

CHAPTER

10

Training in Sports

The term 'training' refers to an organised and systematic instructional process which aims at improving an individual's ability to accomplish his assigned roles effectively and meaningfully. However, this kind of understanding of the term training cannot be applied to the concept of sports training.

The term 'sports training' is specifically used in the context of athletics, sports and games which could be a training of sportspersons, coaches and teachers of physical education.

Sports training is a special process of participation of sportspersons based on scientific principles, aimed at improving and maintaining higher performance capacity in different sports activities.

It is a particular type of training designed to improve fitness and abilities to perform in a given sports. It includes strength, endurance, speed, flexibility, cardiovascular training, etc. It also includes mental and psychological training and advises on nutritional values.

CHAPTER CHECKLIST

- Talent Identification in Sports
 - Talent Development in Sports
 - Sports Training Cycles
 - Strength
 - Endurance
 - Speed
 - Flexibility
 - Coordinative Abilities
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Talent Identification in Sports

Talent identification refers to the process of recognising current participants with the potential to become elite players. It entails predicting performance over time by measuring physical, physiological, psychological and sociological attributes as well as technical abilities, either in isolation or in combination.

As per other studies, talent identification in sport is a process in which individuals who are more likely to prosper in a given sport are identified according to the test of specific factors.

Hadavi and Burns defined talent identification as a means of harnessing

Talent has several properties which are genetically transmitted and partly innate. These properties include players' anthropometric characteristics (e.g., stature, mass, body composition, bone diameter, limb girth) are related to performance in important and sometimes complex ways. These properties serve as basis for predicting those individuals who are more or less likely to succeed at some later stage.

Utilisation of scientific methods to identify athletes with potential reduces time required to reach high performance, enhances the coach training effectiveness, increases competitiveness and number of athletes aiming to attain high level and increases confidence.

Talent Development in Sports

Talent development in sports is the most important stage in the process of achieving sporting success. It is aimed at providing the most optimal learning environment to help promising youth athletes realise their potential.

Optimum environment involves provision of adequate number of competent coaches, experts and managers, adequate and availability of quality facilities and equipment for training and testing as well as time for training, actual training and practice that are directed towards enhancing athletes' development.

Availability of these essential resources can significantly influence the ability to engage in the required amount of high quality training. It is recommended that these resources be allocated to help identify and develop talent to enable athletes to reach the top in their sport.

Sports Training Cycles

There is a concept of periodisation in sports which includes three different training cycles.

Periodisation is an organised approach to training which involves progressive cycling of various aspects of a training programme during a specific period of time. It can be defined as the purposeful variation of a training programme over time, so that the competitor gets closer his or her optimum adaptive potential just before an important event. It is based on the principles of

Periodised Training works on the concept of overload and adaptation, by stressing the body over time, allowing it to recover, and then stressing it again, athletes can gradually build fitness.

The three important cycles of periodisation training are discussed below

Micro Cycles

A micro cycle is the shortest training cycle, typically lasting a week with the goal of facilitating a focused block of training. Each micro cycle is planned based on where it is in the overall macro cycle.

Micro cycles are to vary the levels of stress an athlete is subjected to throughout the week's training sessions. This would see a coach implementing sessions that focus on progressions, high volume or load as well as planned regeneration days.

An example of this is an endurance block where a cyclist strings three or four long rides together within one week to progressively overload their training volume. Another example would be where a sports team has a fixture every Saturday.

The coaching staff will need to work together to best produce a plan with a healthy mix of S and C (Strength and Conditioning) and Technical/Tactical work. It is to be noted that time spent in S and C sessions will lead to increases in total work for the week. Therefore the following should be applied, as a guide, for S and C sessions

- Monday - Low Intensity (70% load intensity)
- Tuesday - High Intensity (90-100%)
- Wednesday - Medium Intensity (80%)
- Thursday - Low Intensity (70%)
- Friday - Regeneration (60%)
- Saturday - Match Day
- Sunday - Regeneration/Rest Day (60%)

Meso Cycles

The meso cycle represents a specific block of training that is typically made up of 3-4 micro cycles (3-4weeks) that is designed to accomplish a particular goal. A meso cycle form a number of continuous weeks (micro cycles) where the training programme focuses towards improving the same physical adaptations, for example

To plan towards developing your FTP (the highest average power, measured in watts that you can sustain for one hour), you might include three weeks of threshold intervals followed by a week of recovery (regeneration) in your meso cycle.

Meso cycles are formed from 21-28 days. For an experienced athlete, a coach would focus on utilising the full 28 days and for an inexperienced athlete, a 21 day meso cycle.

Both meso cycles would include 5 days of rest however, the 28 day meso cycle would consist of 23 days of relatively hard work followed by 5 days of recovery (23/5) whereby the 21 day meso cycle would consist of 16 days of hard training followed by 5 days of recovery (16/5).

Macro Cycles

The macro cycle is the longest of the three cycles and typically includes four stages of a periodised training programme, for example this may be

- Endurance
- Intensity
- Competition
- Recovery

A macro cycle is an annual plan that works towards peaking for the goal competition of the year. There are three phases in the macro cycle

- (i) **The Preparation Phase** It is further broken up into general and specific preparation. An example of general preparation would be building an aerobic base for an endurance athlete such as running on a treadmill or by working through multiple micro cycles on the track. An example of specific preparation would be to work on the proper form to be more efficient and to work more on the final format of the sport. This could be focusing on transition techniques with a triathlete.
- (ii) **The Competitive Phase** It can be several competitions, which lead to the main competition. The competitive phase ends with tapering for the competition.
- (iii) **The Transition Phase** It is important for psychological reasons, a year dedicating time towards training means some time off is just as important. An amateur athlete may take a couple of months off while a professional athlete might take as little as two weeks off.

Macro cycles incorporate all 52 weeks of annual plan.

Strength

Strength is an essential component of physical fitness. It means the capacity to withstand force or pressure. Strength refers to the ability of a muscle to exert force or overcome resistance. Strength in sports refers to muscular strength.

Types of Strength

Strength can be divided into the following types

1. Dynamic Strength

This strength is also known as isotonic strength, as it is related to movements. It is the strength in which an individual needs to sustain his body over a prolonged period of time or to be able to apply some force against an object.

For example, a gymnast needs dynamic strength to complete the routine. Other examples are wrestling, rowing or in your daily life, going up stairs or lifting objects, bags, boxes, etc.

