accessible to all as per their need.
- **Objectives of Adaptive Physical Education:**

The primary goal of adaptive physical education should be to ensure that the child is provided with physical education services that meet his/her unique needs. The most important objective of APE is development of the student's motor skills.

Adaptive physical education programmes strive to ensure that each student actively participates in physical education programmes at his or her own level and that the student is integrated into the regular physical education programme whenever possible.

- To build in CWSN the capacity to be functionally active for lifetime
- To provide a safe and accessible PE and sports Programme as per the needs of the individual
- To ensure active participation or transition towards the integrated or regular PE Programme (Inclusion)
- Helping to develop self-esteem in CWSN
- To promote regularity and discipline
- To promote sportsmanship

Topic-3 Role of Various Professionals for Children With Special Needs

Revision Notes

- Keeping in view the fact that Children with Special Needs form one of the largest groups that are still outside the fold of the general education system, Inclusive Education provides them with an opportunity to enter formal education. This makes it necessary for the school to employ various professionals such as school counsellor, occupational therapist, physiotherapist, etc., for CWSN. These professionals help and support children in achieving their full potential physically as well as academically, improve their motor skills, enhance their communication skills and in promote their mental as well as physical health. These professionals include:
- **Counsellor:** Counsellors connect to students with special needs in elementary schools, middle schools, and high schools, to ensure they have the support services they need in order to achieve their highest potential in the areas of academics, personal and social growth as well as career development. This is accomplished by working with students with special needs physically, socially, behaviourally or emotionally in a variety of settings including one-

on-one counselling, group counselling, in special education classrooms, as well as in regular education classrooms.

- **Occupational Therapist:** Occupational therapists work with fine motor skills, sensory processing, visual skills, and self-care. Typical activities during sessions might involve grasping and releasing toys, improving hand-eye coordination, handwriting skills, and learning how to bathe, dress and feed oneself. Occupational Therapist is also useful in teaching social skills, anger management, and improved focus.
- **Physiotherapist:** Physiotherapists are trained to evaluate and improve movement and function of the body, with particular attention to physical mobility, balance, posture, fatigue, and pain. The physical therapy programme typically involves educating the child about the physical problems caused by their special needs, designing an individualised exercise programme to address the problems, and enhancing mobility and energy conservation through the use of a variety of mobility aids and adaptive equipment.
- **Physical Education Teacher:** A physical education teacher is someone who works with children and youth who have a variety of special needs. Children with special needs require unique instructions by specially trained professionals to help them achieve their highest potential and strive to progress beyond their limitations. Special education teachers are patient, understanding educators dedicated to giving each individual student, the tools and guidance needed to help them maximise success.
- **Speech Therapist :** Autism Spectrum Disorder is characterised by difficulties with social interactions, communication, restricted and/or repetitive behaviours and sensory sensitivities. It is referred to as a spectrum disorder as it can manifest differently from child to child. Through early intervention, the child's quality of life can be significantly improved. The services of Speech Therapists focus on building positive interactions where language and social goals are targeted and the child's unique needs are taken into consideration.
- **Special Educator:** Special education professionals are responsible for creating an Individualised Education Plan (IEP) for each of their students. An IEP is a document specifying documented medical issues, accommodations, and educational goals for each disabled student. An IEP informs all education professionals working with a particular student that the student has moderate autism, needs additional testing time in an isolated area, as well as isolated downtime during the day, and that the student's goal is to limit self-isolated sessions to five per day.

Chapter 5
PHYSICAL FITNESS, WELLNESS AND LIFESTYLE

Topic-1 Meaning and Importance of Wellness, Health and Physical Fitness

Revision Notes

- **Wellness**
  - **Wellness is an active process of becoming aware of and making choices toward a healthy and fulfilling life. Wellness is more than being free from illness, it is a dynamic process of change and growth.**
  - **"A state of complete physical, mental, and social well-being, and not merely the absence of disease or infirmity." —The World Health Organization**
  - **"A conscious, self-directed and evolving process of achieving full potential."**
    —The National Wellness Institute
- **Importance of Wellness**
  Wellness requires continuous and thoughtful efforts to remain healthy and to reach the highest level of wellbeing. Overall physical wellness is achieved through the balance of physical activity, nutrition and mental well-being to keep your body in top condition. Health related lifestyle habits lead to longevity, improve quality of life and help achieve total wellbeing. After reading seven dimensions of wellness an individual can understand the importance of wellness:
  - Wellness Programme should be developed with an aim to providing health-related lifestyle education with required support and resources to achieve wellness.
  - Wellness makes the individual responsible for taking good decisions and adopting good practices and preventative measures for achieving optimum level of physical, emotional and social functioning.
  - Wellness Programmes enable an individual to understand health issues like chronic diseases, cancer, cardiovascular disease, STDs, obesity, nutrition, diabetes, injuries, and other lifestyle related diseases and enhances longevity and the quality of healthy life.
  - It promotes the behaviours which help maintain good health like quitting smoking, giving up alcohol abuse etc., and reducing social evils like

violence, abuse, child labour, gender inequality, caste system etc., and adoption of positive values that result in an individual becoming a good citizen of the country.

- It also enables an individual to maintain balance between work, personal life and health that results in efficient and consistent output and improves general health, and fitness through adopting regular physical activities.
- It also helps to develop healthy social environment where people share and solve personal and social problems, thus making the individual socially accessible and culturally sensitive.
- Wellness components like physical, emotional, mental, social, environmental, occupational, and spiritual are highly inter connected and can help to make environment disease and pollution free.

- **Physical fitness:** It is used in the context of two meanings: General fitness (a state of health and well-being) and Specific fitness (the ability to perform specific sports or occupational skills). Fitness can be further subdivided into five categories: Cardiovascular endurance, muscular strength, muscular endurance, flexibility and body composition. The criterion for physical fitness has also been expanded to include the capacity to meet physical demands in an emergency situation.
- Physical fitness is the capacity of the Heart, Blood vessels, Lungs and muscles to function at optimum efficiency.
- It is the body's ability to function efficiently and effectively in work and leisure activities, not only at a set point of time, but at various ages and stages within a person's life cycle. The key is in finding optimum health within the limits of one's lifestyle in order to be able to resist hypokinetic diseases.
- **Importance of Physical Fitness**
  - Overall Health – A regular fitness regime helps in improving the overall health of an individual. A brisk walk for half an hour and free hand exercise can keep one fit. It enhances blood circulation and improves immunity as well.
  - Boosts Energy – After working out or after a session of yoga, one shall feel rejuvenated and energised throughout the day. Contrary to this, if one's lifestyle is sedentary and lethargic, the individual will feel tired and sluggish the entire day.
  - Weight Reduction – This is the main advantage of being fit. Working out regularly is one of the natural weight loss methods. One can burn extra calories; the individual will also remain in shape. Therefore, weight reduction is one of the important benefits of physical fitness.
  - Strong Build – Staying fit with regular workouts and muscle building makes the bones strong. People suffering from backache, shoulder pain, etc., must exercise regularly.
  - Mental Strength – A fit body is not only physically strong but mentally strong as well. A combined routine, including-proper exercise and diet, have a positive effect on brain function. It elevates flow of blood to brain and enhances one's memory. It also keeps one mentally strong.
  - Personality Development – Staying fit makes one look good. The more one indulges into healthy habits the more overall looks improve. This increases confidence level and grooms personality. One feels fresh and rejuvenated throughout the day. The mood remains happy and optimistic too.

Topic-2 Components/Dimensions of Wellness, Health and Physical Fitness

Revision Notes

- **Components of Wellness :**
  - Social Wellness is the ability to relate to and connect with other people in the world. The ability to establish and maintain positive relationships with family, friends and co-workers contributes to Social Wellness.
  - Emotional Wellness is the ability to understand self and cope with the challenges life can bring. The ability to acknowledge and share feelings of anger, fear, sadness, stress, hope, love, joy and happiness in a productive manner contributes to Emotional Wellness.
  - Spiritual Wellness is the ability to establish peace and harmony in lives. The ability to develop congruency between values and actions and to realise a common purpose that binds together contributes to Spiritual Wellness.
  - Environmental Wellness is the ability to recognise one's own responsibility for the quality of the air, the water and the land that surrounds us. The ability to make a positive impact on the quality of environment - be it home, communities or planet - contributes to Environmental Wellness.

- Occupational Wellness is the ability to get personal fulfilment from jobs or chosen career fields while still maintaining balance in lives. The desire to contribute in careers to make a positive impact on the organisations and to society as a whole leads to Occupational Wellness.
- Intellectual Wellness is the ability to open minds to new ideas and experiences that can be applied to personal decisions, group interaction and community betterment. The desire to learn new concepts, improve skills and seek challenges in pursuit of lifelong learning contributes to Intellectual Wellness.
- Physical Wellness is the ability to maintain a healthy quality of life that allows to get through our daily activities without undue fatigue or physical stress. The ability to recognise that behaviours have a significant impact on wellness and adopting constructive habits (routine check ups, a balanced diet, exercise, etc.) while avoiding destructive habits (tobacco, drugs, alcohol, etc.) leads to optimal Physical Wellness.

- **Health-related Fitness:**
  There are five components of health-related physical fitness – muscular endurance, cardiorespiratory endurance, flexibility, muscular strength and body composition. These are directly related with good health, and help to reduce the risk of hypokinetic diseases. For health promotion and disease prevention, each of the components of health-related fitness are important in moderation. A higher level of health-related fitness is directly related to the degree of skill performance. e.g., moderate level of muscular strength is required to maintain posture and to prevent neck, back or knee pain etc. but a high amount of muscular strength helps to increase performance in weight lifting, jumps, throws etc.
- **Skill-related Fitness:** Skill related fitness has six components namely agility, balance, coordination, reaction time, power and speed. These are associated with performance. An individual who has achieved a good skill-related fitness is able to achieve high level of motor skills, which are a prerequisite in sports and in certain jobs. Though, skill-related fitness is generally known as sports fitness or motor fitness, but it is very specific and multi- dimensional. For e.g., agility is required in combat sports as well as in the job of a fire fighter.
- **Components of Health-related fitness:**
  - **Body Composition: There are several techniques to measure body composition. Some of them are mentioned below:**
    1. Height and Weight
    2. Body Mass Index (BMI)
    3. Waist-to-Hip Ratio (WHR)
    4. Girth Circumferences
    5. Skinfolds
    6. Bioelectrical Impedance Analysis
    7. Hydrostatic Weighing
  - **Muscular Endurance**
  - **Cardio Respiratory Endurance**
  - **Muscular Strength**
  - **Flexibility**
- **Components of Physical Fitness.**
- There are five components of Physical Fitness. They are directly or indirectly interrelated wth each other. Each component has its own importance in different games and sports.
- **These components are:**
  - **Endurance:**
    (a) Cardiovascular Endurance: Cardiovascular endurance or cardiopulmonary endurance refers to the efficiency of the heart, lungs and vascular system's delivery of oxygen-rich blood to working muscles during activities that last longer than 90 seconds. Cardio means related to heart, vascular means related to blood vessels, and pulmonary means related to lungs.
    (b) Muscular Endurance: While muscular strength deals with short duration muscle contractions, muscular endurance deals with sustained muscular contractions and other anaerobic activities lasting less than 90 seconds.
  - **Muscular Strength:** Muscular strength is the amount of force muscles can exert against resistance for short duration, anaerobic (without oxygen) activities. Resistance includes external objects such as free weights or household objects, or even own body weight during body weight exercises. Physiologically, muscular strength is the ability of cells to supply muscle energy in the form of ATP (adenosine triphosphate) to muscle fibres for concentric, eccentric and isometric contractions in time frames ranging from 0 second to 15 seconds.
  - **Speed:** Speed is the ability to perform a task in less time as compared to others. A physically fit person

has better speed than a person who is not in best of health.

- **Flexibility:** Flexibility is the range of motion possible for each of the joints or group of joints.
- **Coordinative Abilities:** The coordinative abilities are those abilities of an individual which enable the individual to do various related activities properly as well as efficiently.

- **Introduction to First Aid-PRICE.**

When a person suffers an injury or sudden illness, immediate medical attention or treatment may be provided to her/him in order to reduce the discomfort, pain, and deterioration of her/his condition. During these situations, trained doctors may not available on the spot. Therefore, the 'first care', which is provided before professional medical help is available, is called 'First Aid'.

PRICE is an acronym used to indicate the procedure that should be followed in an injury like sprain (ligament injury) or strain (muscle or tendon injury).

In this acronym P- stands for Protect, R- stands for Rest, **I:** stands for application of Ice, C - for compressing the injured area, and E- for elevating the injured area.

P: Protect the injury from further damage, for example. by using a support or splint.

R: Rest the injury for the first two to three days. Crutches may be needed if the leg is injured, in case one wants to remain mobile.Then reintroduce movement gradually so the recovery is not delayed. Muscle strength is not lost.

I: Ice the painful area with a cold compress such as ice or a bag of frozen peas wrapped in a towel. This will help reduce swelling and bruising. Do this for 15 to 20 minutes every two to three hours. Don't apply ice directly to the skin as it can damage it.

C: Compress the injured area with an elastic bandage or elasticated tubular bandage to help limit swelling and movement. But don't leave the bandage on while sleeping.

E: Elevate the injured area by resting it above the level of the heart and keep it supported. This could mean lying on the sofa with the foot on some cushions if the injury is to leg.

Topic-3 Traditional Sports and Regional Games for Promoting Wellness, Leadership quality through Physical activities and Sports

Revision Notes

- India has a vast and unique culture, so every state has its own traditional sports to follow. India has become the land of traditional sports like Kushti. The Indian Wrestling, Vallamkali, Jallikattu and many more. India is also known for its diversified culture and traditions. One of the traditional sports in India is Mallakhamb also known as the pole dance of India, it is one of the very difficult sports in India. There are few famous village sports that are also very adventures sports in India. Few most popular traditional sports in India are:

- **Kabaddi**

It is one of the most popular sports in India played by the people in villages as well as in small towns. Kabaddi is an Indian game which requires both power and skill for its play. It is simple and inexpensive game and doesn't require any playing equipment. Regular Kabaddi tournaments are held throughout the country.

- **Kho-Kho**

Kho-Kho is one of the most popular traditional sports in India. Kho Kho is a 'run and touch' game that is very simple to play and can be enjoyed by people of all ages. It does need any good physical fitness just need skills to play.

