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"My single achievement is that, with my sincere and honest approach, I inculcated the spirit of oneness and togetherness among players."
– BISHAN SINGH BEDI

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COMPETENCY-BASED QUESTIONS (CBQs)
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MCQs

As per the guidelines of NEP 2020

A TEXTBOOK OF

Physical Education

Based on the latest CBSE syllabus

XII

SCAN QR CODE

A TEXTBOOK OF PHYSICAL EDUCATION CLASS 12

Chapter 6

TEST AND MEASUREMENT IN SPORTS

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MOTOR FITNESS TEST

Meaning of Motor Fitness

Motor fitness or motor physical fitness refers to how an athlete can perform at her/his sport and involves a mixture of the five components – agility, coordination, balance, power and reaction time.

Motor Fitness Test Items

1. 50 m standing start or 50 m dash (To measure speed) Refer to Figure 6.1
2. 600 m Run / Walk (To measure endurance) Refer to Figure 6.2
3. Sit and reach (To measure flexibility) Refer to Figure 6.3
4. Partial curl up - Refer to Figure 6.4
5. Push ups (Boys)- Refer to Figure 6.5
6. Modified push ups (Girls)- Refer to Figure 6.6
7. Standing broad jump (To measure power) Refer to Figure 6.7
8. Agility – 4 × 10 m Shuttle run - Refer to Figure 6.8

Figure 6.1 50 m Standing start

MEASUREMENT OF CARDIOVASCULAR FITNESS — HARVARD STEP TEST / ROCKPORT TEST

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Harvard Step Test

In 1943, Belgian – American physiologist Lucien Brouha and his associates C W Health and A Graybiel developed a cardiovascular endurance test known as the Harvard step test at the Harvard Fatigue Laboratories during World War II. The purpose of this test is to measure aerobic fitness.

The score is given based on the following formula: Fitness Index Score (long-term)

$$= \frac{(\text{Duration of exercise in seconds} \times 100)}{(2 \times \text{Sum of three pulse counts in recovery})}$$

Table 6.2 Norms for Harvard Step Test

Rating	Fitness Index (long form)
Excellent	> 96
Good	83 – 96
Average	68 – 82
Below average	54 – 67
Poor	< 54

Figure 6.12 Harvard step test

Rockport Fitness Walking Test

This Test was developed by exercise physiologists and cardiologists, Kline, Porcari, Hintermeister and others in 1987 at the Department of Exercise Science in the University of Massachusetts at Amherst. It is mainly for individuals with low fitness level, such as those who follow a sedentary lifestyle, to evaluate their aerobic fitness through assessment of their VO_2 max (maximum volume of oxygen).

To calculate VO2 max, the following formula may be used:

VO_2 max = 132.853 – (0.0769 × Weight) – [(0.3877 × Age) + (6.315 × Gender) – (3.2649 × Time)] – (0.1565 × Heart rate)

where: Weight is in pounds (lbs); Gender Male = 1 and Female = 0
Time is expressed in minutes and 100ths of minutes; Heart rate is in beats/minutes
Age is in years.

COMPUTATION OF FITNESS INDEX

This is accomplished using the method employed in Harvard step test, but the formula is changed to:

$$\text{Fitness Index Score (short-term)} = \frac{(\text{Duration of exercise in seconds} \times 100)}{(5.5 \times \text{pulse count between 1–1.5 minutes after exercise})}$$

Table 6.3 Fitness index score

Score	Cardiovascular Classification
55 or below	Very Poor
56 – 64	Poor
65 – 79	Average
80 – 89	Good
90 or above	Excellent

RIKLI AND JONES – SENIOR CITIZEN FITNESS TEST

In 2001, Roberta E Rikli and C Jessie Jones invented a method called Senior Fitness Test, also known as Fullerton Functional Fitness Test, in the Lifespan Wellness Clinic in California State University in Fullerton.

Chair Stand Test for Lower Body Strength

Purpose: To test the strength of the lower body, especially the legs.

Equipment Required: A chair without arms and a straight back with seat of at least 44 cm and a stopwatch.

Procedure: Refer to book page 121

Scoring: The total number of completed chair stands during 30 seconds is called score.

Refer to Table 6.4 for recommended ranges for This test based on different age groups.

Figure 6.14 Chair stand test for lower body strength

Arm Curl Test for Upper Body Strength

Purpose: To test the strength of the upper body.

Equipment Required: Five pound weight for women and 8 pound weight for men, a stopwatch and a straight-back chair with no arms are required for this test.

Procedure: Refer to book page 122
Scoring: The total number of arm curls performed in 30 seconds of duration is called a score.

Refer to Table 6.5 for recommended ranges for this test based on different age group.

Figure 6.15 Arm curl test

Chair Sit and Reach Test for Lower Body Flexibility

Purpose: To test the flexibility of the lower body Especially for hamstring flexibility.

Equipment Required: A chair with a straight back, approximately 44 cm high and a ruler.