It can be further divided into three types, which are as follows

- **Maximum Strength** It refers to the greatest force that is possible in one single effort. It is basically the ability of muscles to overcome against maximum resistance. It is used in those sports where players have to tackle maximum resistance like weightlifting, shot put, hammer throw etc. It is also required in sports where maximum strength is needed for start like gymnastics.
- **Explosive Strength** It refers to the ability to apply strength along with high speed. In other words, it is the ability to overcome resistance with high speed. It is required in long jump, high jump, sprints as well as all throwing events. It is also used for jumping in basketball and volleyball.
- **Strength Endurance** It refers to the ability of the muscles to overcome resistance even under conditions of fatigue. It is a combination of strength and endurance abilities. It is used in long distance races, swimming, cycling, pole vault, judo because players have to carry on for a long time period.

2. Static Strength

In other words, it is the greatest amount of strength that can be applied to an immovable object. It is the ability to apply a force where the length of the muscle does not change and there is no visible movement at a joint.

For example, you need static strength to maintain a posture or push a heavy object. In sports, weightlifting is a good example.

Training Methods for Improving Strength

There are three different methods of training to develop or improve strength. These are discussed as follows

Isometric Exercises

These exercises were introduced by Hettinger and Muller in 1953.

The word 'isometric' is derived from the words '*iso*' meaning 'same' and '*metric*' meaning 'length'.

Thus, the word isometric refers to the length of the muscle that remains unchanged during workouts.

This happens when there is a tension on a muscle but no movement is made, causing the length of the muscle to remain the same. Therefore, one cannot see any external movement but a muscle is stretched as a lot of pressure is exerted on it.

These exercises are very helpful in sports like archery, yoga, judo, weightlifting etc. Examples of these exercises are pressing or pushing a wall, lifting a very heavy weight, pulling the rope in tug-of-war, etc.



Holding Dumbbell Side Ways



Holding Legs at 45°

Examples of Isometric Exercises

Method of Doing Isometric Exercise

These exercises can be done with or without using equipments. Doing exercises with equipment requires a bench, a bar, power rack and weights of different sizes.

Isometric with Equipment

For doing bench press, adjust the power rack by setting the pins at the appropriate height. Load the bar with weights and start pushing the bar upwards.

Isometric without Equipment

Squat, lunge, push-ups are some isometric exercises that can be done without using any equipment.

For doing push-ups, lay your palms flat on the floor and with the help of feet and hands, lift your body upwards. Then, hold in that position for 20 seconds and release your weight by coming back to the original position.

Isotonic Exercises

These exercises were developed by De Loone in 1954.

The word 'isotonic' is derived from Latin words '*iso*' meaning 'same' and '*tonic*' meaning 'muscle tone'.

Thus, the word isotonic refers to the toning of the muscles by repetitive exercises. Here, external movement in the muscles can be seen clearly.

When the muscles contract repeatedly, then they develop strength and endurance. The muscle or group of muscles changes in size, *i.e.* shortens and lengthens during action. Isotonic exercises are of two types

- **Concentric** It means upward movement of the muscles like lifting dumbbells, throwing a ball etc. It shortens the muscles as person overcome the force of a weight.
- **Eccentric** It means downward movement of the muscles like lowering the dumbbells down. It lengthens the muscles while being opposed by the force of a weight.

Method of Doing Isotonic Exercises

For performing squats with weights, make sure your knees are in line with feet. Then, pull the weight by using abs, back and hip muscles. Keep your weight distributed throughout your feet and pull the weight upto shoulder level.



Squat Workout

Lifting weights, arm curling, wrist curling are some of the isotonic exercises. When users workout with much heavier weights, it causes a specific increase in muscle size, because the high weight load leads to tiny tears in the muscle tissue. This causes enlarging of the muscle when they are repaired by the body.



Arm Curling Exercise

Isokinetic Exercises

These exercises were developed by Perrine in 1968. The word 'isokinetic' is made from words 'iso' meaning 'same' and 'kinetic' meaning 'motion'.

Therefore, isokinetic exercises refers to the exercises that are based on the movement of the muscles throughout the range of the joint with a constant speed.

Examples of isokinetic exercises are pedalling cycle and arm stroke in swimming. In cycling, the muscles around the knees move around the entire joint and in



Swimming



Cycling

Examples of Isokinetic Exercises

Method of Doing Isokinetic Exercises

Start by doing the isokinetic exercises slowly, so that there is no unnecessary pressure. Then, slowly increase the speed and velocity of the exercises allowing for more controlled muscle development and muscle flexibility. For example, to exercise cycling, start with a slow speed of 10-20 kmph and gradually increase it.

Endurance

Endurance is the ability to do sports movement with the desired quality and speed under the conditions of fatigue.

Types of Endurance

The types of endurance can be divided on the basis of nature and duration of activity.

On the Basis of Nature of Activity

According to the nature of activity, the endurance is classified into the following types

- **Basic Endurance** Basic endurance is the ability to perform movements in which large number of body muscles are involved and the activity is performed at slow speed or pace for a long duration such as walking

- **General Endurance** It means the ability of body to tolerate fatigue satisfactorily caused by different types of activities. It is not specific to any sports, whereas, it is developed through general exercises. If the general endurance is better, than the performance in sports will also be better.
- **Specific Endurance** It is the ability to resist the fatigue caused by a particular sports activity. The nature of fatigue and specific endurance is different from sports to sports.

On the Basis of Duration of Activity

According to the duration of the activity, the endurance is classified into following types

- **Speed Endurance** It is the ability to resist fatigue in activities that last upto 45 seconds. For example, 400 m sprint race.
Speed endurance is mainly dependent on the power and capacity of energy production.
- **Short-term Endurance** It is the ability to resist fatigue in activities that range from 45 seconds to 2 minutes. For example, 800 m race. This endurance depends on strength and speed endurance.
- **Medium-term Endurance** It is the ability to resist fatigue in activities that range from 2 minutes to 11 minutes. For example, 1500 m race.
This endurance also depends on strength and speed endurance, but upto a limited degree.
- **Long-term Endurance** It is the ability to resist fatigue in activities that last more than 11 minutes. For example, marathon, that requires such type of endurance.

Training Methods for Endurance Development

Methods for endurance development are as follows

Continuous Training

This method was developed by Dr Van Aaken. Continuous training involves continuous running activity or exercise without rest or pause. It allows the body to work from its aerobic energy stores to improve overall fitness and endurance.