- **Kushti**

The Indian wrestling is the best sports to play and maintain the physique. It needs to be following some set rules to become a wrestler. A heavy diet and strict discipline is to be maintained by the wrestler. Famous Indian wrestler Sushil Kumar is the Indian world wrestling champion of 66 kg freestyle wrestling games and winner of Beijing and London Olympics. Indian wrestling is one of most popular and difficult

type of traditional sport in India, mostly played at North Indian state of Punjab and Haryana along with Maharashtra.

- Following are the benefits of playing traditional sports:
  - It can contribute to the motor, linguistic, cognitive and social-emotional development fields of children.
  - Traditional games as physical activity or active playing can give benefit to physical health i.e., increase heart rate, oxygen consumption, and blood pressure.
  - It also enhances the fundamental motor skills which in fact help the children to control their bodies, manipulate their environment and any complex skills and movement patterns involved in sports and other recreational activities.
- **Leadership through physical activity and sports**

Definitions of Leadership

"Leadership is the exercise of authority and making of decisions" states Durlin. R.

"Leadership is the ability to secure desirable actions from a group of followers voluntarily, without the use of force", by Alford and Beaty.

"Leadership is the activity of influencing people to strive willingly for group objectives", expressed R. Terry.

"Leadership is the initiation of acts which results in insistent pattern of group interaction directed towards the solution of the mutual problem", stated Hemphill. J. K.

- **Nature and Characteristics of Leadership:**

1. Leadership is a personal quality.
2. It exists only with followers. It is implied that if there are no followers, there is no leadership.
3. It is the willingness of people to follow that makes a person a leader.
4. It exists only for the realization of common goals
5. It involves readiness to accept complete responsibility in all situations.
6. Leadership is the function of stimulating the followers to strive willingly to attain the objectives of the profession/group.
7. Leadership styles do change under different circumstances.
8. Leadership is not synonymous with management.

- **Qualities of Leader:**

Though the qualities of leadership are innumerable yet the word "LEADERSHIP" itself contains the qualities of a great successful leader. Each letter of leadership can be abbreviated in the following manner:

L: Loyalty

E: Enthusiasm, Endurance, Engaging personality

A: Alertness, Adjustment

D: Discipline, Dependability, Desire to help others

E: Energetic, Earnestness

R: Reliability, Right thinking

S: Sincerity, Sympathy, Self-control

H: Health, Honey, Humor

I: Intelligent, Impartiality, interest in teaching

P: Patience, Personality, Public relations

- **Leadership through sports and games:**

Physical activity-based programs have enormous potential in creating leadership skills. One reason for this is that physical activity is highly interactive. Its context creates many "natural" opportunities for youth to explore both one-and-one and group-lead leadership exploration. Physical activity also challenges young leaders to respond to spontaneous circumstances that may arise. In a basketball game, for example, these "leadership moments" might require defusing an argument over a call, enforcing certain rules for his or her team members (e.g., no trash talk), or making sure that no one is excluded from touching the ball. And, many of these "moments" can ignite moral introspection and action by the youth leader. They provide ample opportunity to bring together the moral meaning of that moment during a game and experiences of life itself.

Physical activity develops leadership qualities in many ways. Following are the ways through which leadership qualities are developed through physical activities.

1. **Good Personality:** Personality is the key factor of leadership.A fine personality includes good physical fitness and mental alertness. A leader's personality always influences other team members. Physical activities help to build physically and mentally strong personality.
2. **Faithfulness:** Faithfulness is a highly needed quality in any leader.While playing one has to follow the rules and regulations of the game at anycost otherwise one will get punished at the spot.The player who obeys the rules is faithful to sports, will get recognized, and become popular in the media. Faithfulness is one of the main characteristics of leadership and, in sports, we see faithfulness in every step.

3. **Sincerity:** One who wants to become a leader must express and be sincere about the duties one has to follow as a team member. One who isn't sincere in sports doesn't get success in sports. One needs to be sincere while training. During competition one needs to give one's 100% involvement and commitment to the activity and the role one is playing in the team like being forward, defense, goalkeeper etc.…
4. **Cooperative and coordinative:** Leadership develops when we improve our cooperation and coordinating nature with teammates. In a team game, one needs to be cooperative and coordinative with the junior and senior players. In football one needs to pass the ball, take position to receive the ball, assist defense members when opponents attack etc.… Thus, a player exhibits different roles during the game. In short, games teach players one person cannot achieve everything but together one can achieve everything.
5. **Discipline:** For effective leadership discipline is essential. Discipline is the key factor for success in all kinds of work. Discipline in work, talk, behavior will make a positive effect on team members. With discipline, a leader can reach the goal successfully and in a planned time. Being punctual is a sign of discipline. Sports teach the value of each second in the last second a basket made by a player can decide the winner and if a player in the last second becomes casual can become the cause of team's failure.
6. **Tolerance:** With patience or tolerance and good self-control working efficiency and performance becomes better. In leadership presence patience is very important. Patience is required to handle defeat and win. It is required in dealing with injuries, recovering from injuries, responding calmly to aggressive behavior of opponents, mass pressure from audience etc…
7. **Impartiality:** Taking unbiased decisions are needed in any leader. Sports first teaches us to be honest. we lose or win impersonality must be shown by every sportsperson. Strict rules and regulations, umpires, referees, punishments, and penalties are the builders of impartial behavior in sports.
8. **Public relations:** A true leader must always be in good and friendly public relations. Playing a group game like football, cricket, or handball helps to develop public relations skills. A sportsperson in his / her sports career meets various people of different societies and places, thereby the public relations skills of sports person improve.

Chapter 6
TEST, MEASUREMENT AND EVALUATION

Topic-1 Test, Measurement and Evaluation

Revision Notes

Test

- Test is a tool, a question, a set of questions or an examination which is used to measure a particular characteristic of an individual or a group of individuals. It is something which provides information regarding individual's ability, knowledge, performance and achievement.
- According to Barrow and Mc Gee, "A test is a specific tool or procedure or a technique used to obtain response from the students in order to gain information which provides the basis to make judgement or evaluation regarding some characteristics such as fitness, skill, knowledge and values."

Measurement

1. It is the collection of information in numeric form.
2. It is the record of performance or the information which is required to make judgment.

- According to R.N. Patel, 'Measurement is an act or process that involves the assignment of numerical values to whatever is being tested. So, it involves the quantity of something.'

Scales of Measurement

Measurement numbers are composed of scales. There are four scales of measurement:

- **Nominal measurement scales –** Nominal measurement scales are used to name or label things or to depict categories. Nominal scales put

things or people into categories. e.g., Gender is categorised in Male and Female.

- **Ordinal scales –** Ordinal scales order or rank things. In measurement, an assigned rank given to a person or thing is an ordinal number. e.g., First, Second and Third rank in sports.
- **Interval scale –** The most commonly used scale in measurement in physical education is the interval scale. Interval measurement scales are based on a continuum where the interval (or distance) between any two numbers is always the same. The intervals are equal to each other. e.g., 2, 4, 6, 8 are at equal interval of 2. This scale does not have an absolute meaning of zero.
- **Ratio scale –** The most advanced, the most sophisticated, and the most precise measurement scale is the ratio scale. The ratio measurement scale is distinguished from the interval measurement scale by the fact that it has an absolute, true zero that has meaning. e.g., if somebody's pulse is zero mean there is no life in the individual. If something weighs zero, it means it is weightless.

Evaluation

1. It is a technique used to know the extent to which objectives are being achieved.
2. It is a decision making process which assists to make grade and ranking.

- According to Barrow and Mc Gee, 'It is the process of education that involves collection of data from the products which can be used for comparison with preconceived criteria to make judgment.'

Importance of Test Measurement and Evaluation in Sports :

1. For the selection of athlete.
2. For getting knowledge about the progress.
3. For preparation and effective planning.
4. For classification of sportsperson.
5. For knowing the abilities and capacities.

Test, Measurement, and Evaluation:

A test may be called as tool, a question, a set of questions, or an examination which use to measure a particular characteristic of an individual or a group of individuals. It is something which provides information regarding individual's ability, knowledge, performance, and achievement.

According to R.N. Patel measurement is an act or process that involves the assignment of numerical values to whatever is being tested. It involves the quantity of something.

According to Barrow and McGee, it is the process of education that involves collection of data from the products which can be used for comparison with preconceived criteria to make judgment.

Importance of test, measurement, and evaluation:

(a) To understand the strength, weaknesses,and various qualities and capacities of a sportsman.

(b) It helps the player to select the most appropriate or suitable game or skill according to their capability.

(c) To predict potential and future performance.

(d) To conduct research and, prepare new norms and standards.

(e) To evaluate the teacher, coach, and trainer and their teaching program and training method.

(f) To evaluate the learner from time to time and find his or her progress, weakness, and current fitness status so that a learner can be placed into the appropriate training group.

(g) For the purpose of guidance and counselling of an athlete and motivating him to do better.

(h) It helps in classification or gradation of learners and makes it easy for the teacher/ coach in selecting and identify talented athletes.

(i) To diagnose the learning problem of an individual and discover their need.

(j) To evaluate the effectiveness of a physical education program.

(k) To analyze the progress of the athlete.

Topic-2 Calculation of BMI, Waist-Hip Ratio, and Skin fold measurement

Revision Notes

Calculation of BMI

Body Mass Index (BMI) is a person's weight in kilograms divided by the square of height in meters. It does not measure body fat directly but appears to be a strong indicator of risk for various diseases. In general, it's an inexpensive and easy method of screening for weight categories.

A high BMI can be an indicator of high body fatness. BMI can be used as a screening tool, but it is not diagnostic of the body fatness or health of an individual. To determine if a high BMI is a health risk, a healthcare provider would need to perform more assessments. These might include skin fold measurements, diet evaluations, physical activity, family history, and other appropriate health screenings.

Formula: weight (kg) / [height (m)]^2

Example: Weight = 68 kg, Height = 165 cm (1.65 m)

Calculation: 68 ÷ $(1.65)^2$ = 24.98

For adults 20 years and older, BMI is interpreted by using standard weight status categories that are the same for all ages and for both men and women. The standard weight status categories associated with BMI ranges for adults are:

Below 18.5 - Underweight

18.5 – 24.9 - Normal or Healthy Weight

25.0 – 29.9 Overweight

30.0 and above Obese

- **Waist-Hip Ratio**

The waist-to-hip ratio (WHR) is an anthropomet-ric measure of body shape. It is calculated by taking the distance around the waist at its narrowest point and by dividing the distance around the hips and buttocks at their widest points.

The WHO states that abdominal obesity is defined as a waist–hip ratio above 0.90 for males and above 0.85 for females, or a body mass index (BMI) above 30.0. Women with waist–hip ratios of more than 0.85, and men with more than 1, are at increased health risk because of their fat distribution.

- **Skin fold measurement (3-site).**

The purpose of this measurement is to estimate body fat % based on measurements of subcutaneous fat it is helpful for deciding on a diet or a training regime. The Jackson/Pollock method uses skin folds to measure body fat percentage. This one uses skin folds from 3 different points.

1. Chest
2. Abdomen
3. Thigh

Measurements are taken on the right side of body. Caliber needs to be perpendicular to the site analyzed. The participant must relax the muscle group that is being assessed. When skin fold is pinched, the practitioner should be taking reading at the middle of the pinched skin, not apex or base. Wait 1 to 2 seconds after releasing caliber, record the closest 0.5 mm. Retake each site in order to obtain accurate readings.

Measurements:

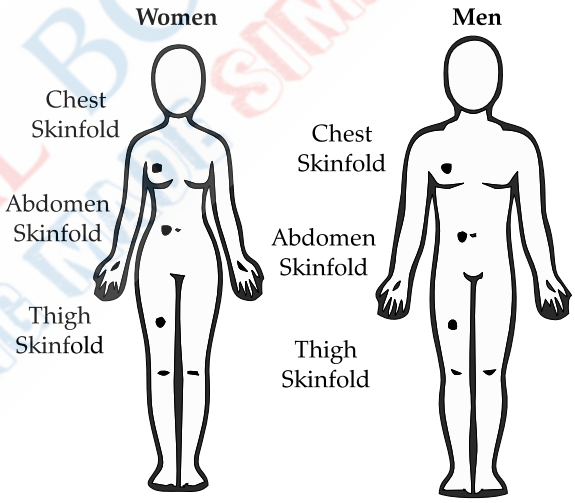
Chest: Diagonal fold

Men: one-half the distance between the anterior axillary line (crease of the underarm) and the nipple.

Women: one-third of the distance between the anterior axillary line and the nipple.

Abdominal: vertical fold 2 cm to the right of the navel.

Thigh: midpoint of the anterior side of the upper leg between the patella and top of thigh.



Topic-3 Somato Types (Endomorphy, Mesomorphy, and Ectomorphy)

Revision Notes

- William H. Sheldon, Ph.D., MD, introduced the concept of body types, or somato types, in the 1940s. Since then, nutritionists, exercise physiologists, and even doctors have used it to help design effective, individualized fitness plans. The gist is that everyone falls, though not altogether neatly, into the three categories below. Keep in mind that these are generalizations and that most of us have characteristics of two or even all three somato types. People are born with an inherited body type based on skeletal frame and body composition. Most people are unique combinations of the three body types: ectomorph, mesomorph, and endomorph.

Ectomorphs are long and lean, with little body fat, and little muscle. They have a hard time gaining weight. Fashion models and basketball players fit this category While most of us love to hate these genetically-blessed individuals, some male ectomorphs may not be thrilled with their narrow-chested frames, and some female ectomorphs long for more womanly curves.

General Characteristics:

(a) More narrow shoulders and hips with respect to height.

(b) Relatively smaller muscles with respect to bone length.

(c) Naturally fast metabolism makes it difficult for many to gain mass.

(d) Potentially indicative of disordered eating (e.g., anorexia, bulimia) when BMI is ≤17.

Endomorphs, on the other hand, have lots of body fat, and lots of muscle, and gain weight easily. They're heavier and rounder individuals.

General characteristics:

(a) Stockier bone structures with larger midsections and hips.

(b) Carries more fat throughout the body.

(c) Gains fat fast and loses it slowly.

(d) Naturally slow metabolism; potentially due to chronic conditions (e.g., thyroid deficiency, diabetes) but too frequently the result of a sedentary lifestyle and chronically-positive daily energy balance.

Mesomorphs are athletic, solid, and strong. They're not overweight and not under weight and they can eat what they want without worrying too much about it. They both gain and lose weight without too much effort.

General characteristics:

(a) Medium bone structure with shoulders wider than the hips.

(b) Developed athletic musculature.

