

C.B.S.E. EXAMINATION PAPER—2018 (Delhi)

PHYSICAL EDUCATION (Theory)

CLASS—XII

Time : 3 hrs.

Max. Marks : 70

General Instructions

- (i) The Question paper contains 26 questions in all.
- (ii) All questions are compulsory.
- (iii) Questions no. 1 to 11 carry 1 mark each. Answers to these questions should be in approximately 10-20 words each.
- (iv) Questions no. 12 to 19 carry 3 marks each. Answers to these questions should be in approximately 30-50 words each.
- (v) Questions no. 20 to 26 carry 5 marks each. Answers to these questions should be in approximately 75-100 words each.

Q.1. What do you mean by fixture ?

1

Ans. A fixture is a sporting event arranged to take place on a particular date.

Or

A fixture is a piece of equipment or furniture which is fixed in position in a building or vehicle.

Q.2. Why does the Weightlifter's diet include lots of Proteins ?

1

Ans. The maximum amount of protein is found in the tissues of our body. Besides, this protein is also found in blood, secretion of endocrine glands, bones, teeth and in delicate tissues. If water is extracted from our body, the maximum percentage of protein will be left behind in our body. Protein is a compound, which is formed by the combination of oxygen, carbon, hydrogen and nitrogen.

Q.3. What is Hypertension?

1

Ans. Hypertension means increased blood pressure. It has become a world wide health problem because a great number of people are facing the problem of hypertension throughout the world. Hypertension that blood pressure increases with the advancement of age. Hypertension used to be considered a middle-age problem but now-a-days, youngsters also suffer from this problem due to their faculty lifestyles.

Q.4. What do you understand by 'Physical Disability'?

1

Ans. Physical Disability is an impairment that may be cognitive developmental, intellectual, mental physical etc. It affects every day activities of the individual to a considerable amount. Disability is an injury that restricts the functions or movements of an individual. It is the consequence of an impairment caused to an individual.

Physical disability is the reduction of functional ability to lead daily fruitful life.

Q.5. What is the main causes of 'Scoliosis'?

1

Ans. Scoliosis may be due to many reasons but the main reasons are diseases in the joint of bones under-developed legs, infertile paralysis, rickets etc.

Q.6. What is 'Amenorrhoea' in female athletes triad ?

1

Ans. Amenorrhoea is a menstrual disorder or illness in women where girls of 18 years and above either never began menstruating or there is an absence of menstruation for three months or more than that in women with a history of normal menstrual cycle. Amenorrhoea can also be defined as the cessation of woman's menstrual cycle for more than three months or more.

Q.7. What do you know about the term 'cardiac output'?

1

Ans. The amount of blood the heart pumps through the circulatory system in a minute. The amount of blood put out by the left ventricle of the heart in one contraction is called the stroke volume. The stroke volume and the heart rate determine the cardiac output.

Q. 8. What type of fracture is known as Greenstick fracture? 1

Ans. Greenstick fracture an incomplete fracture in which the bone is bent. This type of fracture occurs most often in children. Transverse fracture a fracture at a right angle to the bone's axis. This commonly occurs with arm fractures in children and is sometimes known as a buckle fracture.

Q. 9. What do you mean by 'Kinesiology'? 1

Ans. The term kinesiology means 'the study of movement' and the academic discipline of kinesiology comprises the sub disciplines of exercise physiology, athletic training and sports medicine, sports administration, fitness and health promotion. Kinesiology is the branch of physiology that studies mechanics and anatomy in relation to human environment.

Q. 10. Define the term 'Emotions'. 1

Ans. An introduction to the study of emotions]. ... According to the psychoevolutionnism theories, all emotions derive from a set of discrete basic emotions, common to human and animals, genetically determined. Basic emotions are thus considered as physiological processes based on specific neuronal circuits.