Benefits of continuous training include fat burning

For example, long distance running at a stretch. It is divided into three parts

- **Slow Continuous Method** In this method, the intensity of exercise is low and heart rate remains stable. This means a 10 kilometre run with a heart beat of 140-160 beats per minute. This method is effective for long cross country runs.
- **Fast Continuous Method** In this method, the intensity is high, heart rate is high and duration is less. The heart beat reaches to 160-180 beats per minute due to increase in intensity. It is for well trained athletes who can run without any pause. It is very effective for improving the VO_2 capacity.
- **Variable Pace Method** This is a combination of slow and fast continuous method therefore the intensity varies. The heart beat varies under 140-180 beats and time is 15-60 minutes.
This method is effective for players of almost all games and sports. This includes cycling and jogging.

Advantages

- It increases the efficiency of heart and lungs.
- It also increases muscle mass and endurance.
- Heavy equipments are not required for training.
- It helps an individual to be self-disciplined and self-confident.

Disadvantages

- It does not improve anaerobic fitness.
- It can be hard to keep going when you start to fatigue.

Interval Training

This method was given by Woldemar and Greshler in 1939. Physiologist Reindell further modified this training method.

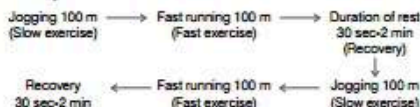
This method enhances speed and endurance ability. In this method, the exercises are followed by a period of rest, also known as recovery.

Under this method of training, recovery period is given to an athlete after each speedy workout and it can be adjusted according to the efficiency of athlete.

Interval Training Method

This method involves alternating periods of high intensity

For example,



Following factors are essential to note down

- Distance of exercise
- Speed/Intensity
- Duration of work and rest
- Frequency/Number of repetitions
- Heart rate

According to the above example, noting down the factors will give the following result

- Distance of exercise (run) — 400 m
- Time /duration — 5 minutes (3.5 minutes of run +1.5 minutes of rest)
- Speed — 10-20 kmph in jogging
25-30 kmph in running
- Frequency/repetitions — Any number of repetitions are allowed
- Heart rate — 70-140 beats per minute in jogging
180-200 beats per minute in running

Advantages

- More workout can be performed in short duration.
- It is beneficial for respiratory and circulatory systems.
- The progress can be measured easily.
- An athlete achieves peak performance in short period.

Disadvantages

- There are chances of injury.
- It can lead to heart diseases.

Fartlek Training

This method was introduced by O Astrand and Gosta Halner. It is good for aerobic and anaerobic fitness.

Fartlek is a Swedish term which means, 'speed play' and has been used by distance runners for years.

Fartlek is a form of road running or cross-country running in which the runner usually changes the pace significantly during the run.

Fartlek Training Method

The duration of this training method lasts for 45 minutes or more. It can vary from aerobic walking to anaerobic sprinting. Proper warm up and cooling down is required to get best results.

This is followed by a vigorous activity like climbing uphill. Then, it is followed by recovery phase where the pace slows down. Again, it is followed by a vigorous activity that needs a lot of effort.

Advantages

- It improves cardiovascular endurance.
- Good for aerobic and anaerobic fitness.
- It makes the body versatile.
- It is flexible in nature.
- It can be adopted easily by the athletes.

Disadvantages

- Difficult to judge the exact efforts of the athletes.
- It may cause accidents.

Speed

It is the ability to cover distance in minimum possible time such as covering a distance in shortest time.

In simple words, it means capacity of a moving body part or the whole body with greatest possible velocity.

Types of Speed

In general, speed has several different forms which are seen in most sports movements.

These are discussed below

1. Reaction Speed

It is the ability to respond to a given stimulus as quickly as possible, like good speed in sprints, speed in fielding, chasing the ball, etc. It is of two types viz. simple and complex reaction speed.

- Simple reaction speed means reaction to known signals like gun shot at the start of the sprint race.
- Complex reaction speed means reaction to unknown signals like facing a ball in cricket.

2. Movement Speed

It is the ability to do a single movement in the

3. Acceleration Speed

It is the ability to achieve maximum speed in shortest possible time. This form of speed depends upon explosive strength, frequency of movement and technique. This ability is important in swimming, hockey, football, gymnastics etc.

Training Methods for Speed Development

A speed development programme can be framed according to need, level and training state of the players. Following are the training methods to develop speed

Acceleration Run

It is generally used to develop speed indirectly by improving explosive strength, technique, flexibility and movement frequency. It is basically the capacity to attain maximum speed in minimum time.

Before acceleration runs, proper warm-up must be done. After every acceleration run, there should be a proper interval so that the athlete may start the next run without any fatigue.

Acceleration Run Method

For acceleration run, sprinter is required to run a specific distance. He starts from stationary position and tries to attain the maximum speed as soon as possible and tries to finish the distance at that speed.

These accelerations are repeated 6 to 12 times with sufficient intervals between runs.

The maximum speed should be achieved within 5-6 seconds after the stationary position.

The number of acceleration runs can be fixed according to the age, experience and capacity of the athlete. Thus, it is the ability of the sprinter to achieve high speed from a stationary position.

Pace Run

Pace run means running the whole distance of a race at a constant speed or with uniform speed. Generally, 800 m and above races are included in pace races.

It develops explosive strength and endurance as the athletes run long distances without getting fatigue. Runners must be fresh and fit at the beginning of the

Pace Run Method

This method is useful for longer races. Under this method, the runner conserves his/her energy by reducing the speed.

For example, if there is a runner of 900 m race and his best time is 1 minute 50 seconds, so he should run the first 450 m in 54 seconds and the next 450 m in 56 seconds. This procedure is basically known as pace run.

Flexibility

It means the ability of a joint to perform actions through a range of movements. It is needed to perform everyday activities with relative ease.

Flexibility is affected by the length of the muscle, joint structure, ligaments, tendons and other factors. Flexibility tends to deteriorate with age.

Types of Flexibility

Flexibility can be divided into two types, which are as follows

1. Passive Flexibility

It is the ability to perform movement with greater range using external help, *i.e.* with the help of an equipment or a partner.

For example, using exercise cycle to improve flexibility of lower body.

2. Active Flexibility

It is the ability to perform movement with greater range without using external help, *i.e.* with the help of muscular force.

For example, performance of stretching, push-ups, running and other exercises that stretch the muscles of the body.