(c) Efficient metabolism; mass gain and loss both happen with relative ease

Chapter 7
FUNDAMENTALS OF ANATOMY, PHYSIOLOGY IN SPORTS

Topic-1 Anatomy, Physiology and their Importance

Revision Notes

- **Anatomy:** The word anatomy has been derived from a Greek word "Anatome" meaning to cut up. It is the study of structures that make up the body and how those structures relate with each other.
- **Anatomy is divided into the following categories:**

  Gross/Macro anatomy is the study of the larger structures of the body, those visible without the aid of magnification. It deals with the large body structures such as heart, lungs and bones. Microscopic anatomy is the study of those structures of body which can't be seen with the naked eye. Gross anatomy may further be subdivided into the following categories:

  1. **Systemic anatomy:** Systemic anatomy is the study of the working and structures of a discrete body system. It is the study of a group of structures that work together to perform a unique body function. e.g., a systemic study of the muscular system would include all of the skeletal muscles of the body.
  2. **Regional anatomy:** is the study of the interrelationships of all of the structures in a specific body region. Regional anatomy helps us appreciate the interrelationships of body structures, such as how muscles, nerves, blood vessels, and other structures work together to serve a particular body region. e.g., the study of an area of the body such as the abdomen would include a study of all organs, blood vessels, etc., in that part of the body.
  3. **Surface anatomy:** this is a study of external features of the body like the bony projections of the body which act as a landmark and help us to locate the other deeper structures. e.g., skin, nails, hair, etc. Microscopic anatomy includes:
     (i) Cytology or the study of the internal structure of cells
     (ii) Histology or the study of tissues (groups of cells)
- **Physiology:** The word physiology has been derived from a Greek word "physis-logia" meaning study of nature. It is the study of how the body and its parts work or function.
  - Hence, anatomy and physiology are studied together to give students a full appreciation and understanding of human body.
  - Physiology is further divided into sub parts which are as follows:
  - **Human physiology:** This branch of physiology refers to the study of a specific organism, i.e., the human being.
  - **Cellular and systemic physiology:** Cellular physiology is the study of the function of cells while systemic physiology is the study of the function of the body's systems.

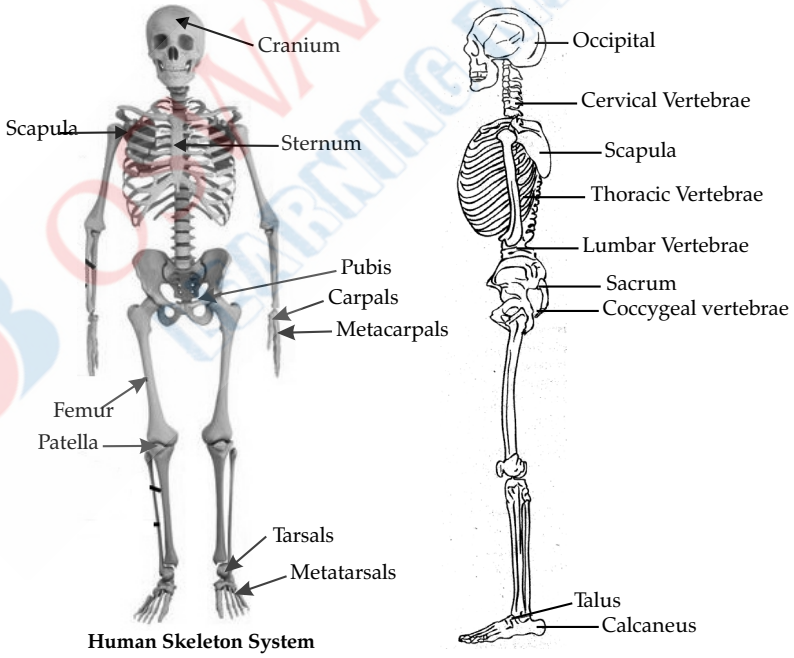
- **Importance of Anatomy and Physiology:** The relationship between physiology and anatomy is very important. The study of Anatomy and Physiology:
  - Helps in valuation of a player's capacity.
  - Helps to study the effects of exercises on human body.
  - Helps in positioning of body during training session.
  - Helps in preventing sports injuries.
  - Helps in providing adequate information of sports nutrition.
  - Helps in speedy rehabilitation from sports injuries.
  - Helps in improving the sports performance of a player.
  - Helps a player to choose any sporting event as per his bodily capacity.
  - Helps in recovery of fatigue occurred during training session.
  - Helps in the study of ill-effect of alcohol to human body.
  - Provides information of positive or negative aspects of a player's body structure.

Topic-2 Functions of Skeleton System, Classification of Bones and Types of Joints

Revision Notes

- **Skeletal System**

The human body is designed in a particular shape because of the skeletal system. The bones and associated cartilages of the skeleton create a supportive framework for the muscles and organs of the body. The bones are rigid while the cartilage components of the skeleton are flexible. The joints, or articulations, form the junctions between individual bones. The muscles pull against the bone levers to cause movement. The axial skeleton consists of the skull, vertebral column, and ribcage. The appendicular skeleton consists of the arms, legs, and supporting structures in the shoulders and pelvis.



Human Skeleton System

- **It is of two types:**
  - **Axial Skeleton: This skeleton consists of the following bones:**
    - Skull: 28
    - Sternum: 1
    - Ribs: 24
    - Hyoid bone: 1
    - Vertebral column: 26 for adults and 33 for children
  - **Appendicular Skeleton: This skeleton consists of the following bones:**
    - Upper Limbs: 64
    - Lower Limbs: 62
- **Classification of bones:** The bones of the body come in a variety of sizes and shapes. The four principal

types of bones are long, short, flat and irregular.

- **Long Bones:** Bones that are longer than they are wide are called long bones. These consist of a long shaft with two bulky ends or extremities. These are primarily compact bone but may have a large amount of spongy bone at the ends or extremities. Long bones include bones of the thigh, leg, arm, and forearm.
- **Short Bones:** Short bones are roughly cube shaped with vertical and horizontal dimensions approximately equal. These consist primarily of spongy bone, which is covered by a thin layer of compact bone. Short bones include the bones of the wrist and ankle.
- **Flat Bones:** Flat bones are thin, flattened and usually curved. Most of the bones of the cranium (or the upper skull) are flat bones.
- **Irregular Bones:** Bones that are not in any of the above three categories are classified as irregular bones. These are primarily spongy bones that are covered with a thin layer of compact bone. The vertebrae and some of the bones in the skull are irregular bones. All bones have surface markings and characteristics that make a specific bone unique. There are holes, depressions, smooth facets, lines, projections and other markings. These usually represent passage ways for vessels and nerves, points of articulation with other bones or points of attachment for tendons and ligaments.

- **Functions of bones:** Our bones perform seven important functions:
  - **Support:** Bones provide a framework that supports the body and cradles its soft organs. For example, bones of the lower limbs act as pillars to support the trunk of the body when we stand and the rib cage supports the thoracic wall.
  - **Protection:** The fused bones of the skull protect the brain, the vertebrae surround the spinal cord and the rib cage protects the vital organs of the thorax.
  - **Movement:** Skeletal muscles, which attach to bones by tendons, use bones as levers to move the body and its parts. As a result, we can walk, grasp objects and breath. The design of joints determines the types of movements possible.
  - **Mineral and growth factor storage:** Bone is a reservoir for minerals, most importantly calcium and phosphate. The stored minerals are released into the blood stream in their ionic form as needed for distribution to all parts of the body.
  - **Blood cell formation:** Most blood cell formation, or hematopoiesis, occurs in the red marrow cavities of certain bones.
  - **Triglyceride (fat) storage:** Fat, a source of energy for the body, is stored in bone cavities.
  - **Hormone production:** Bones produce osteocalcin, a hormone which not only helps regulate bone formation, but also protects against obesity, glucose intolerance and diabetes mellitus.

- **Classification of Joints:** A joint also called an articulation, is any place where adjacent bones or bone and cartilage come together to form a connection. Joints are classified both structurally and functionally. Structural classification of joints take into account, whether the adjacent bones are strongly anchored to each other by fibrous connective tissue or cartilage, or whether the adjacent bones come together within a fluid-filled space called a joint cavity.

- Joints are classified according to the amount of movement of which they are capable and their structural composition in three categories:

  (i) Immovable Joints: These joints are also called fibrous joints, because the bones are connected by fibrous tissue. These joints cannot be used for movement of body parts.

  (ii) Slightly Movable Joints: In these joints, surfaces of bones are separated by some intervening substance and only slight movement is possible.

  (iii) Freely Movable Joints: These joints are also called synovial joints. These joints include most of the joints of the body. These freely movable joints are further classified into these categories:

  (a) Gliding Joints: These joints permit gliding movements only, as in the joints between bones of the wrist, between bones of the ankle.

  (b) Hinge Joints: These joints permit angular movement in one direction, like a door on its hinges. The movements of these joints are called flexion and extension e.g., elbow, knee and ankle joints, etc.

  (c) Condyloid Joints: These joints allow an angular movement in two directions e.g., wrist joint. Movements of this joint include flexion and extension, but no rotation.

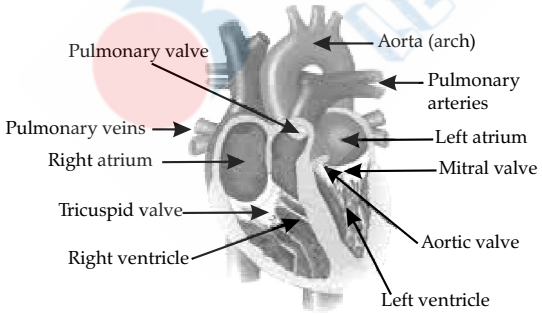
  (d) Saddle Joints: These joints permit a great freedom of movement e.g., joint of thumb. It enables the thumb to oppose the fingers.

  (e) Ball and Socket Joints: These joints have an angular movement in all directions and a pivot movement. In this form of joint, a more or less rounded head lies in cup. For example, shoulder joint and hip joint.

Topic-3 Functions and Structure of Circulatory System and Heart

Revision Notes

- **Meaning of Circulatory System:** The circulatory system is sometimes called the blood-vascular system. It consists of the heart, which is a muscular pumping device, and a closed system of vessels called arteries, veins, and capillaries. As the name implies, blood contained in the circulatory system is pumped by the heart around a closed circle or circuit of vessels as it passes again and again through the various "circulations" of the body. As in the adult, survival of the developing embryo depends on the circulation of blood to maintain homeostasis and a favourable cellular environment. In response to this need, the circulatory system makes its appearance early in development and reaches a functional state long before any other major organ system. The primitive heart begins to beat regularly early in the fourth week following fertilisation.
- **Heart :** The heart is a muscular pump that provides the force necessary to circulate the blood to all the tissues in the body. Its function is vital because, to survive, the tissues need a continuous supply of oxygen and nutrients and metabolic waste products have to be removed. Deprived of these necessities, cells soon undergo irreversible changes that lead to death. While blood is the transport medium, the heart is the organ that keeps the blood moving through the vessels.



Internal View of the Heart

- **Structure of the Heart:** The human heart is a four-chambered muscular organ, shaped and sized roughly like a man's closed fist with two-thirds of the mass to the left of midline.

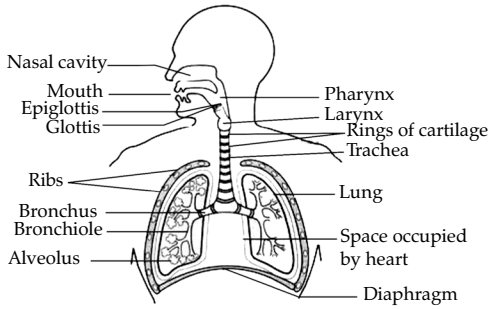
  The heart is enclosed in a pericardial sac that is lined with the parietal layers of a serous membrane. The visceral layer of the serous membrane forms the epicardium.

- **Functions of Heart:** The heart circulates blood through two pathways: the pulmonary circuit and the systemic circuit. In the pulmonary circuit, deoxygenated blood leaves the right ventricle of the heart via the pulmonary artery and travels to the lungs, then returns as oxygenated blood to the left atrium of the heart via the pulmonary vein. In the systemic circuit, oxygenated blood leaves the body via the left ventricle to the aorta, and from there enters the arteries and capillaries where it supplies the body's tissues with oxygen. Deoxygenated blood returns via veins to the vena cava, re-entering the heart's right atrium.
- **Arteries:** Arteries carry blood away from the heart. Pulmonary arteries transport blood that has low oxygen content from the right ventricle to the lungs. Systemic arteries transport oxygenated blood from the left ventricle to the body tissues. Blood is pumped from the ventricles into large elastic arteries that branch repeatedly into smaller and smaller arteries until the branching results in microscopic arteries called arterioles. The arterioles play a key role in regulating blood flow into the tissue capillaries. About 10 percent of the total blood volume is in the systemic arterial system at any given time.
- **Capillaries:** Capillaries, the smallest and most numerous of the blood vessels, form the connection between the vessels that carry blood away from the heart (arteries) and the vessels that return blood to the heart (veins). The primary function of capillaries is the exchange of materials between the blood and tissue cells.
- **Veins:** Veins carry blood towards the heart. After blood passes through the capillaries, it enters the smallest vein, called venules. From the venules, it flows into progressively larger and larger veins until it reaches the heart. In the pulmonary circuit, the pulmonary veins transport blood from the lungs to the left atrium of the heart. This blood has high oxygen content because it has just been oxygenated in the lungs. Systemic veins transport blood from the body tissue to the right atrium of the heart. This blood has reduced oxygen content because the oxygen has been used for metabolic activities in the tissue cells.