Q. 11. Explain the term 'Sports Training'. 1

Ans. Sports Training is considered to be a complex process for preparing athletes to achieve their goals, such as winning an event. Training involves, not only, the desire to win, but also the finding of sports medicine, bio-mechanics, exercise psychology and the likes.

According to Martin : Sports Training is a planned and controlled process which for achieving a goal changes in complex sports motor performance, ability to act and behaviour are made through measures of content, methods and organization.

Q. 12. Naman was a Class VI student. He used to bring junk-food in his lunch-box daily. His teacher observed that he was neither concentrating on his studies nor actively participating in physical activities. In this matter, he had a talk with his parents and came to know that he refuses to eat roti, dal, fruits and vegetables. Due to this he is facing these problems. 3

Based on the above passage, answer the following questions :

- (a) What types of problems was Naman facing ?
- (b) Why should junk-food not be recommended ?
- (c) What values has his teacher shown in this matter ?

Ans. (a) Naman facing was neither concentrating on his studies nor actively participating in Physical activities.
(b) Junk food not be recommended because it is not energetic and gives many health problems.
(c) caring, sympathy

Q. 13. Write briefly about some considerations of fluid intake pre, during and post competition, that affect the sportsperson's performance. 3

Ans. Balanced diet definitely affects the performance in sports competitions :

Sports Activity	Diet Before Competition	Diet During Competition	Diet After Competition
Endurance activities like players of Marathon, Basketball, Football, Hockey, Cyclist, Cricket.	More amount of complex carbohydrates like Rice, Potato, Wheat, Bread, Banana, Date, Gram, Sugar, Nuts, Pulses, Bajra.	Simple carbohydrates and sufficient water if required (after 1 hour) like, fruit juice, glucose water.	Lots of Complex carbohydrates, more amount of low fats, sufficient water like rice, potato, wheat, bread, chocolate, cake, biscuits pulses, cereals, etc.
Skill activities or Speed activities like players of Sprint races, Middle distance races, Kho-Kho, Water polo, Skating, Swimming.	More amount of carbohydrates-simple and complex.	Simple carbohydrates in liquid form, if required.	Sufficient amount of complex carbohydrates, lots of vitamins and minerals, increased amount of proteins.
Explosive activities and Body contact activities like players of Wrestling, Kabaddi, Judo, Jump, Throws.	More amount of carbohydrates-simple and complex.	Simple carbohydrates in liquid form, if required.	Sufficient amount of complex carbohydrates, lot of proteins, lots of vitamins and minerals.

Q. 14. What are the benefits of Physical activities for children with special needs ? Explain. 3

Ans. Physical activities can provide significant benefits for the children with special needs. Following are the advantages/benefits of physical activities for children with special needs :

- (i) **Mental Improvement** : Physical activities are not only good for a child's body but these are beneficial for their mind too. In fact, physical activities improve general mood and wellness of children with special needs.
- (ii) **Reduce the level of Anxiety, stress and Depression** : Physical activities may help in reducing the level of anxiety, stress and depression of children with disabilities.
- (iii) **Cognitive Benefits** : Physical activities lead to cognitive skill improvement in children with disabilities. These activities allow them to discover and access strengths that cannot be challenged in the classroom setting.
- (iv) **Better Emotional and Psychological Health** : Physical activities are beneficial for children with special needs because these activities improve emotional and psychological health.

Q. 15. How does participation in Games and sports contribute to the psychological development of women athletes in India ? Explain. 3

Ans. Psychological Aspects of Women Athlete : Over the past several decades, the role of women has changed drastically. Most of the people in our society consider that sports are not meant for females but only for males. Social tradition, customs and cultures have great influence upon the psychology of women. The various psychological traits of women athletes are stated below :

- (i) **Develop confidence** : The females who participate in sports should develop self-confidence to face the challenges of sports life.