Active flexibility can be further divided into two types, which are as follows

- **Static Flexibility** It is required by a sportsperson when he remains in a static position, like diving, sitting etc.
- **Dynamic Flexibility** It is required or needed for doing movements with greater distance, when an

Training Methods to Improve Flexibility

The ways to improve flexibility are as follows

1. Dynamic Stretching

It refers to stretching that involves putting muscular effort along with movement at the same time. Walking lunges, kicking action, moving the arm in circular motion are examples of dynamic stretching.

Proper warm-up is necessary for these exercises. Speed, muscular effort, movement and rhythm are required in this method.



Dynamic Stretching

2. Static Active Stretching

Under this method, the muscles are stretched without moving the limbs and the limbs are held in a position for 30 seconds. Standing on one leg and holding the other leg directly in front for 20-30 seconds is static active stretching.

This exercise consists of 1-2 stretches per muscle group for 30 seconds each. It is a warm-up exercise also.

3. Static Passive Stretching

This also refers to stretching of muscles without moving the limbs. However, an external force is applied to hold the stretch in position.

The external force can be some other part of your body like hands to hold the stretch, an assistance or an equipment.

For example, bringing your leg up high and then holding it there with your hand. It is also a warm up exercise and a form of isometric exercise.



Static Passive Stretching

4. Ballistic Stretching

It uses the momentum of a moving body or a limb in an attempt to force it beyond its normal range of motion.

This is a stretching or warming up, by bouncing into a stretched position, using the stretched muscles as a spring which pulls you out of the stretched position.

The stretching can be performed rhythmically with a count. At each count, joint is stretched to the maximum limit and then it is again flexed.

This type of stretching can lead to injury, if body is not warmed up. It should proceed from slow swinging exercises in beginning followed by fast swinging exercises.



Ballistic Stretching

5. PNF Stretching

It refers to Proprioceptive Neuro Muscular Facilitation Technique. This is an advanced technique for improving flexibility. PNF involves both stretching and contraction of specific muscle group. This is done with the help of a partner.



PNF Stretching

The procedure is as follows

- The muscle group to be stretched is positioned and stretched.
- The athlete then contracts the stretched muscle group for 8-10 seconds while a partner applies force to resist the movement.
- An immovable object such as a wall or a heavy equipment can also be used for resistance.
- The contracted muscle group is then relaxed and very little stretch is applied for 20-30 seconds.
- The muscle group is then allowed 30 seconds to recover.
- This process is repeated 3-4 times.

Coordinative Abilities

The term 'coordinative ability' replaced the term 'agility'. The term 'agility' was discarded as it was not clearly defined and there was no unanimity in its meaning.

Coordinative ability mainly depends on the central nervous system. It is the ability to perform smooth and accurate movements involving different parts of the body.

It requires good integration between the senses and muscles as well as good neuromuscular coordination. In other words, the ability to control the movements of different parts of our body, so that they work well together is called coordinative ability.

Coordinative abilities are essential in sports and games. Infact, the accuracy of actions, rhythm, change of movement, balance, graceful action, etc. all are a product of well-developed technical skills and coordinative abilities.

Types of Coordinative Abilities

Different types of coordinative abilities are

1. **Differentiation Ability** It is the ability to achieve a high level of fine tuning of individual movements and body part movements. Highly skilful movements with hand, feet or head increase differentiation ability.
2. **Orientation Ability** It is the ability to determine and change the position and movements of the body in different types of situations. For example, in gymnastics, the position and movement of head and eyes is important for orientation.
3. **Coupling Ability** It is the ability to coordinate body parts movement (For example, movements of hands, feet, trunk etc.) with one another. It is especially important in sports in which fast movements have to be done.

For example, gymnastics, team games etc.

4. **Reaction Ability** It is the ability to react quickly and effectively to a signal. There are generally two types of reaction ability, which are as follows
 - **Simple reaction ability** is to react immediately to a well-known signal. Here the signal is known so the reaction is prepared.
 - **Complex reaction ability** is the ability to react immediately or quickly to unexpected signals. For example, a batsman facing ball in cricket. Here the signal is unknown so the reaction is spontaneous.

5. **Balance Ability** It is the ability of a sportsperson to maintain equilibrium of the body both in static and dynamic conditions.

In other words, it is the ability to maintain balance during the complete body movements and to regain balance quickly after the balance disturbing movements. This ability is essential in most of the sports and games.

6. **Rhythm Ability** It is the ability to do body movements according to a given rhythm like in gymnastics, performing floor exercises with a definite rhythm. Examples of this type are found in gymnastics, synchronised swimming, diving, skating, etc.
7. **Adaptation Ability** It is the ability to adjust or completely change the movement according to changing situation. It depends on the speed and

Methods to Improve Coordinative Abilities

Following are training methods to improve coordinative abilities:

Ball or Balloon Toss

In this exercise catch and bump a balloon back and forth using hands, head, and other body parts. Since the balloon floats slowly, one can change the angles to make the exercise a little unpredictable.

For a little more challenge, use a small ball (like a tennis or table tennis ball) which allows for faster speed. During exercise ask the other partner to switch up the angles, speeds, and throwing patterns as they toss the ball to other person. This hand-eye coordination drill helps rehearse the way athlete thinks and react quickly to the variations.

If you're training alone, consider doing the ball toss from different orientations - while lying on your back, in a squat, or lunge positions - to get the most out of the drill. Doing this adds mobility to your coordination training, enhances your balance and reduces the risk of injury.

Jump Rope

This classic coordination exercise works to synchronise hand-foot-eye movements. Start off by hopping from one foot to the other or slowly running in place. Gradually progress to criss-cross jumps, two-foot hops, or even a faster speed, when athletes found their rhythm. Also, try to keep rope at a steady pace if an athlete is working on his footwork to minimise pain and injury. Essentially, jumping rope is not just an excellent drill that improves hand-eye coordination, it also works on foot speed, teaching to maintain control and rhythm when athletes are fatigued.

Balance Exercises

An essential part of coordination training is balance. This ability to perform static movements helps athletes

to perform a wide range of bodily activities, including walking, squatting, and pressing overhead.

Begin by standing on both feet, then slowly lift one leg as high as hip to create a 90-degree angle. You will begin to feel shaky, but try to keep it there as long as possible. Remember, the longer you can maintain your balance, the better you're improving your coordination.

Target Exercises

One of the staple drills for hand-eye coordination is called target practice. Though it looks easy, it's actually a really complex and challenging task of aiming and throwing at a target.

Start by standing close to a target and hitting it accurately. Slowly progress by moving further away from the target. For added difficulty level, try to aim at your targets from different angles instead of just a straight line (or directly in front).