Topic-4 Functions and Structure of Respiratory System

Revision Notes

- **Structure of Respiratory System**



Human Respiratory System

- **Nose and Nasal Cavity :** The nose and nasal cavity form the main external opening for the respiratory system and are the first section of the body's airway—the respiratory tract through which air moves. The nose is a structure of the face made of cartilage, bone, muscle, and skin that supports and protects the anterior portion of the nasal cavity. The nasal cavity is a hollow space within the nose and skull that is lined with hair and mucus membrane. The function of the nasal cavity is to warm, moisturise and filter air entering the body before it reaches the lungs. Hair and mucus lining the nasal cavity help to trap dust, moulded pollen and other environmental contaminants before they can reach the inner portions of the body. Air exiting the body through the nose returns moisture and heat to the nasal cavity before getting exhaled into the environment.
- **Mouth :** The mouth, also known as the oral cavity, is the secondary external opening for the respiratory tract. Most normal breathing takes place through the nasal cavity, but the oral cavity can be used to supplement or replace the nasal cavity's functions, when needed. Because the pathway of air entering the body from the mouth is shorter than the pathway of air entering from the nose, the mouth does not warm and moisturise the air entering the lungs as well as the nose performs this function. The mouth also lacks the hair and sticky mucus that filters air passing through the nasal cavity. The one advantage of breathing through the mouth is that its shorter distance and larger diameter allow more air to quickly enter the body.
- **Pharynx :** The pharynx, also known as the throat, is a muscular funnel that extends from the posterior end of the nasal cavity to the superior end of the esophagus and larynx. The pharynx is divided into 3 regions: the nasopharynx, oropharynx, and laryngopharynx. The nasopharynx is the superior region of the pharynx found in the posterior of the nasal cavity. Inhaled air from the nasal cavity passes into the nasopharynx and descends through the oropharynx, located in the posterior of the oral cavity. Air inhaled through the oral cavity enters the pharynx at the oropharynx. The inhaled air then descends into the laryngopharynx, where it is diverted into the opening of the larynx by the epiglottis. The epiglottis is a flap of elastic cartilage that acts as a switch between the trachea and the oesophagus. Because the pharynx is also used to swallow food, the epiglottis ensures that air passes into the trachea by covering the opening to the oesophagus. During the process of swallowing, the epiglottis moves to cover the trachea to ensure that food enters the oesophagus and to prevent choking.
- **Larynx :** The larynx, also known as the voice box, is a short section of the airway that connects the laryngopharynx and the trachea. The larynx is located in the anterior portion of the neck, just inferior to the hyoid bone and superior to the trachea. Several cartilage structures make up the larynx and give it its structure. The epiglottis is one of the cartilage pieces of the larynx and serves as the cover of the larynx during swallowing. Inferior to the epiglottis is the thyroid cartilage, which is often referred to as the Adam's apple as it is the most commonly enlarged organ and is visible in adult males. The thyroid holds open the anterior end of the larynx and protects the vocal folds. Inferior to the thyroid cartilage is the ring-shaped cricoid cartilage which holds the larynx open and supports its posterior end. In addition to cartilage, the larynx contains special structures known as vocal folds, which allow the body to produce the sounds of speech and singing. The vocal folds are folds of mucus membrane that vibrate to produce vocal sounds. The tension and vibration speed of the vocal folds can be changed to change the pitch that they produce.
- **Trachea :** The trachea, or windpipe, is a 5-inch long tube made of C-shaped hyaline cartilage rings lined with pseudo-stratified ciliated columnar epithelium. The trachea connects the larynx to the bronchi and allows air to pass through the neck and into the thorax. The rings of cartilage making up the trachea allow it to remain open to air at all times.
- **Bronchi and Bronchioles :** At the inferior end of the trachea, the airway splits into left and right branches known as the primary bronchi. The left and right

bronchi run into each lung before branching off into smaller secondary bronchi. The secondary bronchi carry air into the lobes of the lungs–2 in the left lung and 3 in the right lung. The secondary bronchi in turn split into many smaller tertiary bronchi. The tertiary bronchi split into many smaller bronchioles that spread throughout the lungs. Each bronchiole further splits into many smaller branches less than a millimeter in diameter called terminal bronchioles. Finally, the millions of tiny terminal bronchioles conduct air to the alveoli of the lungs.

- As the airway splits into the tree-like branches of the bronchi and bronchioles, the structure of the walls of the airway begins to change. The primary bronchi contain many C-shaped cartilage rings that firmly hold the airway open and give the bronchi a cross-sectional shape like a flattened circle or a letter D. As the bronchi branch into secondary and tertiary bronchi, the cartilage becomes more widely spaced. The bronchioles differ from the structure of the bronchi in that they do not contain any cartilage at all. The presence of smooth muscles and elastin allow the smaller bronchi and bronchioles to be more flexible and contractile.
- The main function of the bronchi and bronchioles is to carry air from the trachea into the lungs. Smooth muscle tissue in their walls helps to regulate airflow into the lungs. When greater volumes of air are required by the body, such as during exercise, the smooth muscle relaxes to dilate the bronchi and bronchioles. The dilated airway provides less resistance to airflow and allows more air to pass into and out of the lungs. The smooth muscle fibers are able to contract during rest to prevent hyperventilation. The bronchi and bronchioles also use the mucus and cilia of their epithelial lining to trap and move dust and other contaminants away from the lungs.
- **Lungs :** The lungs are a pair of large, spongy organs found in the thorax lateral to the heart and superior to the diaphragm. Each lung is surrounded by a pleural membrane that provides the lung with space to expand as well as a negative pressure space relative to the body's exterior. The negative pressure allows the lungs to passively fill with air as they relax. The left and right lungs are slightly different in size and shape due to the heart pointing to the left side of the body. The left lung is therefore slightly smaller than the right lung and is made up of 2 lobes while the right lung has 3 lobes.
- The interior of the lungs is made up of spongy tissues containing many capillaries and around 30 million tiny sacs known as alveoli. The alveoli are cup-shaped structures found at the end of the terminal bronchioles and surrounded by capillaries. The alveoli are lined with thin simple squamous epithelium that allows air entering the alveoli to exchange its gases with the blood passing through the capillaries.
- **Muscles of Respiration :** Surrounding the lungs are sets of muscles that are able to cause air to be inhaled or exhaled from the lungs. The principal muscle of respiration in the human body is the diaphragm, a thin sheet of skeletal muscle that forms the floor of the thorax. When the diaphragm contracts, it moves inferiorly a few inches into the abdominal cavity, expanding the space within the thoracic cavity and pulling air into the lungs. Relaxation of the diaphragm allows air to flow back out of the lungs during exhalation.
- Between the ribs are many small intercostal muscles that assist the diaphragm with expanding and compressing the lungs. These muscles are divided into 2 groups: the internal intercostal muscles and the external intercostal muscles. The internal intercostal muscles are the deeper set of muscles and depress the ribs to compress the thoracic cavity and force air to be exhaled from the lungs. The external intercoastal are found superficial to the internal intercoastal and function to elevate the ribs, expanding the volume of the thoracic cavity and causing air to be inhaled into the lungs.
- **Pulmonary Ventilation :** Pulmonary ventilation is the process of moving air into and out of the lungs to facilitate gas exchange. The respiratory system uses both a negative pressure system and the contraction of muscles to achieve pulmonary ventilation. The negative pressure system of the respiratory system involves the establishment of a negative pressure gradient between the alveoli and the external atmosphere. The pleural membrane seals the lungs and maintains the lungs at a pressure slightly below that of the atmosphere when the lungs are at rest. This results in air following the pressure gradient and passively filling the lungs at rest. As the lungs fill with air, the pressure within the lungs rises until it matches the atmospheric pressure. At this point, more air can be inhaled by the contraction of the diaphragm and the external intercostal muscles, increasing the volume of the thorax and reducing the pressure of the lungs below that of the atmosphere again.
- To exhale air, the diaphragm and external intercostal muscles relax while the internal intercostal muscles contract to reduce the volume of the thorax and increase the pressure within the thoracic cavity. The pressure gradient is now reversed, resulting in the exhalation of air until the pressures inside the lungs and outside of the body are equal. At this point, the elastic nature of the lungs causes them to recoil back to their resting volume, restoring the negative pressure gradient present during inhalation.
- **Types of Respiration**
  - **(i) External Respiration :** External respiration is the exchange of gases between the air filling the alveoli and the blood in the capillaries surrounding the walls of the alveoli. Air entering the lungs from the atmosphere has a higher partial pressure of oxygen and a lower partial pressure of carbon

dioxide than does the blood in the capillaries. The difference in partial pressures causes the gases to diffuse passively along their pressure gradients from high to low pressure through the simple squamous epithelium lining of the alveoli. The net result of external respiration is the movement of oxygen from the air into the blood and the movement of carbon dioxide from the blood into the air. The oxygen can then be transported to the body's tissues while carbon dioxide is released into the atmosphere during exhalation.

(ii) Internal Respiration : Internal respiration is the exchange of gases between the blood in capillaries and the tissues of the body. Capillary blood has a higher partial pressure of oxygen and a lower partial pressure of carbon dioxide than the tissues through which it passes. The difference in partial pressures leads to the diffusion of gases along their pressure gradients from high to low pressure through the endothelium lining of the capillaries. The net result of internal respiration is the diffusion of oxygen into the tissues and the diffusion of carbon dioxide into the blood.

Topic-5 Properties and functions of muscles

Revision Notes

- All muscle cells share several properties: contractility, excitability, extensibility, and elasticity:
  - **(a)** Contractility is the ability of muscle cells to forcefully shorten. For instance, in order to flex (decrease the angle of a joint) the elbow one needs to contract (shorten) the biceps brachii and other elbow flexor muscles in the anterior arm. Notice that in order to extend your elbow, the posterior arm extensor muscles need to contract. Thus, muscles can only pull, never push.
  - **(b)** Excitability is the ability to respond to a stimulus, which may be delivered from a motor neuron or a hormone.
  - **(c)** Extensibility is the ability of a muscle to be stretched. For instance, let's reconsider our elbow flexing motion we discussed earlier. In order to be able to flex the elbow, the elbow extens or muscles must extend in order to allow flexion to occur. A lack of extensibility is known as spasticity.
  - **(d)** Elasticity is the ability to recoil or bounce back to the muscle's original length after being stretched.
- **Functions of muscle tissue:**
  - **Movement:** The body's skeleton gives enough rigidity to our body that skeletal muscles can yank and pull on it, resulting in body movements such as walking, chewing, running, lifting, manipulating objects with our hands, and picking our noses.
  - **Maintenance of posture:** Without much conscious control, our muscles generate a constant contractile force that allows us to maintain an erect or seated position, or posture.
  - **Respiration:** Our muscular system automatically drives movement of air into and out of our body.
  - **Heat generation:** Contraction of muscle tissue generates heat, which is essential for maintenance of temperature homeostasis. For instance, if our core body temperature falls, we shiver to generate more heat.
  - **Communication:** Muscle tissue allows us to talk, gesture, write, and convey our emotional state by doing such things as smiling or frowning.
  - **Constriction of organs and blood vessels:** Nutrients move through our digestive tract, urine is passed out of the body, and secretions are propelled out of glands by contraction of smooth muscle. Constriction or relaxation of blood vessels regulates blood pressure and blood distribution throughout the body.
  - **Pumping blood:** Blood moves through the blood vessels because our heart tirelessly receives blood and delivers it to all body tissues and organs.
  - Muscles help protect fragile internal organs by enclosing them and are also critical in maintaining the integrity of body cavities. For example, fetuses with incompletely formed diaphragms have abdominal contents herniate (protrude) up into the thoracic cavity, which inhibits normal lung growth and development.

Chapter 8
FUNDAMENTALS OF KINESIOLOGY AND BIOMECHANICS IN SPORTS

Revision Notes

- **Definition and Importance of Kinesiology and Biomechanics in sports**

1. **Kinesiology:** The term "Kinesiology" is a combination of two Greek verbs "Kinein", meaning "to move", and "logos" meaning "to discourse" or "to study". As such, Kinesiology may be defined as a science which investigates and analyses human motion.

Importance of Kinesiology:

(i) The main focus of Kinesiology is the study of the mechanical concepts related to human movement which is beneficial for every individual even in their daily activities.

(ii) Kinesiology applies sciences like biomechanics, anatomy, physiology and psychology to better understand how the human body responds to physical activity and various stimuli.

(iii) Kinesiology and physical education study the role of exercise, physical movement and sports in the development of human health and happiness.

(iv) It helps to understand the interconnection between human structure and functions.

(v) It provides adequate knowledge of movement to athletic trainers who can, then, try to prevent athletes from suffering injuries.

(vi) It provides knowledge regarding efficient movements as a part of daily living in order to achieve optimum quality of body efficiency.

(vii) The study of Kinesiology and Physical Education may be used as the basis for a variety of careers which include Gym instructors, Coaches in different sports, etc.

2. **Biomechanics:** Biomechanics is derived from Greek words. Bio-means living things and mechanics is the field of physics. Thus, it is a branch of science, which deals with the forces related to body movements. Biomechanics is defined as the systematic study of the mechanics of body joints.
According to Wikipedia, "biomechanics is the study of structure and function of the biological system of humans.

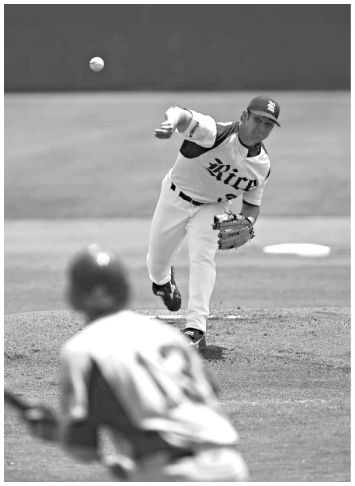
3. **Importance of Biomechanics in Sports:** The knowledge of biomechanics helps the players to improve their techniques and allow better equipment to be developed. It also helps in understanding the human body. Knowledge of how the human body works and techniques to use natural force to create maximum momentum helps in improving the performance of the players. Following are some other benefits of biomechanics:
   - Knowledge of safety principles.
   - Helps in research work.
   - Creates confidence in the player.
   - Helps in maintaining a healthy body.
   - Increase the popularity of sports.

- **Principles of Biomechanics**
  - **Stability**
    Principle 1: The lower the center of mass, the larger the base of support, the closer the centre of mass to the base of support, and the greater the mass, the more the stability increases.
    Example: Sumo.
  - **Maximum Effort**
    Principle 2: The production of maximum force requires the use of all possible joint movements that contributes to the task's objective.
    Examples: Golf, bench press.

  - **Maximum Velocity**
    Principle 3: The production of maximum velocity requires the use of joints in order from largest to smallest.
    Examples: hockey slapshot, hitting a golf ball.
  - **Linear Motion**
    Principle 4: (The impulse-Momentum Relationship.) The greater the applied impulse, the greater the increase in velocity.
    Examples: high jumpers, cyclists, runners.
    Principle 5: (Direction of force application.) Movement usually occurs in the direction opposite to that of the applied force.
    Example: slam-dunking a basketball.
    Principle 6: (Production of Angular motion.)

Angular motion is produced by the application of a force acting at some distance from an axis, that is, by torque. Principle is also known as the principle of the production of angular motion.

Example: Baseball pitchers.