- (ii) **Financial Aid** : Female athlete should be given financial aid and reward should be given to deserving female athlete.
- (iii) **Job and Career** : Female athletes should get good social status, moreover they should be provided jobs and career through sports, thus every girl is motivated to do same.
- (iv) **Equality in society** : Our society should accept females as equal and important part of society. There should be no discrimination between girl and boy child.
- (v) **Government Policies** : The government should make good and encouraging policies to bring up mass girls participation in sports.
- (vi) **Motivation from Parents** : Parents should be counselled, motivated and encouraged to make girls participate in sports activities.
- (vii) **Encouragement from Institutions** : The girls should be encouraged by teachers and institutions to participate in sports activities.
- (viii) **Safe Playing Environment** : Female athlete should be given safe and clean sports environment, moreover they should be well protected from anti-social elements.
- (ix) **Hood Coaching and Training Facility** : The girls should be given good coaching and training facilities, moreover regularly counselled about their problems.
- (x) **Respect in Society** : The females athletes should get good respect in society and family.

Q. 16. Write briefly about menstrual dysfunctions and their effect on sports participation of female athletes. 3

Ans. Menstrual dysfunction is a disorder or irregularity in women's menstrual cycle. In other words, it can be defined as an 'abnormal bleeding' during the menstrual cycle. Normal menstrual cycle varies from 21 to 35 days. Its flow lasts approximately two to seven days. Menstrual irregularities seem to be higher in women athletes in comparison to non-athletic women.

Menstruation and sports Participation

Most of the people used to believe that participation in sports during menstruation could be physiologically harmful. Recent studies conducted in this field show that there has been no basis or evidence of dysmenorrhoea of any consequence as a result of intensive participation in sports. In fact, there have been recent reports to indicate complete absence of menstruation in women who usually get trained for long duration in running. However, it is not applicable for all the women sports persons or in all the sports. Some studies indicate that sport participation is beneficial in relieving pain and preventing dysmenorrhoea. Even research studies show that a small number of women participating in sports experience dysmenorrhoea in comparison to non-participants.

Q. 17 What do you understand by 'FirstAid'? How will you manage Joint injuries? Explain. 3

Ans. Meaning of FirstAid : Every individual's life and work are closely related to his environment. Man has progressed in various fields of life such as industrialisation, mechanisation, transport and science etc. Therefore, this age is called an electronic age or space age. But on the other hand, this development has created such conditions that a person may get injured anywhere and at anytime. First aid is the assistance given by any person suffering a sudden illness or injury, with care provided to save life, prevent the condition from worsening, and/or promote recovery. First aid is generally performed by the layperson, with many people trained in providing basic levels of first aid, and others willing to do so from acquired knowledge. Mental health first aid is an extension of

the concept of first aid is extension of the concept of first aid to cover mental health. So, it is essential to have the knowledge of first aid for common sports injuries.

Joint Injuries : Joint injuries are injuries to any joint in the body. The larger limb joints tend to be the most utilised and are hence more prone to injuries. A joint injury can involve damage of the bones, alignments or other tissues of the joint. The injury may be acute or chronic. Joints are places where bones connect. They are generally classified as immovable, slightly movable and freely movable.

- (i) **Immovable joints :** An immovable joint is a place in the body where two bones are joined together but where little or no movement is normally possible and where no joint cavity exists, as is present in the majority of joints in the body in order to allow for a range of movement.
- (ii) **Slightly movable :** Slightly movable joints have a cushion of cartilage in between the bones, with the bones resting on these beds of cartilage. This cushion of cartilage stops the bones from rubbing together. As the name suggests, these joints are slightly moveable, with ligaments or cartilage stopping them from moving too far. Joints are classified as either fibrous or cartilaginous, with one type of each considered, slightly movable.
- (iii) **Freely movable :** Freely movable joints are joints in the body with a high degree of mobility and flexibility. Freely movable joints are the most complex of joints. The bones are held together by freely movable joints that have a layer of hyaline cartilage at the adjoining ends. The junction of the bones is a joint capsule, the top layer of which is composed of ligaments.

Q.18. What do you understand by sports medicine ? Discuss briefly about the scope of sports medicine.