Another option to improve your hand-eye coordination is to throw objects through an opening. You can use hoops, rings, or items with small to large openings as your visual target. Essentially, the further you are or the smaller the opening, the higher the difficulty level is and it's even better for coordination training.

Juggling and Dribbling

They may look simple, but juggling and dribbling are hand-eye coordination drills that help to develop control, rhythm, and timing.

When juggling, begin with just two balls and motioning slow circles. Once you've found your pace, you can add in a third ball which, when you're not fully focused, can make you lose your speed and rhythm. Similarly, dribbling will train to concentrate on the ball, maintain the speed, and keep the right angles. There are many options to try like dribbling with one hand, two hands back and forth, various speeds, further or closer to the ground, and other tricks. While this requires a good amount of time and practice, this coordination exercise helps to improve hand-eye movements.

CHAPTER PRACTICE

OBJECTIVE TYPE QUESTIONS

Multiple Choice Questions (MCQs)

- 1 Which of the following is the shortest training cycle?
(a) Meso cycle (b) Macro cycle
(c) Micro cycle (d) None of these
Ans (c) Micro cycle
- 2 The ability which help to overcome the resistance with speed, is known as _____.
(a) Maximum Strength (b) Explosive Strength
(c) Static Strength (d) None of these
Ans (b) Explosive Strength
- 3 The method in which there will be no change in the length of the muscle is known as _____.
(a) Isometric Method (b) Isotonic Method
(c) Isokinetic Method (d) Fartlek Method
Ans (a) Isometric Method
- 4 Which exercise method was developed by De Loone in 1954?
(a) Isometric Exercises
(b) Isotonic Exercises
(c) Isokinetic Exercises
(d) None of the above
Ans (b) Isotonic Exercises
- 5 While exercising on a multigym, the type of muscular contraction that occurs is _____ CBSE 2020
(a) Isotonic (b) Isometric
(c) Isokinetic (d) Eccentric
Ans (b) Isometric
- 6 Resistance ability against fatigue is called _____ CBSE 2020
(a) Strength (b) Speed
(c) Endurance (d) Agility
Ans (c) Endurance
- 7 Which is not the training method to develop endurance?
(a) Continuous Method
- 8 'Speed play' is another name of which method?
(a) Interval Method
(b) Continuous Method
(c) Isokinetic Method
(d) Fartlek Method
Ans (d) Fartlek Method
- 9 _____ is a combination of speed and endurance abilities.
(a) Speed Endurance (b) Locomotor Ability
(c) Movement Speed (d) Reaction Speed
Ans (a) Speed Endurance
- 10 The ability which helps the movement with greater range is known as _____.
(a) Endurance (b) Strength
(c) Flexibility (d) Speed
Ans (c) Flexibility
- 11 This method which uses the momentum of a moving body or a limb in an attempt to force it beyond its normal range of motion is known as _____.
(a) Ballistic Stretching Method
(b) PNF Stretching Method
(c) Dynamic Stretching Method
(d) Static Active Stretching Method
Ans (a) Ballistic Stretching Method
- 12 Ability which helps to change on the spot, predecided movement is known as _____.
(a) Differentiation Ability (b) Orientation Ability
(c) Adaptation Ability (d) Rhythm Ability
Ans (c) Adaptation Ability
- 13 Assertion (A) Strength means the capacity to withstand force or pressure.
Reason (R) Strength in sports refers to immunity strength.
In the context of above two statements, which one of the following is correct?
Codes
(a) Both A and R are true and R is the correct explanation of A
(b) Both A and R are true, but R is not the correct

Fill in the Blanks

14 _____ is the ability to coordinate body parts movement with one another.

Ans Coupling ability

15 _____ are primarily dependent on the motor control and regulation process of central nervous system.

Ans Coordinative abilities

16 Fartlek training method was introduced by _____ and _____.

Ans O Astrand, Gosta Halner

State True or False

17 Proper warm up is needed before doing PNF which also reduces the risk of soft tissue injuries.

Ans True

18 Shuttle run is used to develop speed and agility.

Ans True

19 Complex reaction ability is the ability to react immediately to a well-known signal.

Ans False. Complex reaction ability is the ability to react immediately to an unknown signal.

20 Balance ability of a sportsperson is to maintain equilibrium of the body both in static and dynamic conditions.

Ans True

Match the Following

List I (Type of Endurance)	List II (Examples)
A. Short-term Endurance	(i) Marathon
B. Speed Endurance	(ii) 400 m Sprint race
C. Medium-term Endurance	(iii) 800 m race
D. Long-term Endurance	(iv) 1500 m race

Codes

- | | | | |
|-----------|-------|-------|------|
| A | B | C | D |
| (a) (iii) | (ii) | (iv) | (i) |
| (b) (iii) | (iv) | (ii) | (i) |
| (c) (iv) | (iii) | (i) | (ii) |
| (d) (i) | (ii) | (iii) | (iv) |

List I	List II
A. PNF Stretching	(i) Kicking action in a circular motion.
B. Dynamic Stretching	(ii) Bringing your leg up high and then holding it there with your hand.
C. Static Active Stretching	(iii) Muscles are stretched without moving the limbs.
D. Static Passive Stretching	(iv) Involves both stretching and contraction of specific muscle group.

Codes

- | | | | | | | | |
|----------|-------|-------|------|-----------|------|-------|------|
| A | B | C | D | A | B | C | D |
| (a) (iv) | (iii) | (ii) | (i) | (b) (iv) | (i) | (iii) | (ii) |
| (c) (i) | (ii) | (iii) | (iv) | (d) (iii) | (iv) | (ii) | (i) |

Ans (b) (iv) (i) (iii) (ii)

VERY SHORT ANSWER TYPE QUESTIONS

23 What do you mean by training?

Ans Training means to prepare someone for some assignment. Training is the process of preparation for some task.

24 What is sports training?

Ans Sports training means allround preparation of a sportsperson to improve his/her performance in sports. It includes physical training, mental training and moral preparation.

25 What do you understand by talent identification in sports?

Ans Talent identification refers to the process of recognising current participants with the potential to become elite players. It entails predicting performance over time by measuring physical, physiological, psychological and sociological attributes as well as technical abilities, either in isolation or in combination.

26 Name the four stages of macro cycle.

Ans The macro cycle includes four stages of a periodised training programme, such as

- Endurance
- Intensity
- Competition
- Recovery

27 What is strength?

Ans It is the capacity to withstand force or pressure.