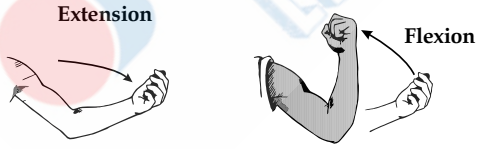


- **Conservation of Angular Momentum:**
  Principle 7: Angular momentum is constant when an athlete or object is free in the air. This principle is also known as the principle of conservation of angular momentum, and its key component is the fact that, once an athlete is airborne, he or she will travel with constant angular momentum.
  Example: Diver.

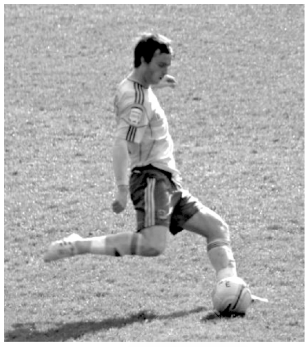
Types of Body Movements: Flexion, Extension, Abduction, Adduction, Rotation, Circumduction, Supination and Pronation

Types of movement

- **Flexion:** It describes a bending movement that decreases the angle between two body parts, that is bones of the limb at a joint. Flexion refers to the movement in the anterior direction.

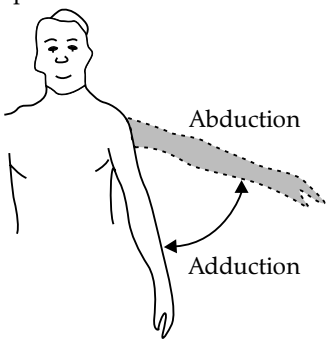


  - It happens when muscles contract and move your bones and joints.
    Example: Elbow flexion is decreasing the angle between the radius and the humerus. Knee flexion is decreasing the angle between the femur and tibia.
  - Flexion of the shoulder or hips refers to the movement of the arm or leg forward.
- **Extension:** Extension is a movement that increases the angle between two body parts. It is known as the opposite of flexion. Extension refers to the movement in the posterior direction. Extension at the elbow is to increase the angle between the ulna and the humerus. Extension of the knee is to increase the angle between the tibia and the femur.



- **Abduction:** Abduction is a movement that pulls a structure or part away from the midline of the body. The muscles which create this type of motion is known as an abductor.

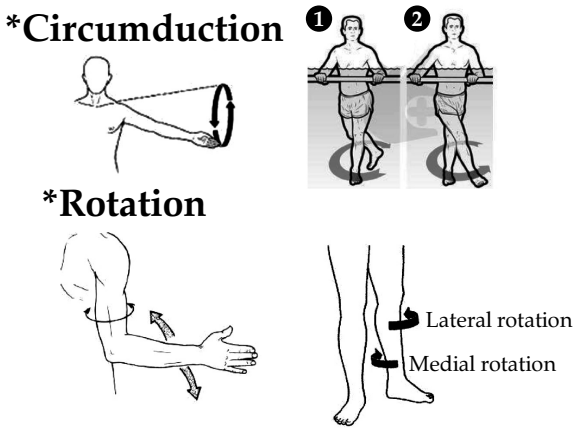
  - Abduction of the wrist is also known as radial deviation.
  - Swinging the arms laterally from the side of the body up to the shoulder or moving
  - The legs away from the midline is abduction example.



- **Adduction:** It refers to the movement that pulls apart towards the midline. When the arms straight out at the shoulders bring down to their sides is adduction. Arms closing towards the chest, bringing the knees together, bringing all the fingers or toes together, and thumb back to the normal position are some of the examples of adduction.
- **Rotation:** This is where the limb turns round its long axis, like using a screw driver. This occurs in the hip joint in golf while performing a drive shot or the shoulder joint when playing a topspin forehand in tennis.
- **Circumduction:** Circumduction is the movement of the limb in a circle and is a combination of shoulder abduction, shoulder adduction, flexion and extension. You can perform Circumduction with the arm, leg, finger or foot.

Remember that Circumduction is when you move an area of the body in a circle through the combination of different anatomical movements.

Circumduction can be further defined as the circular motion of a joint where the proximal end is fixed, and the distal end is free to move in a circle.



- **Pronation :** Pronation is the inward rolling of the foot during the landing of the foot in walking or running. Generally, it is a type of normal motion which occurs when the outer edge of the heel strikes on the ground. This rolls the foot inwards and flats out. Therefore, the weight of the body shifts from the heel to the forefoot. However, overpronation results in the flattening out of the foot arches, stretching the tendons, ligaments, and muscles of the foot.

  Furthermore, the pronation of the hand is the rotational movement of the hand, turning the lower arm and the hand inwards.

- **Supination:** Supination is the opposite movement of the pronation. Therefore, it is the outward rolling of the foot, occurring while lifting the foot from the ground during walking or running. As lifting off the heel from the ground, both forefoot and the toes are involved in propelling the body forward. Also, this shifts the weight of the body towards the lateral edge of the foot. However, over supination produces a large strain on the muscles and tendons in order to stabilise the ankle. Therefore, this may cause the ankle to a complete rollover, leading to a total ligament rupture or ankle sprain.

  Moreover, in the hand, supination is the rotational movement of the forearm and the hand outwards.

- **Axis and Planes:** Concept and its application in body movements
- **Axis and planes:** There are a variety of movements which happen in the human body, e.g., the movement of eyelids, heart muscles, jaw and teeth. In addition, movement could also refer to movement of arms and legs, as well as head and neck. Interestingly, movement of some organs occurs because of the collaboration of muscles and bones. In these cases, it happens along a point at which two or more bones form a joint.

  Human movements are described in three dimensions based on a series of planes and axis.

- **Plane:** A plane is an imaginary surface through which movement takes place. There are three planes of motion that pass through the human body.
  - Sagittal plane
  - Frontal plane
  - Transverse (horizontal) plane
  - **Sagittal Plane:** The sagittal plane is an imaginary vertical surface which divides the body into right and left parts or sections. Flexion and extension types of movement occur in this plane, eg., kicking a football, chest pass in netball/basketball, walking, jumping, squatting.
  - **Frontal Plane:** The frontal plane is also an imaginary vertical surface which divides the body into front (anterior) and back (posterior) parts or sections. Frontal plane is also known as Coronal plane. Abduction and adduction movements occur in this plane, e.g., Jumping jack exercises, raising and lowering arms and legs sideways, cartwheel.
  - **Transverse Plane:** The transverse plane is an imaginary horizontal surface which divides the body into upper (superior) and lower (inferior) parts or sections. Rotation types of movement occur in this plane, e.g., hip rotation in a golf swing, twisting in a discus throw, pivoting in netball/basketball, spinning in skating.
- **Axis:** An axis is an imaginary straight line around which an object/parts of human body rotates. Movement at a joint takes place in a plane about an axis. There are three axes of rotation.
  - Sagittal axis
  - Frontal axis
  - Vertical axis
  - **Sagittal Axis:** The sagittal axis also known as anteroposterior axis or dorsoventral axis. It is an imaginary line which passes horizontally from back (posterior) to front (anterior) through the centre of the body. It is formed by the intersection of the sagittal and transverse planes. e.g., when a person performs a cartwheel, he is rotating about the sagittal axis.
  - **Frontal Axis:** It is also known as Horizontal axis or Left-right axis. The frontal axis is an imaginary line which passes horizontally from left to right through the centre of the body. It is formed by the intersection of the frontal and transverse planes. e.g., when a person performs a somersault, he/she rotates around this axis.

- **Vertical Axis:** The vertical axis is also known as Longitudinal axis or Craniocaudal axis. This axis is an imaginary line which passes vertically from bottom (inferior) to top (superior) through the centre of the body. It is formed by the intersection of the sagittal and frontal planes. e.g., when a skater performs a spin, he is rotating around the vertical axis.

- **Kinetics and Kinematics in sports.**

Kinetics is an important aspect of sports performance, as it is involving the study of the forces and movements involved in athletic performance. Athletes use their kinematic and kinetic knowledge to optimize their movement patterns and mechanics which helps them to enhance their performance.

Kinetics examines the forces acting on the body during movement and the motion with respect to time and forces. Kinematics is a branch of biomechanics that describes the motion of a body without regard to the forces that produce the motion It Involves the time, space, and mass aspects of a moving system.

Here are a few examples of kinetics in sports:

1. **Running:** Kinetics are important in running as they are involved in how the body stores and releases kinetic energy. The runner applies force to the ground, thus causing a reaction force which propels them forward. Proper running mechanics that utilize efficient kinetic energy transfer can improve running speed and reduce the risk of injury.
2. **Jumping:** Kinetics play a significant role in jumping sports such as high jumping, long jumping, and triple jumping. In these sports, the athlete must apply an appropriate amount of force to the ground in order to jump to the highest or farthest distance. Proper use of kinetic energy transfer can improve the takeoff and landing phases of the jump.
3. **Throwing:** Kinetic principles are critical in throwing sports like javelin, shot put, discus, and hammer throw. By applying force on the object, athletes enable the object to move from their hand at a high velocity. Correctly applying the kinetic energy transfers and getting the right angles in throwing motion can help the athlete to achieve optimal throwing distance.

- Kinematics is the study of motion, and it plays an important role in sports. In sports, kinematics is used to analyze the motion of athletes and equipment to understand their performance and improve their techniques.

One important application of kinematics in sports is the study of movement patterns. This includes analyzing the movement of body segments, such as arms and legs, during sports movements such as throwing, jumping, and running. By understanding the kinematics of these movements, athletes and coaches can identify areas for improvement in technique, leading to greater efficiency and reduced risk of injury.

Another application of kinematics in sports is the analysis of equipment motion. For example, in sports such as golf, tennis, or soccer, the path of a ball after it is hit can be analyzed using kinematics to determine factors such as speed, direction, and spin. This information can help players improve their technique, predict where the ball will go, and improve their performance.

Squat jumping is a basic exercise in sports training to strengthen the muscles of the lower body. A jumping pattern can be essentially divided into four phases: crouch phase, push-off phase, flight phase, and landing phase.The Crouch phase represents the transition from standing posture to the maximum flexion of knee and hip joints. Push-off phase represents the extension of knee and hip until the take-off of the body. The flight phase represents the interval between take-off and landing when the body is in air. The landing phase represents the part when the foot comes into contact with the ground surface. Dividing Squat jumping into four phases comes under the study of Kinematics whereas Kinetics will be the study of forces applied at each phase.

Chapter 9
PSYCHOLOGY AND SPORTS

Topic-1 Definition and Importance of Psychology in Physical Education and Sports

Revision Notes

- Psychology is a word derived from the combination of two words, i.e., 'Psyche' meaning mind or soul and 'Logos' meaning science or study of.
- Some psychologists have given the definition of Sports Psychology as under:
  - **According to John Luther, "Sports psychology is an area which attempts to apply psychological facts and principles to learning performance and associated human behaviour in whole field of sports."**
  - **According to K.M. Burns, "Sports psychology for physical education is that branch of psychology which deals with the physical fitness of an individual through his/her participation in games and sports."**
  - **According to Singer, "Sports psychology explores one's behaviour in athletics."**
- **Importance of sports psychology:**

1. **Enhancement of Physiological Capacities:** Sports psychology plays a very unique role in the enhancement of physiological capacities such as strength, speed, flexibility, etc. Motivation plays a major role in the enhancement of physical capacity of sportspersons.
2. **Learning the Motor Skills:** Sports psychology play its major role in the learning of motor skills. This depends on the individual's level of readiness, i.e., physiological readiness and psychological readiness. Physiological readiness in children is development of the necessary strength, flexibility and endurance as well as the development of various organ systems so that they may perform motor skills required in the activity. Psychological readiness is related to the learner's state of mind. It means the desire and willingness to learn the particular skill. In psychological readiness, sports psychology plays an important role. Sports psychology is also helpful in the cognitive stage, the social-active stage and the autonomous stage of motor skill learning.
3. **Understanding the behaviour:** Sports psychology helps in understanding the behaviour of athletes or sportspersons engaged in competitive sports. Coaches also come to know about the interest, attitude towards physical activity, instincts, drives and personality of sportspersons.
4. **Controlling the emotions:** The emotions like anger, fear, disgust, negative feeling, etc., bring sports related changes in behaviour of sportspersons. If these emotions are not controlled in time, the performance may decrease. Sports Psychology plays a very important role in controlling the emotions of sportspersons during practice as well as competition.
5. **Preparation of athletes psychologically for competitions:** Sports psychology also plays its role in preparation of athletes psychologically for competitions. It creates the will 'to win' in the players.
6. **Role in the emotional problems of sportspersons:** Stress, tension and anxiety are natural during practice period and competitions or tournaments. There may be some other emotional problems such as depression, frustration, anorexia, panic, etc. The knowledge of sports psychology may be helpful in such situations. Techniques of relaxation and concentration for stress management can be applied on sportspersons who are under such problems

Topic-2 Adolescent Problems and Their Management

Revision Notes

- **Adolescent problems and their management:** Owing to various changes, children of this age group face many problems. The major problems, which adolescents face, are described below:

1. **Physical Problems:** During adolescence, many physical changes take place. Menstruation and nightfall become a phenomenon for girls and boys respectively. Development of sex glands takes place. Due to these changes, adolescents feel restless and worried.
2. **Mental Problems:** During this stage, stress, tension and strife are common. These traits create many mental problems. An adolescent faces many problems such as difficulty in co-operating with others, maladjustment, etc. They face anxiety.
3. **Problem of Aggressive Behaviour:** In this age group, adolescents tend to show aggressive behaviour. They become aggressive on small matters. They become irritated easily. This behaviour needs to be tackled with care and politeness. Avoid being strict towards them.
4. **Lack of Stability and Adjustment:** Adolescents do not remain stable and face adjustment problem. Their behaviour does not remain constant. They feel themselves unable to adjust with other people. They fail to coordinate with others. Not only outside, but they cannot adjust themselves in their family. They feel that they are under pressure of their parents. They want to have free atmosphere at home.
5. **Emotional Problems:** The life of adolescents is full of emotions. Sometimes, they seem to be very happy and at the same time, they become sad.
6. **Problems Related to Sex:** During adolescence, adolescents face many problems, which are related to sex. They try to meet the opposite sex. Sometimes, they become so eager that they do not hesitate to leave their family. They feel restless due to their sexual urge. During this stage of their life, parents should make them understand the rights and wrongs, without any hesitation.
7. **Problems of Self Support:** Each and every adolescent needs self-support. They want to make their own place in society. They desire to live a fruitful life.
8. **Feeling of Importance:** Adolescents begin to understand themselves as important. They think that they should also get respect. But, sometimes, parents do not take it seriously. They fail to understand the feelings of adolescents. In such case, they feel themselves to be unimportant and become a great problem.
9. **Social Problems:** It has been observed that adolescents want to adopt their own way. But society creates many hindrances in their paths. So, adolescents revolt against the social customs and traditions. Friends are very important for this age group. They share their views, knowledge and experience and sometimes, the group acts as the medium of spreading social vices and dissatisfaction. These adolescents fall prey to intoxication, i.e., alcohol, drugs and smoking.

