

# Chapter 8

## Physiology and Sports

### Important Questions

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#### VERY SHORT ANSWER TYPE QUESTION (1 MARK EACH)

**Q1. What is flexibility?**

**Ans.** Flexibility is the range of movement of a joint. The range of joints varies significantly from joint to joint & depends on the surrounding tendons, ligaments & muscle tissues.

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**Q2. What is ageing?**

**Ans.** Ageing is a process of continuous & irreversible decline in the efficiency of various physiological functions.

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**Q3. What is stroke volume?**

**Ans.** Stroke volume is a volume, which the heart pumps out the blood in a stroke in aorta.

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**Q4. Define oxygen intake?**

**Ans.** It is the amount of oxygen, which can be taken by the lungs from the atmosphere.

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**Q5. Define physical fitness?**

**Ans.** Physical fitness is considered a measure of the body's ability to perform effectively & efficiently in work and leisure activities, to be healthy, resist hyperkinetic diseases & emergency situations.

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**Q6. What is cardiac output?**

**Ans.** The total volume of blood, pumped by heart per minute.  $\text{Cardiac output} = \text{heart rate} \times \text{stroke volume}$ .

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**Q7. What is oxygen uptake?**

**Ans.** The amount of oxygen, which can be absorbed and consumed by the working muscle from the blood.

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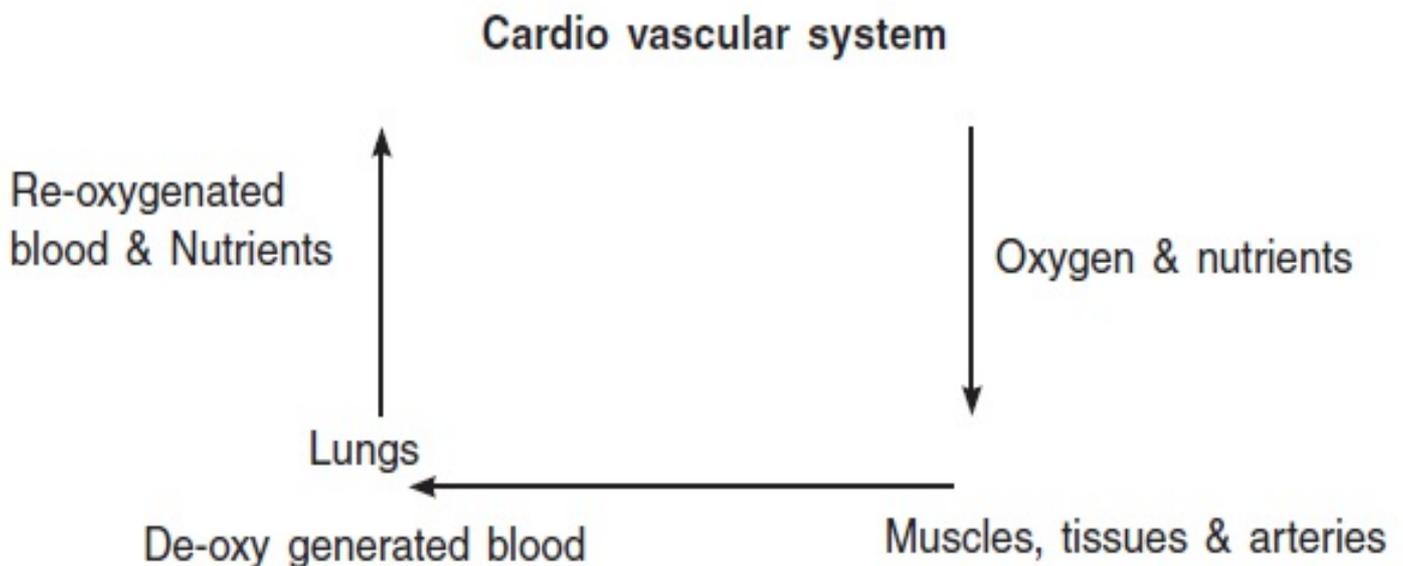
**Q8. What do you mean by physiology?**

**Ans.** Physiology is the division of biology that deals with the functions and activities of living organisms & their parts as well as physical and chemical process i.e. Nutrition, movement & reproduction, which is the living activities.

