UNIT – 6

Test and measurement in sports

Motor fitness test: Motor fitness refers to the capability of an athlete to take part effectively in his/her particular sport. It can also be said that motor fitness is a person's ability to do physical activities. These are the following test to know the motor fitness of an athlete.

- 50 m standing start.

Procedure: The test involves running a single maximum sprint over 50 meters, with the time recorded, starting from a stationary standing position (hands cannot touch the ground) with one foot in front of the other. The front foot must be behind the starting line. Once the subject is ready, the stater gives the instructions "set" then "go" Participants should be encouraged to not slow down before crossing the finish line.

Scoring: Time taken to cover 50 m distance is expressed in seconds.

- 600 m walk/Run

Procedure: 600 m walk and Run can be organized on track subject runs a distance of 600 m. The subject takes a standing start from the starting line. The subject may walk in between. However, the objective is to cover the distance in the shortest time when he crosses the finish line he is informed of his time.

- Standing broad jump.

Procedure: A take-off line is marked on the ground. The subject stands just behind the take-off line with the feet several inches apart. The subject swings his arms and bends his knees to take a jump in the long jump pit. Three trials are given. The distance is measured from the take-off line to the heel or other part of the body that touches the ground nearest to the take-off line. All jumps are measured and the best one is recorded.

- Shuttle Run

Purpose: To measure speed and agility

Procedure: Two parallel lines are marked 10 meters apart wooden blocks 2 × 4 inches are kept on one side of the marked line. The student stands opposite the line, where wooden blocks are placed. On the start, the student runs toward wooden blocks and picks one of them. Then places the block on the line from where he started. The student continues to run and similarly lifts other blocks and is placed at starting line.

Scoring: Record the best time to complete the test in seconds to the nearest decimal place.

- Sit and Reach test

Procedure: This test involves sitting on the floor with legs stretched out straight ahead. Shoes should be removed. The soles of the feet are placed flat against the box. Both knees should be locked and pressed flat to the floor The tester may assist by holding them down with the palms facing downwards, and the hands-on top of each other or side by side, The subject reaches forward along the measuring line as for as possible. Ensure that the hands remain at the same level, not one reaching further forward than the other. After some practice reaches, the subject reaches the same level, not one reaching further forward than the other. After some practice reaches, the subject reaches out and holds that position for one-two second while the distance is recorded.

Scoring: The score is recorded to the nearest centimetre or a half-inch as the distance reached by the hand.

- Partial Curl-up:

Procedure: The starting position is lying on the back with the knees flexed and feet 12 inches from the buttocks. The feet cannot be held or rest against an object. The arms are extended and are rested on the thighs. The head is in a neutral position. The subject curls up with a slow controlled movement, until the student's shoulders come off the mat two inches, then back down again one complete curl up is completed every three seconds and is continued until exhaustion. There is a pause in the up or down

position, the curl-ups should be continuous with the abdominal muscles engaged throughout.

Scoring: Record the total number of curl-ups, only, correctly performed curl-ups should be counted.

- Push-ups (boys)

  Purpose: To measure the upper body strength and endurance.

  Procedure: In a push-up position hands and toes should touch the mat or floor. Hands should be shoulder-width apart. The upper body and legs should be in a straight line. Elbows should be fully extended keeping the back and the knees straight, the subject lowers the upper body so that elbows may bend to 90 degrees or chest may touch the floor/mat, and then returns to the starting position with the arms extended. Count the total number of push-ups performed.

- Modified push-ups (girls)

Purpose: To measure the upper body strength and endurance.

Procedure: In a modified push-up position, hands and knees should touch the mat/floor. The body from the knees, to the hips, and the shoulders should be in a straight line. The subject lowers the upper body so that elbows may bend 90 degrees and then returns to the starting position. Count the total number of modified push-ups for the record.

General motor fitness: The ability to perform body actions or activities by a person is called general motor fitness, In general, motor fitness includes speed, agility, strength, coordination and reaction time, etc. this motor ability test was developed by Dr. Harold M Barrow in 1953. In this test three items such as standing broad jump, zig-zag run, and medicine ball put are used to measure the general motor ability of an individual.

- Standing board jump (for measuring leg strength)

Equipment and material: A mat of 5 × 12 feet and a measuring tap, if the mat is unmarked.

Procedure: A take-off line is marked on the ground. The subject stands just behind the take-off line with the feet several inches apart. The subject swings his arms and bends his knees to take a jump in the long jump pit. Three trials are given. The distance is measured from the take-off line to the heel or other part of the body that touches the ground nearest to the take-off line. All jumps are measured and the best one is recorded.

- Zig-Zag Run (for measuring agility and speed)

Equipment and material: Stopwatch, five obstacles, and space enough to accommodate the 16 × 10 feet course.