- **The following suggestions can be beneficial for the management of these problems:**

1. **Education for Motor Development:** Adolescents should be provided the education for motor development. They should be encouraged to play various games and sports. Through these games and sports, their motor development will take place properly.
2. **Education of Psychology:** Parents should be able to understand the psychology of adolescents. It is essential to sort out the problems and manage them in a positive way.
3. **Sex Education:** Parents should provide sex education without hesitation, so that they may not depend on others and may not resort to cheap literature.
4. **Moral and Religious Education:** Religious and moral education will give them mental peace. Through moral education, some problems like indiscipline, anxiety and worry can be tackled easily.
5. **Suitable Environment:** Adolescents should be provided suitable environment for growth and development and should be provided proper facilities and opportunities for proper development. They should be taught how to behave and live. Parents should look after health problems of adolescents. They should be provided balanced diet.
6. **Adequate Independence:** Adolescents should be given proper chance to express their feelings and expressions. They should be allowed to go for picnic and other recreational activities. Orders should not be imposed on them. Parents should try to understand the sentiments of adolescents.

Topic-3 Team Cohesion and Sports

Revision Notes

- Team Cohesion is a "Dynamic process which is reflected in the tendency for a group to stick together and remain united in the pursuit of goals and objectives" (Carron, 1982).
- It is essential to know how well a team works together and is crucial for a sports team to be successful. There are different strategies to improve individual motivation and success.

- Successful team cohesion in sports is influenced by individual's view of their team and the objective set out to achieve. The success of football/soccer teams such as Liverpool, Manchester United or the success of New Zealand's rugby team is based on how well the individual athletes are performing as well as how successful the team is working together.
- The famous phrase of "there is no I in team" applies here. The book by Patrick Lencioni "The Ideal Team Player" gives a great perspective on how to improve team performance.
- Team cohesion is useful as it can both improve performance and motivation of a team. If a team works well together, this improves their team cohesion, this in turn improves performance. This, then, improves personal satisfaction. Thus improving team cohesion and then the cycle continues either on an upward or downward trend.
- Tuckman, B.W. (1965) discusses the four main stages of team cohesion:
  - **Forming**
  - **Storming**
  - **Norming**
  - **Performing**
- Ultimately, the coach or manager is responsible for developing and improving their team's cohesion.
- Below are recommendations on how one can make their team work well together:
  1. The first step for a sports coach/manager is to clearly set goals for the team to achieve. For example, this could be to reach mid table by the end of the season or to concede no more than 20 goals in a season.
  2. The second step is to set goals for each individual in your team. To ensure all group members feel valued, we recommend meeting all the team first to decide the team goals. This improves the internal motivation of the team and the individuals within the team.
  3. You then need to ensure you provide feedback to the players as well as to the team as a whole. Regularly ask for the opinions of your players and listen to any suggestions from them. This will again make them feel valued. However, make sure you give any criticism privately.
  4. Establish the right environment.
- **Introduction to Psychological Attributes: Attention, Resilience, Mental Toughness.**

Attention:

The mind has developed a system that helps us select some information for further processing while blocking out other information. This system is called attention—a term that denotes the process of exerting mental effort on specific features of the world around us or on our own thoughts and feelings. For example, in sports, making a conscious effort to listen carefully to a coach's instructions before a match involves attention. Similarly, a soccer goalkeeper who is preparing to defend against a corner kick from the opposing team must pay attention to the flight of the incoming ball while disregarding the movements of the players in the penalty area. These two examples show that the ability to focus on what is most important in any situation while ignoring distractions is vital for success in sports.

Three different types of attention have been identified.

First, concentration refers to a person's decision to invest mental effort in what is most important in any situation (as in the example above of listening to a coach's instructions).

Next, selective attention is the perceptual ability to zoom in on task-relevant information (the flight of the ball) while ignoring distractions (the movement of players).

Finally, divided attention refers to a form of mental time-sharing ability whereby people can learn, as a result of extensive practice, to execute two or more concurrent skills equally well. To illustrate, a skilled basketball player can dribble the ball while simultaneously looking around for a teammate who is in a good position to receive a pass. In summary, attention is a multidimensional term that refers to at least three different cognitive processes—concentration or effortful awareness, selectivity of perception, or the ability to coordinate two or more skills at the same time.

- **Resilience:** The ability to respond positively to setbacks, obstacles, and failures is essential for any successful athlete. An athlete will encounter adversity. Those athletes who are able to successfully rebound from their misfortunes are often admired for their resilience.
- The term resilience refers to the ability of a substance to regain its shape following deformation. Resilience is the process of, capacity for, or outcome of successful adaptation despite challenging or threatening circumstances. Thus, three over arching ways that resilience can be conceptualized: (i) as a positive outcome (i.e., something people "do" or "achieve"), (ii) as an innate part of individuals' personality (i.e., something people "have"), or (iii) as a process (i.e., a capacity developed over time as people interact with their environment).
- **Mental Toughness:** Mental toughness is the aptitude of coping and effectively handle adversity, stress, and pressure; capability of overcoming or rebounding from failures; a skill to persevere or refuse to quit.

  The response is presented in a varying manner by mentally tough athletes that enable them to remain feeling energized, calm and relaxed as a consequence of learning the development of two important skills, these skills include the ability to increase their flow of positive energy in adversity and crisis, and secondly to think to in particular ways so that right behavior can be developed to deal with completion, mistakes, pressure, and problems

  Mental toughness is the natural or developed psychological edge that enables one to generally cope better than the opponents with the many demands that sport places on a performer. Specifically, be more consistent and better than the opponents in remaining determined, focused, confident, and in control under pressure.

  Mental toughness encompasses a set of attributions, namely self-confidence, visualization and imagery control, positive energy, motivation, attitude control, negative energy control (e.g., being able to cope with anger and frustration), and attention control (focus). Coping with pressure, focused concentration, motivation, and self-belief as the four pillars of mental toughness. Mental toughness is positively associated with an increase in high performance.

Chapter 10
TRAINING AND DOPING IN SPORTS

Topic-1 Concept and Principles of Sports Training

Revision Notes

- **Training:** The word 'Training' means the process of preparing for some task. This term is widely used in sports.
- **Sports training:** The term sports training denotes preparing of the sportspersons for the highest level of performance. Sports training are the physical, mental, intellectual, psychological and moral preparation of an athlete or a player by the means of physical exercises.
- **Concept of Sports Training:**

  Sports training is the process of preparation for a sport performance. It consists of four parts:
  - **Conditioning training (Strength training, endurance training, flexibility training, physical preparation)**
  - **Training of technique (Technical preparation)**
  - **Training of tactics (Tactical preparation)**
  - **Psychological training (Mental preparation)**
- Before considering the technical aspects of training, experts recommend ten concepts as the backbone of any successful training programme :
  1. **Define goals -** One may have one primary goal and several minor ones.
  2. **Match sport to goals and abilities –** One should carefully evaluate physical, emotional, and social needs and abilities.
  3. **Set intermediate goals -** Should have several sets of goals: general goals, long-range goals, season goals, monthly, weekly, even daily goals.
  4. **Plan workout -** Divide workout into four phases: warm-up, skills practice, match-related practice, cool-down.
  5. **Get professional coaching help -** Ask the coach to analyse one's game, correct the form, and help to plan workouts.
  6. **Join a club or sports organisation -** Not only will enjoy working out with others, the trainee will also learn from them.
  7. **Maintain year-round fitness -** Ideally, the off-season should be used to rest and to work on building strength, endurance, or aerobic capacity without the strain of competition.
  8. **Prevent injuries -** In addition to avoiding sport-specific injuries, one should devote part of each workout to general injury prevention. Warming

up, stretching and cooling down are the key steps of injury prevention. The protective equipment is as much part of the game as the rules.

9. **Use sport-specific training:** Sport-specific training is the best way to develop the fine neuromuscular co-ordination and judgment called skill. Depending on the sport, one will also develop some cardiovascular fitness, endurance, strength, and speed.
10. **Enjoy the training:** Some of the reasons why athletes stop enjoying their sport are overtraining, poor goal setting, or unrealistic expectations.

- **Training Programmes:**

Training programmes are designed to improve performance by developing the appropriate energy sources, increasing muscular structures and improving neuro-muscular skill patterns. Sports medicine professionals must be familiar with the basic principles and processes of training, so that they can evaluate training programmes and determine their adequacy in maintaining an athlete's health and preventing injury.

The scope of training theory can be illustrated as:

Scope of training theory

- **Principles of Sports Training :**

1. **Progressive Loading ("Overload") -** The training load must be higher than the load of normal daily activities. Training loads must be increased gradually, however, to allow the body to adapt and to avoid injury (system failure due to overloading). Varying the type, volume, and intensity of the training load allows the body an opportunity to recover and to over-compensate. Loading must continue to increase incrementally as adaptation occurs, otherwise the training effect will stagnate and further improvement will not occur.
2. **Adaptation -** Adaptations to the demands of training occur gradually over long periods of time. Efforts to accelerate the process may lead to injury, illness or "overtraining". Many adaptive changes reverse when training is not an adequate one.
3. **Specificity -** Energy pathways, enzyme systems, muscle fiber types, and neuro-muscular responses adapt specifically to the type of training to which they are subjected. For example, strength training has little effect on endurance. Conversely, endurance training activates aerobic pathways, with little effect on speed or strength. A well-rounded training programme contains a variety of elements (aerobic, anaerobic, speed, strength, flexibility) and involves all of the major muscle groups in order to prevent imbalances and avoid injuries.
4. **Reversibility -** A regular training stimulus is required for adaptation to occur and to be maintained. Without suitable and repeated bouts of training, fitness levels remain low or regress to their pre-training levels.
5. **Variation and Recovery -** Muscle groups adapt to a specific training stimulus in about three weeks and then stagnate. Variations in training and periods of recovery are needed to continue progressive loading without the risks of injury and/or overtraining. Training sessions should alternate between heavy, light and moderate in order to permit recovery. The content of training programmes must also vary in order to prevent boredom and staleness.
6. **Individual Response -** Each athlete responds differently to the same training stimulus. There are many factors that alter the training response: genetics, maturity, nutrition, prior training, environment, sleep, rest, stress, illness or injury, motivation, etc.
7. **Periodisation of the Training Cycle -** Training cycles usually last about 3 weeks, with a week of lower-intensity recovery before starting the next cycle. Skills acquisition should not be emphasised during a high-intensity training cycle but should be reserved for periods of lower volume and intensity.
8. **Maintenance -** Gains achieved during high-intensity training periods can be maintained with a moderate level of work. Thus, by means of periodisation, some elements can be maintained with less work, while other elements are stressed.

- **Warming Up:** A warm up is a gradual increase in intensity of physical activity, joint mobility exercise and stretching, followed by the activity. Warming up brings the body to a condition at which it safely responds to nerve signals for quick and efficient action.

For example, before running or playing an intensive sport, the athlete might slowly jog to warm their muscles and increase their heart rate. The warm ups must be specific to the activity, so that the muscles to be used are suitably activated.

- **Types of Warm-Ups:**

1. **Passive warming up:** Passive warm-ups (e.g., taking a hot shower, having a rubdown, sitting in the sun) increase the body and skin temperatures and physiological reactions associated with heat removal.
2. **Active warming up:** Active warm-ups are done to warm up the muscles before beginning the traditional static stretches. Research shows that using these techniques get the muscles ready for the workout or the game. The younger player may not require as much warm up time, but the concept of warming up as a team and getting into

the habit will lead to less injuries and accomplish the task of team building.

Types of Active Warm-ups:

(a) General Warming-up: General warming- up is usually performed in all types of activities. This type of warming-up includes jogging, running, jumping, stretching, callisthenics, striding, wind sprints and other general exercises. It increases co-ordinative abilities and flexibility of muscles and joints. It also improves muscle tone. The duration of general warming-up depends upon the nature of work to be performed.

(b) Specific Warming-up: In specific warming-up, exercises are done with implements. Special exercises are performed which have direct relationship with the activity to be done. These specific exercises are performed after the activities of general warming-up. Specific type of warming-up differs from activity to activity and from game to game. For example, a sprinter may take few starts and run for short distance before the actual competition. A basketball player may practise for lay up shots or free throws before the competition. This type of warming-up improves the co-ordinative abilities. In fact, in specific warming-up, the main stress is laid on the practice of various skills which are to be performed in the game. The exercises, which are usually performed in specific warming-up, are:

(i) Cricket: Bowling, catching, batting, fielding, etc.

(ii) Badminton: Forward bending, sideways bending, backward bending, body twisting exercises, etc.

(iii) Basketball: Dribbling, shooting, lay up shots, shuttle run, dodging, free throws, etc.

(iv) Lawn tennis: Wall practice, service practice, passing shots, knocking, etc.

(v) Shot put: Shifting the shot from left hand to right hand and vice versa, standing throws, putting the shot with both hands, gliding practice with or without shot, etc.

(vi) Hockey: Dribbling, relation of stick, stopping the ball with stick, short passes, long hits, scoop, etc.

Importance of Warming Up:

1. Decreases the resistance in muscle capillaries.
2. Increases the speed of transfer of oxygen and fuel to tissues.
3. Increases metabolic rate.
4. Reduces the anxiety and tension.
5. Increases the body temperature.
6. Decreases the viscosity of muscles.
7. Increases the speed of nerve impulses.

Principles of Warming Up:

1. Warming up should be according to the Activity or Sports.
2. Concerned movements of game should be included.
3. Warming up should be done at exact time.
4. Warming up should be started 15 to 20 minutes prior to the competition and should be finished 5 minutes prior to performance.

Warm Up Exercises:

Jump Rope  Using a fast twirl, rapidly jump up and down using spring in the feet and ankles, not in knees.	**Ankle Bounces**  **Rapidly jump up and down using spring in the feet and ankles, not in knees.**	**Jumping Jacks**  **Jump feet wide and together while bringing arms over head then down to hips.**
V-Jumps  Start with opposite arm and foot to the front. With small jumps, quickly alternate the lead foot and arm on each jump.	**Walking Quad Stretch**  Bring heel to butt and press hips forward.	**Walking Lunge Stretch**  Keep belly button facing straight ahead.