3

Ans. Sports medicine is related to the medical science which deals with the treatment and preventive care of athlete. A sports medicine team specially includes physicians, surgeons, athletic trainers, physical therapists, coaches, other athletics, etc. Usually, sports medicine refers to treating, preventing and diagnosing sports injuries of players who get various injuries while playing sports.

The following definitions may be helpful to understand the clear-cut meaning of sports medicine :

- (i) According to **Philip Adler**, "It is the practice of medicine in the area of health and fitness to diagnose, to treat and prevent injuries resulting from sports activities."
- (ii) According to **J.S.P. William**, "Sports medicine is a specialized study of various physiological and pathological problems of athletes or sportsmen to maintain or regain extreme physical fitness."
- (iii) According to **Webster's Dictionary**, "It is the branch of medicine concerned with athletic conditioning and nutrition, the treatment and prevention of athletics injuries and the improvement of athletics performance."

Scope of Sports Medicine

In physical education and sports the fields of various sub-disciplines of sports medicine are used. On the basis of their study, the different problems of sports persons are solved. Without the knowledge of scope of sports medicine it is a difficult task to carry a sports performance at top point. Therefore, at graduation and post graduation levels the various sub-disciplines of sports medicines are included. There are following scope of sports medicine :

- (i) Human anatomy and physiology.
- (ii) Sports and first aid.

- (iii) Prevention of accidents in sports and games.
- (iv) Sports injury rehabilitation.
- (v) Female and sports
- (vi) Fitness for games and sports.
- (vii) Preventive and curative exercise.
- (viii) New methods of detecting the doping as well as use and abuse of drugs.
- (ix) Physiotherapy.

Q. 19. What are the factors affecting Self-Esteem and body Image ? Explain.

1×3=3

Ans. Factors affecting Self-Esteem and Body Image

There are various factors which influence your self-esteem and body image. These factors are given below :

- (i) **Puberty and Development** : Some teenagers struggle with their self-esteem and body image when they begin puberty because during this period, the body goes on a number of changes. They compare their body with others.
They confront with the problem that not everyone develops at the same time or in the same way. Their development takes place differently which may create a negative body image and low self-esteem for some of the teens. Teenage girls who don't like their bodies usually want to lose weight and be thinner, whereas, teenage boys to lose weight, be taller and have more muscles.
- (ii) **Media Images** : During teenage, they usually start to compare themselves with media images and celebrities. Both the media (print and electronic) can affect, how the teenagers feel about themselves and their body images.
- (iii) **Family and School** : The family, school and other members of society can influence our self-esteem and body image. Sometimes, family members may criticize their children about their looks and due to that children may develop a negative body image.
- (iv) **Life Experience and Natural Ageing Process** : When our body changes due to natural ageing process, we have different feelings about our body. Even our experience of life may influence our body image and self-esteem. Individuals may experience negative comments about the way they look from any person. Such experience of life may influence the body image and self-esteem.

Q. 20. Mention all calculations and steps involved to draw a knock out fixture of 19 teams.

Ans. To draw a fixture of 19 teams on knock out basis :

1+4=5

$$\begin{aligned}
 \text{Total numbers of teams} &= 19 \\
 \text{Total number of matches} &= 19-1=18 \\
 \text{Number of teams in upper half} &= \frac{n+1}{2} = \frac{19+1}{2} \\
 &= 10 \text{ teams} \\
 \text{Number of teams in lower half} &= \frac{n-1}{2} = \frac{19-1}{2}
 \end{aligned}$$