Procedure: The subject begins from a standing start on the command to run. The subject runs the prescribed pattern stated to him as quickly as he can without gasping. Three complete circuits are run. The stopwatch is started when the command to run is given and stopped immediately when the subject crosses the finish line. The time is recorded to the nearest tenth of a second. Before running the zig and zag run, the subject should warm up properly. The subject should wear proper fitting shoes with good traction to avoid blisters and slipping. Demonstration of the pattern of the course should be given by the administrator before the beginning of the run.

- Medicine Ball Throw Medicine Ball Put (for measuring arm and shoulder strength)

Equipment and material: A medicine ball and measuring taps.

Procedure: The subject stands between two restraining lines which are 16 feet apart. In the case of girls, a medicine ball of 1 kg is provided, whereas in the case of boys a medicine ball of 3 kg is provided to be put. After that, he/she attempts to put the medicine ball out as far as possible without crossing the restraining line. He/she should hold the medicine ball at the junction of the neck and shoulder then the ball should be put straight down the course. Three trials are given to him/her. The best of three trials is recorded. The distance is computed to the nearest foot. A put in which the subject commits a foul is not scored. However, if all the trials are fouls, he/she should try until he/she makes a fair put.

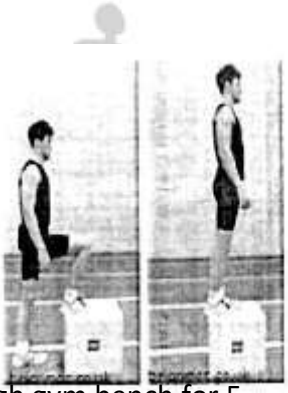
Measurement of cardiovascular fitness:

Cardio-vascular Fitness: Cardio-vascular fitness is the ability of the heart and lungs to supply oxygen-rich blood to the working muscle tissues and the ability of the muscles to use oxygen to produce energy for movements.

Harvard Step Test: It is a cardiovascular fitness test. It is also called an aerobic fitness test. It is used to measure cardiovascular fitness or aerobic fitness by checking the recovery rate.

- Harvard Step Test: The Harvard step test is a test of aerobic fitness, developed by Brouha and others in 1943.

Objective: The objective of this test is to monitor the development of the athlete's cardiovascular system.



Required Resources: -

Gym bench (45 cm high) Stopwatch, Assistant

How to conduct the test:

This test requires the athlete to step up and down off a 45 cm high gym bench for 5 minutes at a rate of 30 steps/minute. The athlete prepares themselves/warm-up for 10 minutes. The assistant gives the command "Go" and starts the stopwatch. The athlete steps up up and down down onto a standard gym bench once every two seconds for five minutes (150 steps). The assistant stops the test after 5 minutes. The assistant measures the athlete's heartbeat rate (bpm) one minute after finishing the test pulse 1. The assistant measures the athlete's rate (bpm) two minutes after finishing the test - Pulse-2. The assistant measures the athlete's heart rate (bpm) three minutes after finishing the test pulse 3. Fitness Index physical efficiency Index

$$\text{Fitness Index (F.I)} = \frac{\text{Duration of Exercises in Seconds} \times 100}{2 \times \text{sum of three pulse counts after exercise}}$$

:-Rockport One Mile Test: It is also known as Rockport Fitness Walking Test. Its objective is to check or observe the development of the individual's VO_2 Max i.e., the maximum volume of oxygen.
It is also known as the Rock port fitness walking test. Its objective is to check or observe the development of the individual VO_2 max, (maximum volume of oxygen.)

Administration of Rockport Fitness Walking Test:

The Athlete is asked to start the mile-long walk and complete it as quickly as possible. The Athlete has to bear in mind that she/he does not start running or jogging to complete the test. Once the athlete has completed walking the mile, the time taken to do so is recorded in minutes and hundreds of seconds and the heart rate is recorded as beats per minute. After the time and heart rate are recorded, the following variables are also recorded:

The calculation of VO_2 max = 132.853 – (0.0769 × body wt.)–[0.3877 × Age] + (6.135 × Gender) – 3.2649 × Time] – (0.1565 × Heart Rate) -Body wt. in pounds

Gender -male -1, Female 0

-Time in minutes & 100^{th} of a minute. –

Heart Rate is in beats/minute.

-Age is in years.

Rikli and Jones: Senior citizen fitness test

This test is also known as the Fullerton Functional test of senior citizens. Rikli and Jones developed the senior citizen fitness test in 2001.

- Chair Stand Test: Purpose. The main purpose of this test is to measure the lower body strength, particularly leg strength which is usually required for various tasks such as climbing stairs, getting in and out of a vehicle, bathtub, or chair.

Equipment Required: A chair with a straight back and a seat of at least 44 cm and a stopwatch.