Procedure: Refer to book page 123
Scoring: If the participant reaches past this ‘0’, she/he receives a positive score of as many inches as they reach past it, measured to the nearest half-inch. If she/he cannot reach it, she/ he receives a negative score of as many inches as they are short of the ‘0’, measured to the nearest half-inch.

Figure 6.16 Chair sit and reach test

Refer to Table 6.6 for recommended ranges for this test based on different age group.

Back Scratch Test for Upper Body Flexibility

Purpose: To test the flexibility of the upper body (shoulder). Upper body flexibility is important as it helps in reaching, changing a light bulb, combing, throwing, putting on overhead garments and so on.

Equipment Required: A ruler.

Procedure: Refer to book page 124.

Scoring: The best score out of the two tests is recorded to the nearest centimetre or half inch.

Refer to Table 6.7 for recommended ranges for this test based on different age groups.

Figure 6.17 Back scratch test

Eight Foot Up and Go Test for Agility

Purpose: This test measures the speed and balance while moving.

Equipment Required: A chair with straight back and about 44 cm high, a stopwatch, cone marker, measuring tape and an area free of interruptions.

Procedure: Refer to book page 124.

Scoring: The best run time is recorded to the nearest tenth second.

Refer to Table 6.8 for recommended ranges for this test based on different age groups.

Figure 6.18 Eight foot up and go test

Six Minute Walk Test for Aerobic Endurance

Purpose: To measure aerobic fitness and endurance, which are important for long distance walking or running, climbing and so on.

Equipment Required: A measuring tape and a stopwatch.

Procedure: Refer to book page 125.

Scoring: Total distance covered within The stipulated time is recorded to the nearest metre.

Refer to Table 6.9 for recommended ranges for this test based on different age groups.

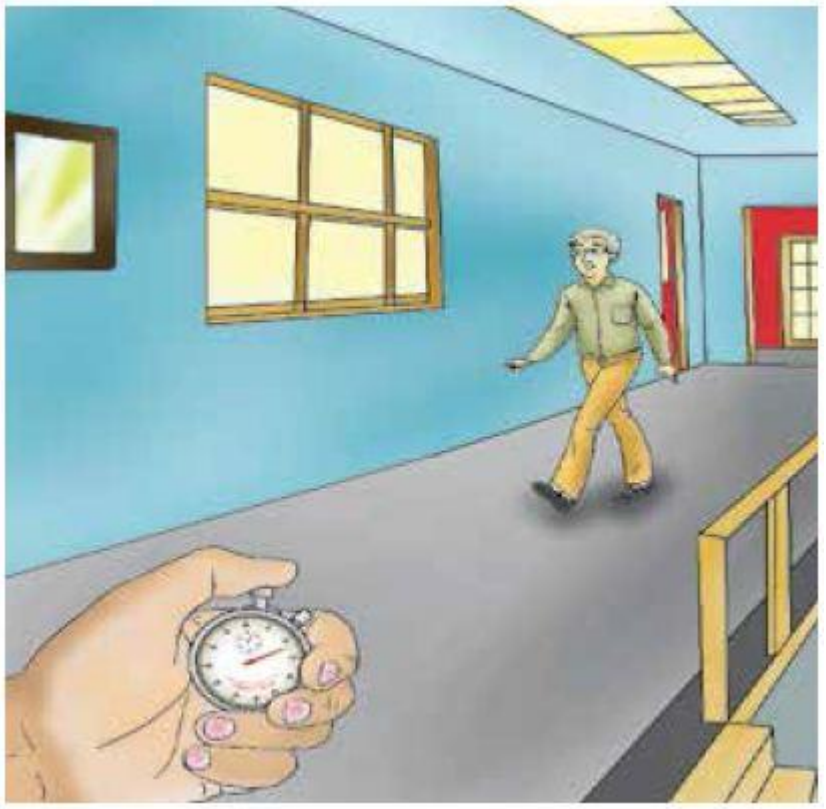

Figure 6.19 Six minute walk test

SUMMARY

1. Motor fitness test includes 50 m Standing start, 600 m Run/Walk, Sit and Reach, Partial curl up, Push ups (boys), Modified push ups (girls), Standing broad jump, etc.

2. General motor ability is the ability to perform different motor movements. The higher the level of general motor ability, the more varied and more effective the motor skills an individual can execute.

3. Cardiovascular fitness is the ability of the heart, blood cells 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 movement.

SUMMARY

4. In the Harvard Step Test, the participant is asked to step-up on the platform and down again at a rate of 30 steps per minute for 5 minutes continuously or until she/he gets exhausted. The total heartbeats are then counted for specific intervals.

5. Rockport Fitness Walking Test is for individuals with low fitness level to evaluate their VO_2 max (maximum volume of oxygen). Participants run 1 mile and then the amount of time taken and their heart rate are monitored.

6. Rikli and Jones came up with a battery of tests for testing fitness of senior citizens. It came to be known as the Fullerton Functional Fitness Test and it is an easy, inexpensive method of assessing the physical traits that senior citizens need in order to carry out their daily activities.