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**Q9. What is Cardio-vascular system?**

**Ans.** It sends oxygen to various muscles, tissues & arteries and at the same time returns The De-oxygenated blood to the lungs to be re-oxygenated and return the fuel to The Active tissues of the different parts of body.



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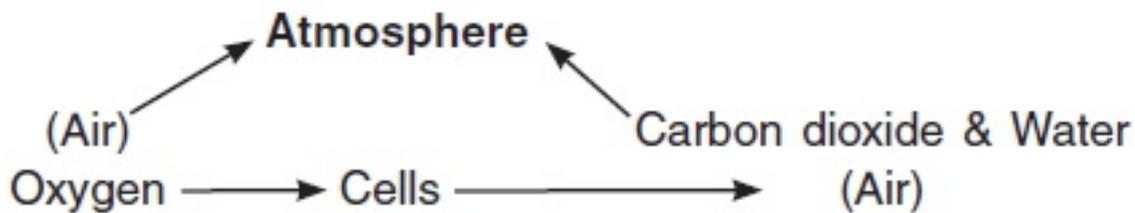
**Q10. Define Respiratory system?**

**Ans.** It is a system in which organs to take oxygen inside and throw away carbon dioxide from the body.

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**Q11. What is Respiration?**

**Ans.** The process of Oxygen supplied to the cells and the transport of carbon dioxide from the cells is called Respiration.



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**Q12. Define Blood Vessels?**

**Ans.** Blood vessels are, tube like structures in the body, in which, blood flows from heart to cell and vice-versa. Three types of blood cells -arteries, veins & capillaries

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**Q13. What do you mean by circulatory system?**

**Ans.** The body system, which specialized function of transporting Air, Nutrients, Waste Material, Harmons and Enzymes. It consists Heart, Blood vessels & Glands.

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**Q14. What is Trachea?**

**Ans.** Trachea is a hollow wind pipe, which permanently kept open and is lined with ciliated epithelium tissues.

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**Q15. What is the Tidal Volume?**

**Ans.** It is the volume of Air, ventilated with one normal inhalation during ordinary respiration.

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**Q16. What is Vital Capacity?**

**Ans.** It is the volume of air, that can expelled by the most forcefully expiration after the deepest inspiration.

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**Q17. What is VO<sub>2</sub> Max(Maximum Oxygen uptake).**

**Ans.** It is the maximum amount of Oxygen, utilized by the body in one minute.

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**Q18. Explain Aerobic capacity?**

**Ans.** It means perform activity with maximum use of oxygen to produce energy for that activity.

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**Q19. Define Total Lung Volume?**

**Ans.** It is the volume of Air, which, the lungs can accommodate after a deep inspiration.

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**Q20. Explain Muscle Fibre?**

**Ans.** The Muscle tissues consists of specialized contractile cell. The type of muscle fibre in:

The body— 1. Fast Twitch fibres- White fibres.

2. Slow Twitch fibres (Red Fibres)

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**Q21. What is Myoglobin?**

**Ans.** The Myoglobin is a type protein present in muscle fibre to store oxygen which produces energy in emergencies.

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**Q22. Define Anaerobic Capacity?**

**Ans.** It means perform activity without the use of oxygen to produce energy for that activity within the body and it's resultant products are:-