Side Step Lunge  Step directly to the side, keep head, knee and toe in straight line.	**Standing Hamstring Kneeling**  Keep hips square.	**Hip Flexor**  Keep belly button facing straight ahead.
Calf Stretch  Both feet point straight ahead.		

- **Limbering Down:** Cooling Down/Limbering Down is an easy exercise, done after a more intense activity, to allow the body gradually transition to a resting or near-resting state. It focuses on gradually lowering down the body temperature after hard training.
- **Limbering Down Exercises:**

Prone Bridge  Start propped up on elbows and toes, hold abs braced to keep back straight.	**Side Bridge**  **Start in Prone Bridge then rotate to one side and hold, keep abs braced.**	**Alt Leg Lowering**  **Start with both legs up. Alternate lowering each leg close to floor without allowing back or pelvis to rock.**
Crunches  Start flat on back with knees slightly bent. Brace abs then crunch up slightly to lift shoulder blades off the floor	**Plank**  Start in Plank with abs braced and body in straight line.	**Side Plank**  Start in Plank with abs braced and body in straight line then rotate to one side and hold body still and straight.
Standing Hamstring  Raise one feet on exercise bench and pull toe.	**Straddle Sit**  Keep knees straight and spine long.	

- Skill is an athlete's ability to choose and perform the right techniques at the right time, successfully, regularly and with a minimum of effort. Athletes use their skill to achieve athletic objectives e.g., sprinting 100 metres in 10.0 seconds. Skill is acquired and therefore has to be learned.
- **Classification of Skills :**
  - **Gross skills:** These involve large muscle movements which are not very precise and include many fundamental movement patterns such as walking, running and jumping. The shot put is an example of a gross skill.
  - **Fine skills:** These involve intricate precise movements using small muscle groups and generally involve high levels of hand-eye coordination. A snooker shot or playing the piano are examples of fine skills.
  - **Open skills:** Sports such as Netball, Football and Hockey involve open skills. The environment is constantly changing and so movements have to be continually adapted. Skills are predominantly perceptual and externally paced, for example, a pass in football.
  - **Closed skills:** Skills that take place in a stable, predictable environment and the performer knows exactly what to do and when. Skills are not affected by the environment and movements follow set patterns and have a clear beginning and end. The skills tend to be self-paced, for example a free throw in Basketball and serving in Squash or Tennis.
  - **Discrete skills:** These skills are brief, well-defined actions that have a clear beginning and end. These are single, specific skills, which make up the actions involved in a variety of sports such as hitting and throwing. e.g. a penalty flick in hockey.
  - **Serial Skills:** These skills are a group of discrete skills strung together to make a new and complex movement, i.e. the sequence of skills for the triple jump.
  - **Continuous skills:** These skills have no obvious beginning or end. The end of one cycle of movements is the beginning of the next and the skill is repeated like a cycle. These skills could be stopped at any moment during the performance of the sport, i.e., Swimming, Running, Cycling, etc.
  - **Internally paced or self-paced skills:** The performer controls the rate at which the skill is executed. These skills are usually closed skills, i.e., javelin throw, discus throw.
  - **Externally paced skills:** The environment, which may include opponents, controls the rate of performing the skill. The performer must pay attention to external events in order to control his/her rate of movement. These skills involve reaction and are usually open skills, i.e., in ball games; the performer must time his actions with the actions of other players and the ball.
- **Techniques:** These are the basic movements of any sport or event e.g., a block start in a 100 metre race is a technique. We combine a number of techniques into a pattern of movement e.g., triple jump - running and then the hop, step and jump phases.
- **Style:** A style is an individual's expression of technique in motor action. No two sportspersons are alike in different factors which determine motor action.
- **Training and Doping in Sports:** Warming-up and limbering down- Types, Methods, and Importance.
- **Warming-upTypes, Methods, and Importance:** Warming up is the set of exercises, sorted and graded, for all muscles and joints whose purpose is to prepare the body for physical sports and avoid injury. The purpose of warming up is to get our body to reach optimum performance level gradually so that from the beginning of the effort, one can perform best.

  Warm-up exercises are essential to prepare the heart, lunges, and muscles to adequately meet the demands placed on them during rigorous physical exercise, and that they are an important prerequisite to all physical activity.

  Generally, there are three types of warm-up exercises. The first type involves static stretching techniques that stretch the muscles prior to an activity. Stretching increases extensibility and reduces the resistance of the muscles. It also produces more efficient muscle contraction and reduces the chances of injury or soreness.

  The second type of warm-up exercise is concerned with general body warm-up. These exercises, such as jogging or calisthenics, are aimed at increasing the body temperature and gradually stimulating the heart.

  When body temperature is increased at least one degree Fahrenheit, a number of changes that aid physical performance occur in the muscles and circulatory system. Generally, body warm-up also prepares the heart to efficiently meet the stressful demands placed upon it during rigorous exercise and helps to prevent the possibility of heart damage during the initial stages of exercise.

  The third type is a specific neuromuscular warm-up where the skill is performed at a less intense level prior to the actual activity to ensure that the proper muscles are being stimulated and that the coordination and skill level are maximized.

  In other words, the type of warm-up is specific to the type of activity that is to follow. For example, hurdlers generally do not do push-ups before a race but engage in some mild running and practice the specific leg movement involves in hurdling.

- **Three types above can be broadly classified into two types of warming up:**

  1. General warming up
  2. Specific warming up

  - **General warming up:** In this type of warming-up sport person goes through a series of physical movements of general nature of whole body such as jogging, striding, calisthenics, stretching, etc. Concentration, flexibility, and coordinative ability also increase through this process.
  - **Specific warming up:** In specific warming up,athletes go through such movements which are to be performed later on in the main activity or competition such as sprinter may go through short distance run.

- **Methods:**

  1. **Active method:** In this method, players go through direct physical preparation procedures, which involve either utilizing the skill or activity that will be used during competition (general warming up and specific warming up).
  2. **Passive method:** In this method, players do not involve physical exercises, instead it involves external stimuli such as massage, steam bath, diathermy, whirlpool bath, and other such means through which physiological changes take Place.

- **Importance of Warm-Up:**

  (a) Increased speed of contraction and relaxation of warmed muscles.
  (b) Dynamic exercises reduce muscle stiffness.
  (c) Greater economy of movement because of lowered viscous resistance within warmed muscles.
  (d) Facilitated oxygen utilization by warmed muscles because hemoglobin releases oxygen more readily at higher muscle temperatures.
  (e) Facilitate nerve transmission and muscle metabolism at higher temperatures; a specific warm-up can facilitate motor unit recruitment required in subsequent all-out activity.
  (f) Increased blood flow through active tissues as local vascular beds dilates, increasing metabolism and muscle temperatures.
  (g) Allows the heart rate get to a workable rate for beginning exercise • Mentally focused on the training or competition

Topic-2 Training load, Overload, Adaptation and Recovery

Revision Notes

- In order to prepare a sportsperson for his/her highest performance in the desired tournament, a certain process has to be followed; that is called training. Sports training nowadays demands certain technicalities and to make the process simpler, yet effective, few principles should be kept in mind. These principles facilitate a trainer in successfully employing an efficient training Programme.

- **Training Load:**

  Load is defined as the amount of work done by an individual's body. It is the psychological and physiological demand put on the body parts through motor stimuli resulting in improvement and maintenance of higher performance capacity. Sports training consists of physical exercises.

  In sports, training load is defined as the total volume, intensity and type of physical activity an athlete undertakes during both training and competition. Therefore, one needs to be aware of how much training load helps to stimulate various organs of the body, so that the maximum benefits can be achieved.

  Training load must be greater than the normal load. This principle testifies that training load must be increased gradually in order to avoid any unwanted tension on the muscles of the individual by increasing the load slowly and in accordance with the capabilities of the sports person.

  Also, this principle highlights the significance of rest and recovery in between the training sessions. Without optimum rest, there is higher risk for the athlete of getting injured. Therefore, while increasing the load, rest and recovery should be given required importance too.

  Types of Load:

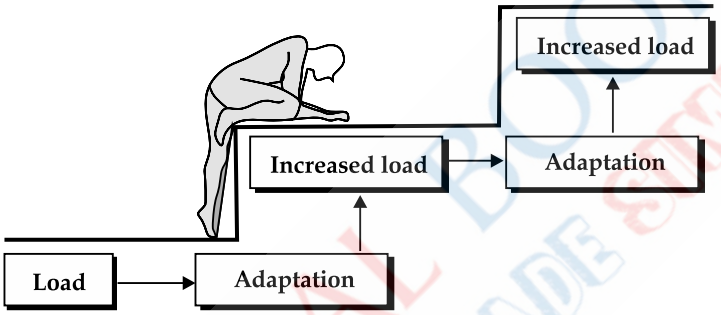
  - **External Load:**
    - It can be described as the amount of work done. External load can occur through-
    - Distance running
    - Performance pressure
    - Number of jump/repetitions
    - Total duration
    - Activity/play
  - **Internal Load:**
    - This can be defined as the psychological stress against the players and can be measured by psychological variables such as:
    - Heart rate
    - Lactic acid concentration in blood
    - Maximum oxygen consumption and symptoms of fatigue
    - Paleness in the skin, darkness

- **Overload:**

  Load, in sports training, is known as the demand, that can be physical, physiological or psychological, put on the body to enhance the performance of the individual. The key point to note, while planning a training session, is the load should be greater than the normal load to aid adaptation process and thus facilitate the performance enhancement

  During training of sports persons, load is given to the players according to their capacity. Whenever this load goes beyond the capacity of an individual, the physiological and psychological functions get disturbed. Though, this increased load does not affect the sports person immediately, if the administration of the overload continues for a longer period, it results in decrease of his/her performance. The important signs and symptoms of over load are: **(i)** fatigue, **(ii)** decline in performance, **(iii)** loss of interest in sports, **(iv)** loss of concentration, **(v)** lack of motivation, **(vi)** sleep disorder and **(vii)** loss of appetite **(viii)** prone to injuries.

- **Adaptation:** Adaptation is defined as the adjustment of physical and psychological functional systems to the training load. Adaptation to a load results in the enhancement of performance capacity. Thus, a sports person is able to increase his/her performance as a result of adaptation process. Adaptation process demands that a sports person maintains regularity in training. If a sports person is exposed to new and unfamiliar load in a systematic planned way the adaptation process will be faster.



- **Recovery:** Recovery is to regain energy after workout what was lost during the activity. It is evident that during rest, the body restores itself and become better and stronger than before. Both short periods, like hours between multiple sessions, and longer periods, like days or weeks to recover from a long season, are required to ensure that the athlete does not suffer from exhaustion or an overuse injury. Therefore, a training plan must be designed in such a manner that proper rest and recovery can take place in between the training sessions.

- **Skill, Technique and style:** Skill, Technique and Style are essential attributes for an athlete to perform at optimum level in sports. Some people are born with a natural ability for a particular game or sport such as speed, agility, coordination, flexibility, balance, reaction time. But they still need to develop and perfect their skills with frequent practice to bring about the result they wish to achieve. In simple words, skill is a learned and practiced ability that helps an athlete or sportsperson achieve the desired result with maximum certainty and efficiency. Technique is the way of performing that fundamental skill/activity in sport involving a well-timed and coordinated sequence of muscle actions so that the movements involved produce the best performance and are least likely to cause injury. Style, on the other hand, is the individual's way of adapting skill and technique to develop his/her performance in a smart way.

- **Skill:** A skill is the fundamental ability to perform a whole movement. Skill can be defined as automatisation of motor action. It enables an individual to perform a large movement with correct technique. It comprises a whole movement of motor action, the ease of which is the result of long hours of practice. Skill is, thus, the result of repetitive practice to get automatisation of movement, by which a performer spends the least energy on are quired task. If an athlete requires a great effort, or struggles to perform any activity, then, it clearly indicates that there is a lack of skill efficiency in the task. In simple words, a motor action which is performed smoothly, with the least error is called skill.

- **Technique:** It is a basic movement of any sports or event. We can say that a technique is the way of performing skill. Technique is the mechanical model of doing any task through which an athlete minimises his energy expenditure and produces remarkable output. It involves a well-timed and coordinated sequence of muscle actions which have been developed through the experience of players, coaches and the analysis provided by sports science. These techniques have evolved and been refined so that the movements involved produce the best performance and are least likely to cause injury. Using good technique in sport is beneficial because it promotes high performance and

reduces the risk of injury. "Technique is an imaginary model of performing any task in cyclic manner which is ideally based on scientific principles to attain effective movement in sports with least energy expenditure." e.g., in cricket, a batsman should play the ball with a straight bat, aiming to connect the ball with the middle of the bat for a sound drive. Or, in ice or roller skating, athletes need to bend their body to keeping the central of gravity (COG) lower for efficient and effective balance and speed.

- **Style:** It is an individual's expression of technique in motor action, therefore each sports person due to his specific or particular psychic, physical and biological capacities realise the technique in different way.

  Style is the unique ability of an athlete to perform many activities in his/her own distinctive manner according to his/her individual technique and ability. It may or may not have a scientific basis. It is just the way a player adapts the movement according to his/her anatomical structure or other factors, and performs it in a unique manner. This unique technique becomes "style". Thus, style is a particular movement started by someone as an innovation, and if the movement becomes popular, it comes to be known after the athlete. For e.g., in cricket, M S Dhoni's "helicopter shot" has become his style. The popular Parry O'Brien style of shotput is named after the American athlete, Parry O'Brien. Similarly, in high jump, American athlete, Dick Fosbury, has given his name to the Fosbury flop.

  Skill, technique and style all are inter-related as technique and style are a part of skill. In fact,

  Skill = Technique + Style

  Acquiring style is a long and continuous process in which a player sets an imaginary mechanical model in his/her mind for performing any skill. Then, through repeated practice he/she adapts the skill in his/her unique style. In the initial phase of learning the technique, an athlete may make many mistakes. However, through practice and proper supervision by coach or teacher, these errors are minimised. Thereafter, a player is able to learn and execute that particular technique in his own style with least energy and error. An athlete can perform at his best if he follows the complete process of skill acquisition by interlinking skill, technique and style.

Topic-3 Concept of Doping and its Disadvantages

Revision Notes

- **Concept of Doping:** Use of prohibited substances or methods by sportspersons to unfairly improve their sporting performances and to gain an advantage over their competitors.
- According to **WADA (World Anti-Doping Agency).** "Doping is defined as the occurrence of one or more of the anti-doping rule violations set forth in Article 2.1 through Article 2.8 of the code."
- **Anti-doping Rules:**
  - **(a)** Presence of prohibited substances.
  - **(b)** Refusing to submit a sample collection after being notified.
  - **(c)** Tampering with any part of the doping control process.
  - **(d)** Possession of a prohibited substance or method.
- **Classification of Doping:**
  - **(a) Performance Enhancing Substances:**
    - **(i) Stimulants:** Stimulants are drugs that enhance alertness and physical activity by increasing heart rate, breathing rate and the functions of brain. These stimulate the body physically and mentally.