$$\begin{aligned}
 \text{Total number of byes} &= 9 \text{ teams.} \\
 &= 32 - 19 = 13 \text{ Byes} \\
 \text{Numbers of byes in upper half} &= \frac{N_B - 1}{2} = \frac{13 - 1}{2} = 6 \text{ Byes} \\
 \text{Number of byes in lower half} &= \frac{N_B + 1}{2} = \frac{13 + 1}{2} = 7 \text{ Byes} \\
 \text{Number of rounds} &= 2 \times 2 \times 2 \times 2 \\
 &= 5 \text{ rounds} \\
 \text{Teams in each quarter} &= \\
 \text{First Quarter} &= Q + 1 = 4 + 1 = 5 \text{ teams} \\
 \text{Second Quarter} &= Q + 1 = 4 + 1 = 5 \text{ teams} \\
 \text{Third Quarter} &= Q + 1 = 4 + 1 = 5 \text{ teams} \\
 \text{Fourth Quarter} &= Q = 4 = 4 \text{ teams}
 \end{aligned}$$

Q.21. Briefly explain the symptoms and causes of Asthma. Explain the procedure, benefits and contradictions of any two asanas to prevent asthma. 1 + 4 = 5

Ans. Asthma is a disease of lungs in which the airways become blocked or narrowed causing difficulty in breathing. In asthma, the airways also swell up and produce extra mucus. It usually triggers coughing, wheezing or whistling and shortness of breath. The coughing usually occurs at night or early in the morning. The excessive amount of mucus in the passage further narrows the airways because it is sticky and thick. Asthma can be allergic and non-allergic. Asthma may be due to genetic factor. There are substances that cause allergic like irritants in the air include smoke from cigarettes, wood-fires, strong fumes, etc. respiratory infections such as cold, flu, sore and sinus infections, drugs etc. Asthma can be prevented as well as cured if the following asanas are practised regularly.

Sukhasana For Asthma :

Steps :

- (i) This yoga is extremely beneficial for burning of fat from the abdomen.
- (ii) This pose is helpful in weight loss and obesity management.
- (iii) It helps to remove any tendency towards round shoulders.
- (iv) It is beneficial in case of sciatica and slipped disc.
- (v) It has been found useful in treating ailments like indigestion, rheumatism and constipation.
- (vi) It is effective in the proper function of adrenal glands, kidney and liver.
- (vii) The yoga pose strengthens the shoulder, hips and neck.
- (viii) It gives relief from stress and strain that occurs in the back due to forward and backward bending yoga poses.

Benefits :

- (i) It provides wide range of flexibility to the spine.
- (ii) It helps to remove any tendency towards round shoulders.

- (iii) It is beneficial in case of sciatica and slipped disc.
- (iv) It gives compression and stretch to the abdominal organs, thus facilitates massage, recirculates impure blood and tones up the associated nerves.
- (v) It has been found useful in treating of ailments like indigestion, rheumatism and constipation.
- (vi) It is effective in the proper function of adrenal glands, kidney and liver.
- (vii) The yoga pose strengthens the shoulder, hips and neck
- (viii) It gives relief from stress and strain that occurs in the back due to forward and backward bending yoga poses.

Chakrasana For Asthma :

'Chakra' means 'wheel'. In this asana, the body assumes the shape of wheel, hence it is called Chakrasana. This asana improves flexibility of whole body especially the back.

Steps :

- (i) Lie flat on your back, feet comfortable apart.
- (ii) Bend the knees and place the feet flat on the floor. Try to bring the heels close to your buttocks.
- (iii) Bending the elbows, place your palms under your shoulders with the fingers pointing towards the feet. Try to keep the elbows shoulder-width apart.
- (iv) Inhale and push the palms into the floor. Slowly try to lift your shoulders and head off the floor.
- (v) Press your feet firmly into the floor. While inhaling lift your buttocks off the floor. Keeping the pressure with the palms and the feet onto the ground, try to roll the spine off the floor to form a semicircular arch or a wheel.
- (vi) In the final position, make an effort to keep your legs and arms as straight as possible so the hips and chest remain lifted up. Look at the wall behind you.
- (vii) Breathe normally and hold the pose for 5-7 breaths or whatever duration feels comfortable while holding this pose.
- (viii) Keep the facing muscles and neck muscles.
- (ix) The weight of the body should be distributed evenly on the feet and palms. You can do so by shifting the body back and forth to find the right balance.
- (x) Become aware of the openness and expansion of the chest and continue with regular, even breaths.
- (xi) Bend your knees to slowly roll your spine and hips back to the floor.