Lactic Acid

Carbon dioxide

Water

**SHORT ANSWER TYPE QUESTIONS (80 TO 90 WORDS) -**

**(3 MARKS EACH)**

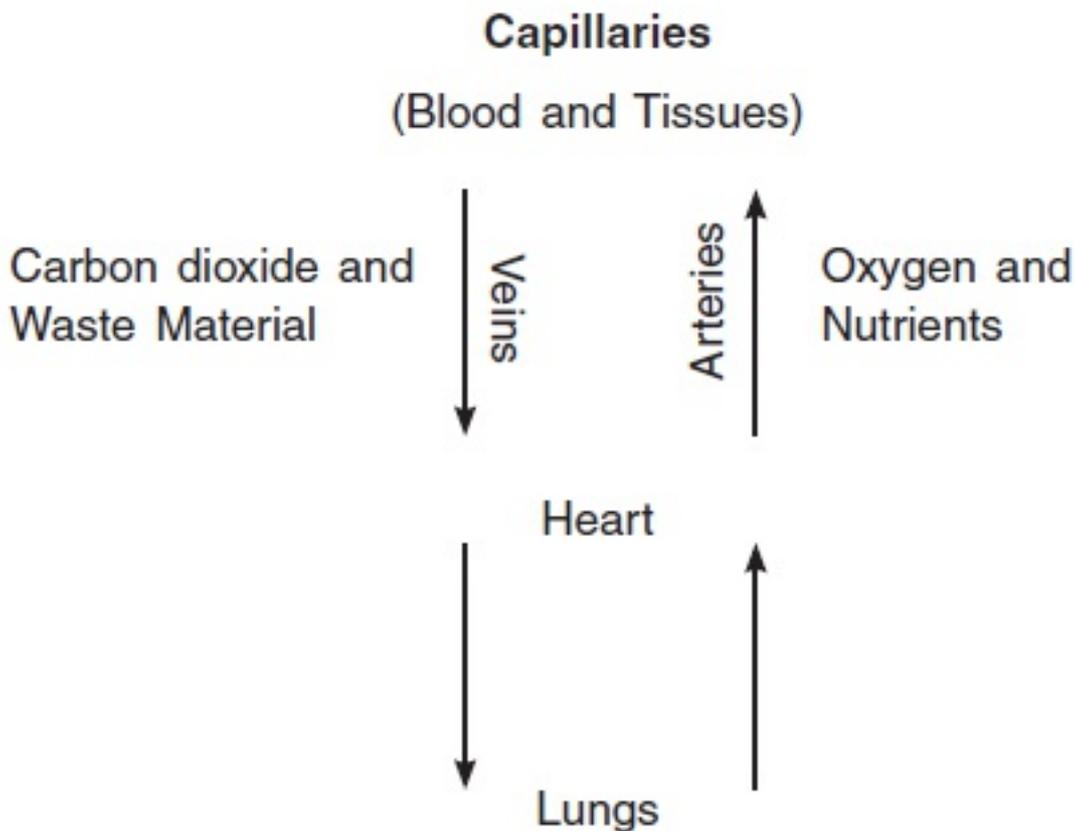
**Q1. Differential between Aerobic and Anaerobic Metabolism?**

**Ans.**

<b>Aerobic metabolism</b>	<b>Anaerobic metabolism</b>
1. Aerobic metabolism means the body can convert nutrients into energy with oxygen and its waste products are:- Carbon dioxide and water.	1. Anaerobic metabolism means the body can convert nutrients into energy without oxygen and its waste products are:- Lactic acid, water and carbon dioxide.
2. Aerobic metabolism occur in the endurance activities.	2. Anaerobic metabolism occur in the speed activities.

**Q2. What are capillaries?**

Ans. Capillaries are the smallest and thinnest vessels in the circulation system. The wall of capillaries, made up of only one layer of cells. The interchange of gases and substance between the blood and the tissues take place here.



**Q3. Write the immediate effects of exercise on Cardio-Vascular system?**

**Ans. 1. Increase in heart rate:-** When an individual starts exercise, his heart rate increases as per the intensity and duration of exercise.

**2. Increase in stroke volume:-** Stroke volume increases proportionally with exercise intensity. It is measured in ml/beat

**3. Increase in cardiac output:-** Cardiac output increases proportionally with the intensity of exercise. It is measured in ltr/ minute.