Instructions for Participants: -

1. The participant should sit in the middle of the chair.
2. She/he should keep his hands on the opposite shoulder crossed at the wrists.
3. The feet should be flat on the floor.
4. Her/his back should be erect.
5. Repeat sit up and down for 30 seconds.

Procedure: Keep the chair against the wall. The participant sits in the middle of the seat. His/her feet should be shoulder-width apart and flat on the floor. The arms should be crossed at the wrists and held close to the chest. From the sitting position, the participant stands up completely and then back down at the start of the signal. This is repeated for 30 seconds. Count the total number of complete chair stands. In case the participant has completed a full stand from the sitting position when the time is finished the final stand is counted in the total.

- Arm Curl test of Rikli & Jones used to Testing upper body strength of senior citizen

Equipment: 5 lb Weight and 8 lb weight, stopwatch, a straight-back chair with no arms.

Women will curl a 5 lb. weight in this test and men will curl an 8 lb. Weight for their test. It is extremely important to the accuracy of the test that we use the appropriate weight for men and women in this test.

Procedure: The test assistant will tell to begin and will time for 30 seconds, using the stopwatch or a watch with a second hand. Do as many curls as can in the allotted30-second time, moving in a controlled manner. Do a full curl, squeezing the lower arm against the upper arm at the top of each curl and returning to a straight arm each time. Keep upper arm still. Do not swing the weight. If started raising the weight again and are over halfway up when time is over, count that curl.

Scoring: The score is the total number of controlled arm curls performed in 30 seconds.

- Chair sit and reach test

Daily Benefit: Lower body flexibility is important for preventing lower back pain. It also plays a role in balance, posture, fall prevention, or walking. Lower body flexibility is important for maintaining an active, independent lifestyle.

Purpose: This test measures lower body flexibility.

Equipment required: Ruler, straight back or folding chair, (about 17 inches/ 44 cm high)

Procedure: The subject sits on the edge of a chair (placed against a wall for safety). One foot must remain flat on the floor. The other leg is extended forward with the knee straight, the heel on the floor, and the ankle bent at 90°. Place one hand on top of the other with the tips of the middle fingers even. Instruct the subject to inhale, and then as they exhale, reach forward toward the toes by bending at the hip. Keep the back straight and head up. Avoid bouncing or quick movements, and never stretch to the point of pain. Keep the knee straight, and hold the reach for two seconds. The distance is measured between the tip of the fingertips and the toes. If the fingertips touch the toes then the score is zero. If they do not touch the toes, measure the distance between the fingers and the toes (a negative score). If they overlap, the measure by how much (a positive score). Perform two trials

- Back Scratch Test

Purpose: - To assess the upper body (shoulder) flexibility, which is important in performing various jobs such as combing one's hair, putting on overhead garments, reaching for a seat belt, etc.

Equipment Required: - A ruler.

Procedure: - This test is performed in a standing position. Keep one hand behind the head and back over the shoulder and reach as far as the possible down middle of the back. Palms should touch to body and the fingers should be downwards. Then carry the other arm behind the back palm facing outward and fingers upward and reach up as far as possible trying to touch or overlap the middle fingers of both hands. Fingers should be aligned. Measure the distance between the tips of the fingers. If the fingertips touch then the score is zero. If they do not touch the fingers measure the distance between the fingertips (negative score). If they overlap the fingertips measure the distance by (positive score). Practice two times and then test.

- Eight Foot up and Go Test: Rikli & Jones Senior Citizen

Test: This test is a coordination and agility test for senior citizens.

Purpose: To assess speed, agility, and balance while moving. These are important in performing various jobs which require quick maneuvering, such as getting off a bus in time to answer the phone, etc.

Equipment Required: A chair with a straight back (about 44 cm high) a stopwatch, cone marker, measuring tape, and an area without any hindrances.

Procedure: Keep a chair next to the wall and the marked, 8 feet in front of the chair. The participant starts completely seated, hands resting on the knees and feet flat on the ground. On the command 'Go'' the stopwatch is started and the participant stands and walks (no running at all) as quickly as possible to and around the cone and returns to the chair to sit down. Time is noted as she/he sits down on the chair. Two trials are given to the participant.

- 6 Minutes Walk Test is used for aerobic fitness.

Purpose: This test measures the aerobic fitness of senior citizens.

Equipment required: Measuring tape to mark out the track distances, stopwatch, chairs positioned for resting.

Procedure: The walking course is laid out in a 50-yard (45.72m) rectangular area (dimensions 45 × 5 yards), with cones placed at regular intervals to indicate the distance walked. This test aims to walk as quickly as possible for six minutes to cover as much distance as possible. Subjects are set their own pace (a preliminary trial is useful to practice pacing) and can stop for a rest if they desire.

Scoring: The total distance covered in six minutes is recorded to the nearest metre.