Benefits :

- (i) The entire front part of the body gets a deep stretch. Openness of the chest helps bring in more fresh supply of oxygen.
- (ii) The muscles on the front part of the thighs (quads) and the calves are stretched and strengthened.
- (iii) This pose is extremely beneficial for those sitting for long hours in front of the desk or computer as they usually hunch over the desk all day long. The backward stretch in the pose relieves tension or stress from the body and helps in alleviating problems resulting from poor posture.
- (iv) This pose helps in toning and strengthening the back muscles.

(v) It helps brighten your mood and brings about a sense of well-being.

Limitation :

Person suffering from weak wrist, high blood pressure, vertigo, hernia, abdominal problems etc., should not practice the asana.

Q. 22. What are the types of motor development ? Describe any six factors affecting motor development in children. 1+4=5

Ans. Motor development refers to the development of a child's bones, muscles and his/her ability to move around and manipulate his/her environment. In simple words, motor development means the development of various motor abilities from birth till death.

Motor development is the step by step ability of an infant to carry out various human skills like flexibility, dexterity, exploration, movement control etc. Motor development can be developed into two sections :

(i) Gross Motor Development

(ii) Fine Motor Development

(i) Gross Motor Development : It is the development of the large muscles in the child's body. These muscles allow us to sit, stand, walk, run and other such activities. Gross Motor Development needs co-ordination and balance.

(ii) Fine Motor Development : It is the development of small muscles of the body, specially in hand. It involves the movement of fingers and hand like picking up the objects, using cups, knives, forks, pouring drinks, dressing, holding and using pen, pencils, scissors and keyboards etc.

Factors affecting motor development in children :

There are various factors which are liable to affect motor development of children. In many cases, genetics may determine how slowly or quickly a child learns to use his or her body and some research indicates that a child's gender may also be a factor.

(i) Stress and arousal : They happen due to an imbalance between demand and the capacity of the individual. Arousal is the state of interest in the skill. The maximum performance level is moderate stress or arousal. If an overqualified worker does a repetitive job it is called too low an arousal.

(ii) Fatigue : If a person does a stressful task for a longer period, his performance is bound to get deteriorated and he experiences fatigue quickly. This is due to over-arousal. Fatigue has an impact on the individual's performance in several ways : perceptual changes in which visual activities slows down the performance, that is, reaction times or movements speed, irregularity of timing and improper organisation of performance.

(iii) Vigilance : It affects the loss of vigilance, similar to fatigue, but is caused by lack of arousal. Motor learning has a few stages which should be followed when teaching children. These are :

(a) Cognitive Phase : Sufficient cognitive activity will enable the learner to determine appropriate strategies to ascertain the desired goal and enable good strategies to be retained. The performance is greatly improved in a short period of time.

(b) Autonomous Phase : The child learns the most effective way to do the task and starts making subtle adjustments to the performance. Gradual improvements are visible and movements

become more consistent. Associative phase lasts longer and the skills are fluent, efficient and aesthetically pleasing.

(c) **Autonomous Phase** : This "autonomous" phase takes some years to reach to automatically complete the task without paying any attention to performing it. Examples include walking and talking or sight reading while doing simple arithmetic.

Q. 23. Write in detail about 'Borrow's motor Ability Test' to measure motor fitness components. 1+4=5

Ans. Agility : Agility is the capacity to change course, controlling the direction and position of your body while maintaining your momentum. Changing course while sprinting to hit a tennis ball is an example of agility. Sports coach Brian Mackenzie offers a simple zig-zag run to test agility.