**4. Increase in blood flow:-** Cardio-vascular can be distribute more blood to those tissues which have more demand and less blood & those tissues which have less demand for oxygen. The blood is moved away from the main organs such as liver, intestine and kidney in fact it is redirected to the skin to enhance heat loss.

**5. Increase in blood pressure:-** During the exercise, systolic blood pressure can increase while diastolic blood pressure usually remains unchanged even during the intensive

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exercise.

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**Q4. Differentiate between slow twist fibre and fast twist fibre?**

Slow twist fibre (red fibres)	Fast twist fibre (white fibres)
The red fibres of muscles are mainly responsible for the endurance activities.	The white fibres of muscles are responsible of strength and speed activities.
The red fibres are produced energy by the nutrients in the presence of oxygen only.	The white fibres are produced energy by the nutrients without the presence of oxygen.

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**Q5. Write the effects of exercise in muscular system?**

**Ans. 1. Increase in muscle mass:-** Through the regular exercise, the cells of the muscle are enlarged, which change the size and shape of the muscle.

**2. Control extra fat:-** Regular exercise controls extra fat of the body. Exercise burns the calories, which is taken in the form of fat. This increases the lean mass in the body.

**3. Delays fatigue:-** Regular exercise delays fatigue. This fatigue is mainly due to formation of carbon dioxide, lactic acid and acid phosphate. The accumulation of carbon dioxide, acid phosphate, lactic acid become less in a person who performs regular exercise.

**4. Posture:-** Regular exercise helps in improving posture by improving portural deformities.

**5. Strength and speed:-** Regular exercise improve the strength and speed muscle cells. This Is partially due to the hypertrophy of muscles and partially due to increase in the capacity of giving and receiving stimulus.

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**Q6. Describe the effects of exercise on respiratory system?**

**Ans.** The effect of exercise on respiratory system is closely linked with the effect of exercise on circulatory and muscular system. This means that the effect produced on respiratory system by training are improved lung capacity and gas exchange.

1. Improved tidal volume and vital capacity of lungs

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2. Improved aerobic and anaerobic capacity

3. Avoid second wind

4. Increased will power

5. Unused alveoles become active:-regular exercise activity, the unused alveolus because much amount of oxygen is required in vigorous and prolonged exercise of daily routine. The passive alveoles becomes active.

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**LONG ANSWER TYPE QUESTION (150 TO 200 WORDS) -**

**(5 MARKS EACH)**

**Q1. Elucidate Physiological changes due to Ageing?**

**Ans.** The Physiological changes, which take place mentioned below.

- 1. Change in Nervous System:-** During the ageing, reaction time and movement time slows down with increase in age. The brain wastes, the size of its network and its blood flow decreases with age.
- 2. Change in Gastro Intestinal System:-** With increase in age, there is a reduction in the production of Hydrochloric Acid, Digestive Enzymes and Saliva. These changes may result in delayed emptying of the stomach, impaired swallowing. The breakdown and absorption of food may also be impaired. The liver becomes less efficient in metabolizing drugs and repairing damaged liver cells.
- 3. Change in Urinal System:-** As we age, the mass of the kidney decreases, which leads to reduction in blood filtration by the kidneys. The capacity of the bladders decreases and there is an increase in residual urine. This increases the chance of urinary infections.
- 4. The change in senses:-** With advance in age, the senses such as vision, hearing, taste, smell and touch may become less active. Vision and hearing are the most affected by ageing. The taste buds are reduced with age so they lose interest in food.
- 5. Change in Respiratory System:-** With the age, pulmonary function is impaired with advancing age. The airways and lung tissues become less elastic and less efficient. There is decreased Oxygen uptake and Oxygen exchange.
- 6. Change in fitness:-** The elasticity of Tendons, ligaments and Joint capsules decrease with Ageing. The range of the movement is restricted and muscle mass decreases as the age

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Increases. This leads to decrease Flexibility, Endurance, Strength, Speed with shortness of Breath, Blood Flow, Enzymes etc.