- 28** Define isotonic exercises. All India 2011
Ans Isotonic exercise is a form of exercise which involves toning of the muscles by repetitive exercises. Examples include a push-up or squat. These were developed by De Loone (1954).
- 29** What is endurance?
Ans Endurance is the ability to do sports movements with the desired quality and speed under the conditions of fatigue.
- 30** Define explosive strength with help of example.
Ans Explosive strength is the ability to exert maximal force in minimal time. It involves heavy loading in shorter high speed movements for a few repetitions with long rest period between them. It is a ability to overcome resistance with high speed.
 Explosive strength is generally used in shotput weightlifting, sprinting, etc.
- 31** Which method will you suggest to develop endurance? CBSE 2019
Ans Fartlek training method is essential to develop endurance. Fartlek is a form of road running in which the runner usually changes the pace significantly during the run.
- 32** What is speed? Delhi 2014
Ans It is the ability to cover the distance in minimum possible time. It is also the quickness of movement of body parts.
- 33** What are pace races? Delhi 2013
Ans Pace races mean running the whole distance of a race at a constant speed. Generally, 800m and above races are included in pace races. Repetitions can be fixed according to the standard of the athletes.
- 34** What is flexibility?
Ans Flexibility is the ability of a joint to perform action through a range of movements. It is needed to perform everyday activities with relative ease. Flexibility tends to deteriorate with age.
- 35** What are the methods for developing flexibility?
Ans Methods for developing flexibility are
- 36** What is active flexibility? All India 2014
Ans It is the ability to perform movement with greater range without using external help i.e. with the help of muscular force e.g. stretching exercises using push-ups etc.
- 37** What do you understand by passive flexibility?
Ans It is the ability to perform movement with greater range using external help i.e. with the help of an equipment or a partner.
- 38** What is coordinative ability? CBSE 2018
Ans Coordinative ability is the ability to perform smooth and accurate movements involving different parts of the body. It requires good integration between the senses and muscles as well as good neuromuscular coordination.

C SHORT ANSWER TYPE QUESTIONS

- 39** What is strength? What are the different types of strength? All India 2014
Ans Strength is the capacity to withstand force or pressure. It refers to muscular strength.
 Types of strength are
 (i) **Maximum Strength** It refers to the greatest force that is possible in a single maximum muscle contraction or one single effort.
 (ii) **Explosive Strength** It refers to the ability to apply strength along with high speed.
 (iii) **Strength Endurance** It refers to ability of the muscles to overcome resistance under fatigue.

- 40** Differentiate between isometric and isotonic exercises. CBSE 2020, 2016

Ans An isometric exercise occurs when there is tension on a muscle without any movement. The length of the muscles remains same. Isotonic exercises involve controlled movements of muscles and mobilisation of the joints around those muscles. A comparison between their characteristics is given below

41 Explain interval training method.

All India 2017

Or What is endurance? Explain the various methods of its development. All India 2014

Ans Endurance is the ability to do sports movements with the desired quality and speed under conditions of fatigue.

The methods to develop endurance are

- (i) **Continuous Training Method** This method was developed by Dr Van Aaken. Continuous training involves continuous running activity or exercise without rest or pause. For example, long distance running at a stretch.
- (ii) **Interval Training Method** This method enhances speed and endurance ability. In this method, the exercises are followed by a period of rest, also known as recovery.

42 What are the salient features of the Fartlek training method? CBSE SQP 2021 Term II

Ans Features of Fartlek training method are

- It is an off season training method but is very useful in developing endurance in athletes.
- It has a psychological advantage over the other training methods because the changing scenes help in delaying fatigue.
- It is the best method to improve endurance in sports where endurance is a basic requirement, e.g. cross-country running.

43 Explain the advantages of Fartlek training.

All India 2014, 12

Ans Advantages of Fartlek training are

- It is good for increasing strength and cardiorespiratory endurance.
- Several athletics can take part in the training programme at a time.
- It does not require any equipment and can be organised easily.
- This training method is not rigid; it is flexible in nature.
- It improves the efficiency of the heart and lungs.

44 Define speed and explain any one method to develop it. CBSE 2020

Or Define speed. Explain the methods of speed development. Delhi 2016, 15

Speed Developing Methods

(i) **Acceleration Run** It is usually used to develop speed indirectly by improving explosive strength, technique, flexibility and movement frequency.

Before acceleration runs, proper warm up must be done. After every acceleration run, there should be a proper interval so that the athlete may start the next run without any fatigue.

(ii) **Pace Races** Pace races mean running the whole distance of a race at a constant speed or with uniform speed.

It develops explosive strength and endurance as the athletes run long distances without fatigue. Repetitions can be fixed according to the standard of the athletes.

45 Explain the physiological factors determining speed.

Or Write in brief about any three physiological factors determining speed. Delhi 2016, 14

Or Explain the types of speed. All India 2012

Ans The physiological factors determining speed are

- (i) **Reaction Speed** It is the ability to respond to a given stimulus as quickly as possible, like good speed in sprints, speed in fielding, chasing the ball etc.
- (ii) **Movement Speed** It is the ability to do a single movement in the minimum time like jumping, throwing, kicking, boxing etc.
- (iii) **Acceleration Speed** It is the ability to achieve maximum speed in shortest possible time. This form of speed depends upon explosive strength, frequency of movement and technique. This ability is important in swimming, hockey, football, gymnastics etc.

46 Briefly explain different types of coordinative abilities. All India 2016

Ans The different types of coordinative abilities are

(i) **Differentiation Ability** It is the ability to achieve a high level of fine tuning or harmony of individual movement phases and body part movements.

(ii) **Orientation Ability** It is the ability to

the position and movement of head and eyes is important for orientation.

- (iii) **Coupling Ability** It is the ability to coordinate body part movements (e.g. movements of hand, feet, trunk etc) with one another.

Coupling ability is especially important in sports in which movements with a high degree of difficulty have to be done e.g. gymnastics, team games etc.

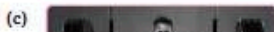
47 Explain target exercise to improve Coordinative Abilities.

Ans One of the staple drills for hand-eye coordination is called target practice. Though it looks easy, it's actually a really complex and challenging task of aiming and throwing at a target.

Start by standing close to a target and hitting it accurately. Slowly progress by moving further away from the target. For added difficulty level, try to aim at your targets from different angles instead of just a straight line (or directly in front).

Another option to improve your hand-eye coordination is to throw objects through an opening. You can use hoops, rings, or items with small to large openings as your visual target. Essentially, the further you are or the smaller the opening, the higher the difficulty level is and it's even better for coordination training.