Effect	Usage	Examples
Mind is more alert	By injection	Cocaine
Reduces feeling of fatigue	By nasal spray	Adrafinil
More aggressive	Orally	Adrafinil
		Amphetamines

    - **(ii) Anabolic Steroids:** They stimulate the growth of muscles and help athlete train harder and recover rapidly. By boosting the muscle power and strength, these enhance the performance.

Effect	Usage	Examples
Muscle power growth	By intermuscular injection	Drostanolone
Muscle size growth	Orally	Metenolone
Rapid recovery		Oxandrolone

    - **(iii) Peptide Hormone:** These are the substances produced by glands in the body. They carry the oxygen and circulate in the blood. They

increase the production of RBC and hence improve the growth of muscles. Additional intake of these hormones can enhance the performance, hence prohibited In and Out of competition.

Effect	Usage	Examples
Increase in RBC	By Injection	Erythropoietin (EPO)
Muscles growth	Orally	Insulin
Hormonal imbalance		Human growth hormones

(iv) Beta-2-Agonists: These drugs are generally used to treat Asthma and it relaxes the muscles that surround the airway and opening of the air passage. It allows more oxygen to reach the blood. It enhances the respiratory function, increases their capacity for strenuous effort and shortens recovery time.

Effect	Usage	Examples
Increase oxygen in blood	Inhalers	Acebutolol
Opens air passage	Orally	Betaxolol
Rapid recovery		Carteolol

(v) Narcotics: These reduce or eliminate pain from injuries, allow athletes to do persistent efforts for a longer time. By using Narcotics to ignore the injury, athletes increase further risk to damage their body. It also reduces anxiety, which enhances the performance.

Effect	Usage	Examples
Reduces pain	By injection	Morphine
Improves stamina	Orally	Heroine
Reduces anxiety	Inhaling	Pethidine

(vi) Glucocorticosteroids: These drugs relieve fatigue and pain, giving more tolerance for pain and prepare the athletes to continue the efforts.

(vii) Cannabinoids: These are psychoactive chemicals that cause a feeling of relaxation. Hashish and Marijuana are examples and their use is prohibited in competitions.

(b) Physical Methods

(i) Blood Doping: According to WADA, the misuse of techniques or substances to increase one's RBC count is Blood Doping. Some quantity of the athletes blood is taken a few weeks prior to competition and is frozen until one or two days before the competition when it is injected into the athlete. This procedure is known as Autologous Blood Doping. When the fresh blood of another person is taken and injected straight into the body of athlete, the procedure is known as Homologous Blood Doping. Another procedure of blood doping involves the injection of "Artificial Oxygen Carriers". Hemoglobin Oxygen Carriers are chemicals or purified proteins which have the ability to carry oxygen. It enhances aerobic capacity. Blood Doping increases the number of RBCs, hence the oxygen carrying capacity to the muscles is increased and enhances the athlete's performance.

(ii) Gene Doping: It is the manipulation of cells or genes to enhance the body's sports performance. Modifying genes enables faster reaction and increases physical strength. It is based on the principles of Gene therapy. Gene therapy plays a vital role in the growth and development of musculoskeletal structures. It speeds up the repair of the injuries of muscles, tendons and ligaments, etc.

Prohibited Substances and Methods:

- The substances and methods which are banned or prohibited from use in sports.
- WADA is responsible for maintaining and updating the list of such substances and methods annually.
- If the substance or method is being used by the athlete for therapeutic use, the athlete has to take the permission from concerned authority. In this case, the physician has to verify that the athlete would face vital health problems without drugs and the drugs have no suitable alternative.

Substances Prohibited at All Times or In-And-Out-of-Competition

S.No.	Name	Reason	Examples
1.	Anabolic Steroids	Enhance the performance serious side-effects	Drostanolone, Metenolone
2.	Peptide Hormones	Increase muscle growth and strength Increase RBC Count	Erythropoietin (EPO), Human Growth Hormone (HGH)
3.	Beta-2-Agonists	Enhance Respiratory efficiency	Acebutolol, Betaxolol
4.	Diuretics	Evade Anti Doping test Unfairly manage body weight	Dextran Probenecid
5.	Hormones & Metabolic Modulators	Interfere with function of Estrogen	Tamoxifen Clomiphene

Methods Prohibited at All Times or In-And-Out-of-competition

S.No.	Name	Reason	Example
1.	Blood Doping	It increases the RBC Counts Enhances the oxygen carrying capacity	Autologous or Homologous Blood Doping Artificial Oxygen Carriers
2.	Gene Doping	Very significant in growth and development of musculoskeletal structure	Gene Doping
3.	Chemical and Physical Manipulation	An attempt to tamper the validity of collected sample	Manipulation

Substances Prohibited In-competition (Banned only In-Competition)

S.No.	Name	Reason	Example
1.	Stimulants	Improves the performance by stimulating mind and body artificially	Amphetamines Ephedra (Caffeine is non-prohibited but monitored)
2.	Narcotics	Reduces pain and allows athlete for persistent effort	Fentanyl Morphine Oxycodone
3.	Cannabinoids	Gives feeling of relaxation	Hashish Marijuana
4.	Glucocortico Steroids	Gives relief from pain and fatigue Increases tolerance	

Substances Prohibited in Particular Sports

S.No.	Prohibited Substances	Sports
1.	Alcohol (ethanol)	Archery Karate
2.	Beta-blockers	Archery Shooting Golf

These substances keep heart ratio low and reduce tremble in hand.

- Side effects of different Prohibited Substances
  - **Side Effects of Anabolic Steroids: The side effects associated with anabolic androgenic steroids are extremely serious and are divided into general, male specific and female specific.**
    - **General Side Effects:**
      - Greasy skin and acne
      - Infertility
      - Hypertension
      - Liver and kidney dysfunction
      - Aggressive behaviour
      - Tumour
    - **Male specific Side Effects:**
      - Breast development
      - Testicular atrophy
      - Diminished male hormone production
      - Diminished sperm production
      - Impotence
      - Alopecia
      - Prostate cancer
    - **Female Specific Side Effects:**
      - Male pattern hair growth and baldness
      - Menstruation disturbances
      - Decreased size of breast
      - Deeper voice (hoarseness)
  - **Side Effects of Stimulants:** If an athlete, after consuming stimulants, performs under severe circumstances e.g., long periods and/or in the heat, the athlete's body heats up intensively and due to influence of stimulants, it may become difficult for the human body to cool down. The cardiovascular system and other vital organs also start malfunctioning by the use of stimulants and in some cases, may lead to death. Other potential harmful effects of stimulants are listed below:
    - Loss of appetite
    - Insomnia (loss of sleep)
    - Euphoria
    - Hallucinations (Psychosis)
    - Trembling

- Restlessness, agitation, tenseness
- Hypertension
- Palpitation and heart rhythm disorders
- Hyperthermia (increased body temperature)

- **Side Effects of Narcotics:**
  - Addiction
  - Loss of balance and co-ordination
  - Nausea and dizziness
  - Insomnia and depression
  - Decreased heart rate
- **Side Effects of Cannabinoids:**
  - Impaired balance and coordination
  - Loss of concentration
  - Increase in heart rate
  - Increased appetite
  - Drowsiness
  - Hallucination

Beta Blockers:

- Beta-blockers inhibit the effect of the body's stress hormones adrenaline and nor-adrenaline. As a result, they have a relaxing effect on the heart and blood circulation and prevent anxiety and muscle trembling.
- **Side effects:** Beta blockers have an inhibitory effect on the sympathetic nervous system (part of the autonomic nervous system, which prepares the body for performance). The reduction in heart rate can cause a cardiac insufficiency in extreme cases. Other possible side effects include asthma attacks, erectile dysfunction, fatigue and a depressed mood.

Topic-4 Concept of skill, technique, tactics, and strategies.

Revision Notes

Limbering down- Types, Methods, and Importance:
Limbering down orcooling down means gradually reducing the intensity of the main workout/ competition by performing limbering and stretching exercises followed by long and deep breathing exercises.

Limbering Down Types:
The types of limbering down can be classified into the phases of limbering down.

Immediate Phase Type:
The immediate phase type occurs right after the run, when the heart rate is still elevated and muscles are fatigued. It is important to never just suddenly stop and stand after the main activity. Ideally, one should ease out of a run by decreasing the pace to a very slow jog for 1-2 minutes, followed by light-to-brisk walking for 3-5 minutes.

Intermediate Phase Type:
The intermediate phase-type of the cool down occurs after the heart rate has decreased from its near maximum and muscles no longer feel fatigued. During this period, performing dynamic agility drills further helps to balance the musculoskeletal system, as well as improve overall flexibility. Great dynamic cool-down exercises include quick jumps (jumping in place bringing the knees to the chest), high knee skips (exaggerating the hips and arms in a normal running motion), simple lunges, and side-to-side shuffles.

Late Phase Type:
The late phase of the cool-down occurs once the heart rate has nearly returned to its resting pace. The late phase of the cool-down involves total body static stretching for 5 to 15 minutes. Static stretching is most beneficial in the late cool-down phase, as it prevents stiff joints and tight muscles, and improves overall flexibility. The late phase is also a great time to do basic yoga poses, use a foam roller and get a massage.

Throughout the cool-down phases, it is also important to maintain proper hydration.

Methods of Limbering Down:

After exercise, slowly decrease the exercise intensity (such as from a fast run to a slow jog to a brisk walk). The second step is stretching, it allows the muscles to elongate length ends the next step is rehydration. Refueling the body with water and sports drink will keep the body hydrated. The duration of cooling down activity is different from player to player and according to intensity and nature of the main activity, generally but 15 minutes is sufficient.

Importance of Cooling Down:

(a) When an athlete involves in workout/training session/competition, then there is a lot of blood flow in his/her muscles. If the sportsman stops the activity immediately after the strenuous activity, there can be a sudden collapse of heart's function. Cooling down plays a very effective role in the field of games and sports and helps the athlete to release the blood which has moved more to the extremities during the main activity, into circulation and also helps to make the exchange easier.

(b) It also helps the athlete to prevent the post-exercise soreness and stiffness.

(c) Cooling down helps to recover to pre-exercise/ workout state and to helps the normalize the various function of physical, physiological, biochemical, and psychological, calisthenics, flexibility, stretching exercises, and deep breathing and relaxation techniques are performed during cooling down.

(d) It helps the athlete reduce heart rate and breathing rates, gradually cooling temperature and returning muscles to their normal position,

also reduces the venous pooling of blood in their lower extremities, which may cause dizziness.

(e) Helps to normalize physiological system of the body.

- **Skill:** Skill may be defined as the ability to perform at a high standard effectively and efficiently. Skill in sport is being able to execute the techniques required at the right time and place, successfully, regularly, and with minimal effort. Skill is acquired and therefore has to be learned. Skills are learned abilities that athletes acquire through training and practice.
- **Types of skills:**

  Cognitive - involves thought processes.

  Perceptual - involves interpretation of information.

  Motor - involves movement.
- **Skilled performance:** When watching a performer or performance, a skilled performance can be identified when demonstrating the following characteristics:

  Effectiveness

  Accurate – e.g., playing the shot to where one wants it to go.

  Consistency – e.g., one can repeat the shot over and over again.

  Controlled – e.g., the performer is in full control of the skill.

  Confidence – e.g., believing in the ability.
- **Efficiency**

  Technique – e.g., a good technique that looks effortless.

  Fluent – e.g., actions are smooth and controlled.

  Aesthetic – e.g., the performance looks pleasing to the eye.
- **Responsive**

  Decision making - e.g., the performer makes correct decisions.

  Adaptive - e.g., the performer can change the performance depending on the situation.
- **Technique**
  - Techniques are the basic movements of any sport or event, e.g., a block start in a 100 meters race. We combine several techniques into a movement pattern, e.g., triple jump - running and then the hop, step and jump phases.
  - Techniques are how athletes in different sports move their bodies to achieve certain targets. Successful athletes master a wide range of techniques that allow them to be successful in their chosen sport. Every sport has its own set of techniques. Some examples of techniques in sports are:

Basketball: In basketball, technical skills include dribbling, passing, and shooting.

Track and field: In track and field, technical skills are running, jumping hurdles, and throwing shot puts.

- **Tactics:** Oxford Dictionaries defines tactics as "an action or strategy carefully planned to achieve a specific end.It is the decisions and actions of players in the contest to gain an advantage over the opposing team or players. Tactics are the plans within the game to gain an advantage – "game sense". It is the decision-making ability needed in sports.

  Tactics might involve problem-solving skills and often rely on the athlete's knowledge of their coach's goals. Many of these skills can apply to multiple sports. For example, observation is a key tactical skill in football, soccer, and hockey, where knowing the opponents' location might be vital for a team's success. Here are some examples of tactics in sports:
  - **Observation:** Athletes can use their observational skills to identify an opposing team's strategy, goal opportunities, or teammates who might need help.
  - **Distance estimation:** Knowing how far a goalpost, basket, opposing player, or teammate is can help a player make choices about passing and other game moves.
  - **Energy management:** Successful athletes understand how to use their energy wisely, so they have enough speed and endurance to make moves at pivotal moments in the game or match.
  - **Communication:** In team sports, communication is vital to the success of every player in the team, and learning to communicate well during the excitement of a match can be a critical tactical skill.
  - **Flexibility:** Learning how to be flexible can help a player adapt to a change or unexpected event during a game, like a teammate being injured or taken out for a penalty.
- **Strategy:** According to Oxford Dictionaries, strategy is defined as 'a plan of action designed to achieve a long-term or overall aim.' It focuses on the end goal. Its main objective is to try to achieve the endpoint. It can be said that tactics are a smaller set of strategies, or that a strategy is the combination of all the tactics together. The focus of a strategy is broader than tactics.

  Strategy is basically laying down the goals and making a plan to get there. In sports, this is something like, having the goal to win the season or win the match as well as making a plan to achieve this, such as developing an athlete's power, working on comradery and selecting the right players.

  Strategy often requires a SWOT (strengths, weaknesses, opportunities, and threats) analysis. The coach might analyze the team and plan to utilize strengths and develop weaknesses, and may also analyze the opposition to identify the best approach to be used in the game to win