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## **Q2. Explain the effect of Exercise on Circulatory System?**

**Ans. 1. Increase in heart size:-** Regular exercise develop the muscles of heart. It increases The size of heart along-with the strengthening of heart. Heart becomes efficient in doing It's job.

**2. Decrease in cholesterol level:-** Regular exercise reduces the level of cholesterol in Our blood. The level of cholesterol in our blood is directly linked with blood pressure. Exercise decreases the level of low density protein and increases the level of high density lipo protein. It means that exercise decreases the LDL (bad cholesterol) and Increase HDL (good cholesterol)

**3. Faster adaptation to workload:-** Due to the regular exercise, the heart can adapt to working load quickly i.e. Quick adjustment of heart according to body needs.

**4. Increase in No. and efficiency of capillaries:-** With the regular exercise, efficiency and No of capillaries are increased with the increase of Muscle Mass. The unused and new capillaries become efficient and nurish the various cells effectively.

**5. Improve the working capacity of cardio-vascular system:-** Regular exercise Improve cardio-vascular system thus the blood travels faster through the blood vessels and increased circulation of blood makes healing faster.

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## **Q3. Discuss the physiological factors determine the flexibility?**

**Ans. 1. Muscle strength:** -The muscle should have minimum level of strength to make the movement, specially against the gravity or external force.

**2. Joint structure:-** There are different types of joint in human body, some of the joints intrinsically have greater range of motion than others for example-The ball & socket Joint of the shoulder has the greatest range of motion in comparison to the knee joint.

**3. Internal environment:-** Internal environment of athlete influences the flexibility. For

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example-warm bath increases body temperature and flexibility whereas 10 minutes outside stay in 10°C temperature reduces the body temperature and flexibility.

4. **Injury:-** Injuries to connecting tissues and muscles can lead to thickening or fibrosis on the affected area. Fibrous tissues are less elastic and can lead to limb shortening and lead to reduce flexibility.

5. **Age and gender:-** Flexibility decreases with the advancement of age. However it is trainable. It can be enhanced with the help of training as strength and endurance are enhanced. Gender also determine the flexibility. Females tend to be more flexible than male .

6. **Active and sedentary life style:-** Regular activities enhance the flexibility, whereas Inactive individual loses flexibility due to the soft tissues and joints shrinking and losing extensibility.

7. **Heredity:-** Bony structures of joints and structure length and flexibilities of the joint capsules and surrounding ligaments are genetical and cannot be altered by stretching programs.

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#### **Q4. Elaborate the Role of Regular Exercise on Ageing Process?**

**Ans.** Reduces the risk of Age Related Diseases:- Regular exercise reduces the risk of a number of health problems, many aged persons face. Such

Health problems are:-

1. **Diabetes, obesity, hypertension and heart disease:-** Regular exercise decreases the sugar level, decrease bad cholesterol, increase good cholesterol, decreases blood pressure and blood vessels stiffness.

2. **Increase in muscular strength:-** Ageing process does not hinder the individual ability to enhance the muscle strength. Regular exercise increases the strength of the muscles. As a matter of fact, exercise increases the size of muscle which ultimately increases muscular strength.

3. **Reduce the loss of muscle mass:-** Muscle mass decreases with advancing age. Ageing has negative effect on metabolism. Regular exercise reduces the loss of lean body mass and drop

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in the metabolic rate. Regular exercise also reduces the accumulation of fats.

**4. Enhances the capacity of lungs and hearts:-** Regular exercise enhance the working capacity of lungs and heart, it reduces the loss of electricity of muscle fibers of lungs and heart. It also plays a key role in keeping the lungs strong and increase oxygen uptake and oxygen exchange.

**5. Maintaining the bone density:-** The bone density decreases with age. It usually leads to fracture and osteoporosis. Physical exercise helps to maintain bone mass and stimulate bone growth. The ageing persons can increase their bone density with the help of regular exercise.

**6. Slow down the brain due to ageing:-** The regular exercise reduces the risk of mild cognitive new nerve cells and builds new capillaries to supply the brain with more oxygen.