Balance : Balance is the ability to stabilize your body, whether standing still or maintaining motion. Ice-skating, skiing and bicycle riding are balance exercises. There are two types of balance- static and dynamic. Static balance refers to remaining upright while staying still, standing on one leg, for example. Dynamic balance deals with stability in motion.

Coordination : Coordination describes the synchronization of your senses and your parts in a way that enhances motor skills. Volleying a table tennis ball is an examples of hand-eye coordination. A variety of tests measure coordination, including juggling ir hitting a ball.

Speed : Speed is the facility to move your body swiftly. Speed is usually associated with running, but other exercises, like throwing or kicking a ball, depend on moving your arms or legs rapidly. Some athletic coaches measure speed with a 40-yard dash.

Power : Power is a combination of speed and muscular force. A football linebacker uses power to blast through a line of men. A gymnast uses power during a performance on the rings and uneven bars. Measure your power by throwing a heavy object or lifting weights.

Reaction Time : Reaction time measures how swiftly you interpret and then react to expacted and unexpected events happening around you. An example of reaction time to an expected event is the interim between hearing the starter's pistol and beginning to run. Your reaction time to unexpected events, such as a bicycle crash just ahead of you in a race, relies on how quickly you can make sense of the event and come to decision about how to react to it.

Q. 24. Write in detail about the physiological changes taking place due to ageing. 1+4=5

Ans. The various physiological functions reach their peak approximately during 20 to 30 years. The research studies conducted in this field show that most of the systems or functions after reaching their peak, start decreasing gradually with age. Most of the research studies also show that most of the organs seen to lose physiological functions at about 1% a year beginning around 30 years of age. There are various physiological changes which occur in our body due to ageing process. The major physiological changes due to ageing are stated below :

(i) **Change in muscle size and strength** : When an individual gets older, there is a decrease in muscle size. There is a decrease in muscle mass and increase in over all body fat. Due to decrease in muscle size, the strength of the muscles also decreases. The decrease in strength gradually occurs during the age of 35 to 45 years.

(ii) **Change in metabolism and body composition** : W ith advancement of age, our body needs less energy and the metabolism slow down. There is an increase in the accumulation of body, fat and lean body weight bones, ligaments, tissues, tendons, muscles and water decreases.

(iii) **Changes in bone density** : With the advancement of age the bone density decrease. The bone becomes less dense and more porous. Less bone density can result in osteoporosis and reduction of weight bearing capacity which may lead to fracture.

(iv) **Changes in respiratory system** : Research studies show that pulmonary function is impaired with advancement of age. The airways and lung tissues become less elastic. They become less efficient. The muscles of the rib cage become weak. Hence, the ability to breathe deeply is reduced. Pulmonary oxygen is reduced which leads to decrease endurance with shortness of breathe and fatigue.

(v) **Changes in cardio-vascular system** : With advancing age, there is a progressive decrease in cardiac muscle strength. The stroke volume, cardiac output and blood flow-are all decreased with age. Blood vessels also lose their elasticity and become more and more rigid. Systolic blood pressure also increases with age. Heart valves become less flexible.

(vi) **Changes in nervous system** : Research studies show that reaction time and movement time slow down with increasing age. To recall memories become slow.

Q.25. **Mention in detail about the Aerodynamic principles and also discuss about the application of aerodynamics in sports.** 1 × 5 = 5

Ans. The word 'Aerodynamics' is originated from two Greek words 'aerions' means related to air and 'dynamics' means motion, so collectively aerodynamics means the study of motion of air. In fact, aerodynamics is the study of properties of moving air and the interaction between the air and solid bodies moving through it. Aerodynamics is the way air moves around things. In simple words, 'Aerodynamics is related to the flow of air around a projecti, which can influence speed and direction of the object.'

The Basic forces of Aerodynamics :

There are four basic forces of aerodynamics such as lift, weight thrust and drag. These forces make an object move up and down, faster on slower. The amount of each force compared to its opposing force determiner how an object moves through the air. The basic force of aerodynamics are stated below .