48 Identify the exercises shown below.



- Ans.** (a) Isometric Push-ups
(b) Isometric-squat
(c) Isotonic-squat workout
(d) Isokinetic cycling

49



- (i) From the above picture, it is identified as training method.
(a) Pace runs (b) Fartlek
(c) Isometric (d) Isotonic
- (ii) The above training method helps in increasing the
(a) Strength (b) Speed
(c) Endurance (d) Flexibility
- (iii) The Swedish word meaning "Speed Play" is.
(a) Citius (b) Fartlek
(c) Pace (d) Altius
- Ans** (i) (b) Fartlek (ii) (c) Endurance
(iii) (b) Fartlek

50 Mr. Gopichand is a renowned badminton coach. When he started his academy, he selected our school badminton players and designed a training program. During the training, he noted that few players were good in defense but due to lack of endurance and strength, they were unable to play up to the last moment. He used various methods to enhance their

- (i) This type of training and exercises help in increasing the static strength and maximal strength.
- (a) Isometric (b) Isotonic
(c) Isokinetic (d) Aerobic
- (ii) Isotonic exercise helps in enhancing
- (a) Speed (b) Strength
(c) Agility (d) Endurance
- (iii) High pressure over muscles can be seen in these set of exercises
- (a) Isometric (b) Isotonic
(c) Both (a) and (b) (d) Ballistic

Ans (i) (a) Isometric (ii) (b) Strength
(iii) (c) Both (a) and (b)

51 Sunita, a student of class VIII, was identified as a strong girl both physically and mentally. She is being encouraged by her teacher to take up wrestling as a professional sport and start training. Sunita is also interested in the sport as she has been watching the sport on the TV and she is highly impressed by the Indian women wrestlers. She expresses her interest to her family that she wants to learn boxing but her brothers made fun of her and ridiculed her. Her father on seeing her interest sent her to a professional coach to learn that sport properly.

- (i) Which component of physical fitness is most important for a sport like wrestling?
- (a) Speed (b) Strength
(c) Endurance (d) Flexibility
- (ii) Which type of body type is most suited for wrestling?
- (a) Ectomorph
(b) Mesomorph
(c) Micromorph
(d) Endomorph
- (iii) Which type of training method is used to develop strength?
- (a) Interval Training
(b) Isometric Training
(c) Ballistic Method
(d) Acceleration runs

Ans (i) (b) Strength (ii) (d) Endomorph
(iii) (b) Isometric Training

52 Ravi has the aim of joining any of the uniform services like police, army, air force etc... But he has not qualified the 1500m

- (i) 1500m run is conducted to find the
- (a) Endurance ability (b) Speed
(c) Strength (d) Explosive
- (ii) The best training method for development of endurance is
- (a) Continuous training method
(b) Interval training method
(c) Circuit training method
(d) Fartlek training method
- (iii) In interval training method is based on principle of
- (a) Over load (b) Effort
(c) Effort and Recovery (d) Recovery

Ans (i) (a) Endurance ability
(ii) (a) Continuous training method
(iii) (c) Effort and Recovery

53 Raghu was good thrower. When he joined a new training camp, where he observed some athletes were running on uneven surfaces like bushes, rocks, pits etc. He was in dilemma. Then the coach explained about that training in detail.

- (i) What type of training are they doing?
- (a) Fartlek Training
(b) Ballistic method
(c) Interval Training
(d) Acceleration run
- (ii) Stretching exercise improves
- (a) Flexibility (b) Strength
(c) Coordination (d) Explosive
- (iii) Fartlek training is also known as
- (a) Pace runs (b) Speed play
(c) Acceleration run
(d) 400 m run

Ans (i) (a) Fartlek Training (ii) (a) Flexibility
(iii) (b) Speed play

LONG ANSWER TYPE QUESTIONS

54 Discuss about talent development in sports.

Ans Talent development in sports is the most important stage in the process of achieving sporting success. It is aimed at providing the most optimal learning environment to help promising youth athletes realise their potential. Optimum environment involves provision of adequate number of competent coaches, experts and managers, adequate and availability of

Availability of these essential resources can significantly influence the ability to engage in the required amount of high quality training. It is recommended that these resources be allocated to help identify and develop talent to enable athletes to reach the top in their sport.

55 Define three phases of macro cycle.

Ans A macro cycle is an annual plan that works towards peaking for the goal competition of the year. There are three phases in the macro cycle such as:

- (i) **The preparation phase** It is further broken up into general and specific preparation. An example of general preparation would be building an aerobic base for an endurance athlete such as running on a treadmill or by working through multiple micro cycles on the track. An example of specific preparation would be to work on the proper form to be more efficient and to work more on the final format of the sport. This could be focusing on transition techniques with a triathlete.
- (ii) **The competitive phase** It can be several competitions, which lead to the main competition. The competitive phase ends with tapering for the competition.
- (iii) **The transition phase** It is important for psychological reasons, a year dedicating time towards training means some time off is just as important. An amateur athlete may take a couple of months off while a professional athlete might take as little as two weeks off.

56 Write in detail about strength improving methods-Isometric, Isotonic and Isokinetic.
CBSE 2019

Ans There are three different methods of training to develop or improve strength. These are discussed as follows

- (i) **Isometric Exercises** These exercises were introduced by Hettinger and Muller in 1953. The word 'isometric' refers to the length of the muscle that remains same during workouts. This happens when there is a tension on a muscle but no movement is made, causing the length of the muscle to remain the same.

These exercises are very helpful in sports like archery, yoga, judo, weightlifting etc. Example of these exercises are pressing or pushing a wall, lifting a very heavy weight, pulling the rope in tug-of-war etc.

- (ii) **Isotonic Exercises** These exercises were developed by De Loone in 1954. The word isotonic refers to the toning of the muscles by repetitive exercises. Here, external movement in the muscles can be seen clearly.

When the muscles contract repeatedly, then they develop strength and endurance. The muscles or group of muscles changes in size, i.e. shortens and lengthens during action. Isotonic exercises are of two types

- **Concentric** It means upward movement of the muscles like lifting dumbbells, throwing a wall, etc. It shortens the muscles as you overcome the force of a weight.
 - **Eccentric** It means downward movement of the muscles like lowering the dumbbells down. It lengthens the muscles while being opposed by the force of a weight.
- (iii) **Isokinetic Exercises** These exercises were developed by Perrine in 1968. Isokinetic exercise refers to the exercises that are based on the movement of the muscles throughout the range of the joint with a constant speed.