**7. Improve mental Health and mood:-** Regular physical activities can help to keep thinking learning and judgement skills sharpen. Aerobic and muscle strengthening activities can also reduce the risk of depression and may help to sleep better.

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**Q5. Discuss the physiological factors, determine the strength as a component of physical Fitness?**

**Ans. 1. Muscle size:-** Muscle strength directly depends on the cross sectional area of muscle. It is well known that bigger and larger muscle can produce more force. The force produced by the same size of muscles in males and females is approximately the same but males are found to be stronger because they have larger and bigger muscles in comparison to females.

**2. Body weight:-** There is a positive correlation between the body weight and strength Individuals with the heavier body weight are stronger than the individual with the lighter Weight.

**3. Muscle composition:-** The muscle composition is genetically determined and cannot be changed by any type of training

**4. Nerve impulses:-** The nervous system also play a role in muscle strength. The brain and nervous system has power to activate more motor units when they need to generate larger amount of force. Through the strength training, the body learns to recruit more motor units

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and increase these units.

**5. Age and gender:-** Age and gender is a factor which effects the muscle strength. Muscle strength decline with the age but it is primarily due to a decrease in muscle cross-sectional area and decline in the amount of contractile tissues within the muscle fibres. Regular strength training limits loss of muscle strength with ageing. Men has greater absolute muscle strength than women.

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**Q6. Describe the physiological factors which determine the speed as a component of physical fitness?**

**Ans.** Speed is determined to a great extent by the genetic factors. The study of physiological Factors help to select the activity for an individual.

**1. Mobility of the nervous system:-** The rapid contraction and relaxation of muscles is made possible by the rapid excitation and inhibition of the concerned motor centres. Nervous system can maintain this rapid excitation and inhibition for only for a few seconds. After which the excitation spread to the neighbouring centres causing tension in the entire body. This results in decrease in speed. The mobility of the nervous can be trained only to a very limited extent.

**2. Muscle composition:-** The muscle, which has more percentage of fast twist fibers, contract with more speed in comparison to the muscle which have lower percentage be slow twist fibres. The muscle position is genetical and cannot be changed by training.

**3. Explosive Strength:-** For very quick and explosive movements, explosive strength is indispensable. It depends upon metabolic composition, muscle size & muscle coordination. The explosive strength of the muscles can be improved through training.

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**Q7. Explain the physiological factors determine endurance as a component of physical fitness?**

**Ans.** Endurance is very significant component of physical fitness, which is determined by the following physiological factors.

**1. Aerobic capacity:-** To perform an activity continuously, energy is required by the muscles

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which can be supplied by the presence of energy. Therefore the ability of organism to maintain the adequate supply of oxygen to the working muscles for energy liberation is important for endurance performance. The aerobic capacity depends upon:

a. **Oxygen intake:-** The oxygen intake depends on the vital capacity which further depends on lungs size, no of active alveoli, respiratory muscle and the size of the chest cavity.

b. **Oxygen transport:-** The oxygen transport depends on the amount of oxygen, which the blood has absorbed from the lungs and the ability of the circulatory system to carry this quickly to the working muscles. The amount of oxygen absorbed into the blood depends on the speed of blood flow through the lungs and on the blood haemoglobin. The concentration of blood haemoglobin can be enhanced by training. The transportation of oxygenated blood depends on the capacity of the heart. This capacity can be improved by training.

c. **Oxygen uptake:-** This depends on the rate of diffusion, which determined the speed of blood flow, temperature & partial pressure of oxygen in the blood and of carbon dioxide in the muscles. The speed and amount of oxygen consumption depends on the no, size & metabolic capacity of mitochondria and fortunatly can be improved to some extent through training.

d. **Energy reserves:-** The aerobic capacity depends on the muscle glycozen & sugar level in the blood. This can be enhanced by the training

**2. Lactic acid tolerance:- The lactic acid tolerance capacity can be improved through the training.**