(i) **Lift** : Lift is the force that pushes the object to move upward. In fact, it is the force that is opposite of weight. Lift plays important role in any sport involving balls. In sports, when a ball is thrown or hit into the air, its lift depends on the force the individual applies. If more force is applied to the ball, its lift will also be higher.

(ii) **Weight** : Weight is the force generated by the gravitational attraction of the earth. The weight of an object controls how strong the push has to be. A shot of 16 pounds requires more force (push) than a javelin. If the weight of two objects is different and same force is applied on both the objects then the lighter object will travel more than the heavier object.

(iii) **Drag** : Drag is a force that tries to slow the object down. It makes hard for an object to move. It is harder to walk through the water than through the air. It is because water causes more drag than air. The shape of an object also changes the amount of drag. Most probably the round objects have less drag than flat objects. Even narrow surfaces such as javelin, racing cars, motor bikes, etc., have less drag than wide ones. In fact, the more air that hits a surface of an object, the more drag it makes.

(iv) **Thrust** : Thrust is the force that is opposite of drag. Thrust is the push that moves some objects forward. In case of sports, the equipment like javelin or discuss does not have thrust. That is why such objects can move into the air until the drag causes them to slow down and lead on the ground.

Q. 26. What do you understand by High Altitude Training in sports ? What is the impact of high altitude training on athletes ? Write in detail. 5

Ans. High Altitude Training : Altitude training is the practice by some endurance athletes of training for several weeks at high altitude, preferably over 2,400 metres (8,000 ft) above sea level, though more commonly at intermediate altitudes due to the shortage of suitable high-altitude locations. At intermediate altitudes, the air still contains approximately 20.9% oxygen, but the barometric pressure and thus the partial pressure of oxygen is reduced.

Depending very much on the protocols used, the body may acclimate to the relative lack of oxygen in one or more ways such as increasing the mass of red blood cells and hemoglobin, or altering muscle metabolism. Proponents claim that when such athletes travel to competitions at lower altitudes they will still have a higher concentration of red blood cells for 10-14 days, and this gives them a competitive advantage. Some athletes live permanently at high altitude, only returning to sea level to compete, but their training may suffer due to less available oxygen for workouts.

Altitude training can be stimulated through use of an altitude simulation tent, altitude simulation room, or mask-based hypoxicator system where the barometric pressure is kept the same, but the oxygen content is reduced which also reduces the partial pressure of oxygen. Hypoventilation training, which consists of reducing the breathing frequency while exercising, can also mimic altitude training by significantly decreasing blood and muscle oxygenation.

Effects of Altitude Training :

(i) **Getting High** : A sudden ascent to high altitude can have a profound impact on your athletic performance. Due to lower atmospheric pressure at high altitudes, the partial pressure of oxygen that you breathe in is lower than at sea level, reducing the amount of oxygen available for physical activity. When oxygen is reduced to levels that impair your performance, you are said to be hypoxic. According to exercise physiologist Frank B. Wyatt, PhD of Midwestern State University, at altitudes of around 5,000 feet, your VO₂ max, the maximum amount of oxygen you can use during intense exercise, begins to diminish and your performance declines. VO₂ max goes down linearly with incremental increases in altitude above 5,000 feet at a rate of about 3 percent per 1,000 feet

(ii) **In the Zone** : Hypoxia triggers a series of metabolic reactions that help you adjust to your new environment, a process called acclimatization. According to Wyatt, individual rates of acclimatization can range from two weeks to several months. One significant adaptation to hypoxia is an increase in red blood cells and hemoglobin, the oxygen transporting protein found in red blood cells. A 1992 Swedish study by Berglund of healthy athletes, published in "Sports Medicine," found that with regular training, hemoglobin increased at the rate of about 1 percent per week. Because the difference in hemoglobin between sea level and high altitude is about 12 percent, Berglund speculated that it would take about 12 weeks for the athletes to become fully acclimatized.