Examples of isokinetic exercises are pedalling in cycling and arm stroke in swimming.

In cycling, the muscles around the knees move around the entire joint and in swimming, there is complete movement of the muscles around the shoulder joint.

57 Define flexibility and explain the methods to develop flexibility. CBSE SQP 2021 Term II

Ans Flexibility is the ability of a joint to perform action through a range of movements. It is needed to perform everyday activities with relative ease. Flexibility tends to deteriorate with age. The methods of flexibility development are as follows

- (i) **Dynamic Stretching** It refers to stretching that involves putting muscular effort along with movement at the same time. Walking lunges, kicking action, using the arms in overhead position are

(ii) **Static Active Stretching** Here the muscles are stretched without moving the limbs and the limbs are held to the end position for 30 seconds. Standing on one leg and holding the other leg directly in front for 20-30 seconds is static active stretching.

(iii) **Static Passive Stretching** This also refers to stretching of muscles without moving the limbs. However, an external force is applied to hold the stretch in position.

The external force can be some other part of your body like hands to hold the stretch, an assistance or an equipment.

(iv) **Ballistic Stretching** It uses the momentum of a moving body or a limb in an attempt to force it beyond its normal range of motion.

This is a stretching or warming up, by bouncing into a stretched position, using the stretched muscles as a spring which pulls you out of the stretch position.

This type of stretching can lead to injury, if body is not warmed up. It should proceed from slow swinging exercises in beginning followed by fast swinging exercises.

58 Discuss in detail the different types of coordinative ability. **CBSE 2020**

Or What do you understand by coordinative ability? Discuss about different types of coordinative abilities. **CBSE 2019**

Ans **Coordinative Ability** Refer to answer 38.

The different types of coordinative abilities are as follows

(i) **Differentiation Ability** It is the ability to achieve a high level of fine tuning or harmony of individual movement phases and body part movements.

(ii) **Orientation Ability** It is the ability to determine and change the position and movements of body in different types of situations.

(iii) **Coupling Ability** It is the ability to coordinate body parts movements (eg movements of hands, feet, trunk, etc.) with one another. It is especially important in sports in which fast movements have to be done. For example, gymnastics, team games, etc.

(iv) **Reaction Ability** It is the ability to react

(vi) **Adaptation Ability** It is the ability to adjust or completely change the movement according to changing situation. It depends on the speed and accuracy with which a situation is adapted. The perfection of this ability is achieved through the mastery of the skills.

59 Anil is a hockey coach. He stresses on the need to develop coordinative abilities to his students specially needed in hockey. Do you agree with it? Also explain five types of coordinative abilities.

Ans. Yes, I agree with it.

Five types of coordinative abilities are

(i) **Differentiation Ability** It is the ability to achieve a high level of fine tuning of individual movements and body part movements. Highly skilful movements with hand, feet or head increase differentiation ability.

(ii) **Orientation Ability** It is the ability to determine and change the position and movements of the body in different types of situations. For example, in gymnastics, the position and movement of head and eyes is important for orientation.

(iii) **Coupling Ability** It is the ability to coordinate body parts movement (For example, movements of hands, feet, trunk etc.) with one another. It is especially important in sports in which fast movements have to be done. For example, gymnastics, team games etc.

(iv) **Balance Ability** It is the ability of a sportsperson to maintain equilibrium of the body both in static and dynamic conditions. In other words, it is the ability to maintain balance during the complete body movements and to regain balance quickly after the balance disturbing movements. This ability is essential in most of the sports and games.

(v) **Rhythm Ability** It is the ability to do body movements according to a given rhythm like in gymnastics, performing

60 Explain any two training methods to improve coordinative abilities.

Ans. Two training methods to improve coordinative abilities are as follows

- (i) **Ball or Balloon Toss** In this exercise catch and bump a balloon back and forth using hands, head, and other body parts. Since the balloon floats slowly, one can change the angles to make the exercise a little unpredictable.

For a little more challenge, use a small ball (like a tennis or table tennis ball) which allows for faster speed. During exercise ask the other partner to switch up the angles, speeds, and throwing patterns as they toss the ball to other person. This hand-eye coordination drill helps rehearse the way athlete thinks and react quickly to the variations.

If you're training alone, consider doing the ball toss from different orientations - while lying on your back, in a squat, or lunge positions - to get the most out of the drill. Doing this adds mobility to your coordination training, enhances your balance and reduces the risk of injury.

- (ii) **Jump Rope** This classic coordination exercise works to synchronise hand-foot-eye movements. Start off by hopping from one foot to the other or slowly running in place. Gradually progress to criss-cross jumps, two-foot hops or even a faster speed, when athletes found their rhythm. Also, try to keep rope at a steady pace if an athlete is working on his footwork to minimise pain and injury. Essentially, jumping rope is not just an excellent drill that improves hand-eye coordination, it also works on foot speed, teaching to maintain control and rhythm when athletes are fatigued.

SELF ASSESSMENT

OBJECTIVE ANSWER TYPE QUESTIONS

- The credit for developing isokinetic exercises goes to whom?
(a) Muller (b) Perrine (c) Dr Van Aaken (d) De Loone
- Name the endurance in which ability to resist fatigue in activities last upto 45 seconds.
(a) Speed endurance (b) Medium term endurance
(c) Short-term endurance (d) Long-term endurance
- Continuous training is related specifically with which of the following fitness abilities?
(a) Speed (b) Strength (c) Coordinate abilities (d) Endurance
- Why the term 'agility' is closely related with which of the following fitness abilities?
(a) Strength (b) Coordinate abilities (c) Circuit training (d) Flexibility
- _____ means upward movement of the muscles like dumbbells etc.
- Explosive strength refers to the ability of the muscles to overcome resistance even under conditions of fatigue. State true or false.
- Static passive stretching refers to stretching of muscles without moving the limbs. State true or false.

VERY SHORT ANSWER TYPE QUESTIONS

- Define cardiovascular endurance.
- What do you mean by isokinetic exercises?
- What are the benefits of isotonic exercise?
- What are the ways of developing strength?
- Write two isometric exercises.

SHORT ANSWER TYPE QUESTIONS

- Elaborate on isotonic exercises.
- What are the methods of improving flexibility?
- Explain the method of doing isometric exercise.

LONG ANSWER TYPE QUESTIONS

- What is flexibility? How can it be developed?
- Discuss the significance of speed in sports.