



# **IQRA NATIONAL UNIVERSITY**

## **DEPARTMENT OF ALLIED HEALTH SCIENCES**

Final-Term Examination  
DPT 2<sup>nd</sup> Semester

Course Title: Human Physiology II

Instructor: Dr Sara Naem

Time: 6 Hours

Max Marks:50

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**DEPARTMENT (AHS DPT)**

**Q1. What would be the total lung capacity (TLC) if expiratory reserve volume ( ERV) is 1000 ml , (RV) residual volume is 1200 ml keeping the inspiratory capacity ( IC) as 3000 ml.**

**Ans: GIVEN DATA:**

Expiratory reserve volume( ERV) =1000ml

Residual volume (RV) = 1200ml

Inspiratory capacity (IC) = 3000ml

**REQUIRED:**

Total lung capacity (TLC) = ?

**SOLUTION:**

As,  $TLC = FRC + IC$

SO  $FRC = ERV + RV$

$= 1000 + 1200$

$= 2200$

$TLC = FRC + IC$

$TLC = 2200 + 3000$

$TLC = 5,200$  ml ANS.

**Q2. What is pulmonary edema . Enlist the muscles of inspiration and muscles of expiration.**

## **ANS : PULMONARY EDEMA:**

Pulmonary edema is also sometimes also known as lung congestion , lung water or pulmonary congestion. It is condition which is the result of extra fluid in the tissues of the lungs. This fluid is also collected in the air sacs (alveoli) of the lungs which causes difficulty in breathing, the body starts to struggle to get enough oxygen. This condition can sometimes lead to respiratory failures. This condition can develop suddenly and requires fast and immediate care and treatment. Pulmonary edema can be deadly but if treated on time the condition of the patient can improve.

### **Causes:**

1. Damaged pulmonary blood capillary membranes
2. Congestive heart failure
3. High altitude exposure

## **PART B :**

### **MUSCLES OF INSPIRATION :**

Following are the muscles of inspiration

- A. Diaphragm works as the primary muscle in inspiration
- B. Other muscles :
  - I. External intercostals
  - II. Scaleni helps to elevate the first two ribs
  - III. Sternocleidomastoid muscles
  - IV. Anterior serratti also lifts the ribs

Innermost intercostal muscles helps the external and internal intercostals to perform their function.

### **MUSCLES OF EXPIRATION:**

Following are the muscles which helps in expiration during respiration.

- A. The primary muscle of expiration is the abdominal recti
- B. Internal and external obliques
- C. Transverse abdominus
- D. Internal intercostals

**Q3. Compare the properties of different blood groups. Also mark universal donor and universal recipient.**

**Ans: ABO BLOOD TYPES:**

Our blood is divided into four main groups according to the existence of different antigens present on the red blood cell's surfaces. These antigens can be proteins or sugar. These antigens are also called agglutinogens because of their ability to cause agglutination of RBC. The antigens let the body's immune system know which blood group is not compatible to the

| <b><u>BLOOD GROUPS</u></b> | <b><u>PRESENT ANTIGEN</u></b> | <b><u>ANTIBODY</u></b> |
|----------------------------|-------------------------------|------------------------|
| A                          | A                             | ANTI-B                 |
| B                          | B                             | ANTI- A                |
| AB                         | A and B                       | NONE                   |
| O                          | NONE                          | ANTI- A and B          |

**TYPE A :**

1. type A contains A antigen
2. It produces B anti body

**TYPE B:**

1. It has b antigen
2. Having A anti bodies is the property of b blood group

**TYPE: AB**

1. This type has both the antigens A and B
2. It does not have any antibody

**TYPE O:**

1. In type o blood group no antigen is present
2. A and B both antibodies are present in its serum

**PART B:**

**UNIVERSALL DONOR:**

Donor means the person who gives blood the antigen of the recipient and the antibody of the donors are usually ignored. As type O group does not react with other blood

types neither attacks them because of the absence of antigens in them. So it can be given to any blood group person, people with this blood group are called universal donors because anyone can receive the red blood cells from them

### **UNIVERSAL RECIPIENT:**

Recipient means the person the who receives blood from other person. AB blood group has A and B antigen so it won't attack A or B blood group as it with sense them as natural blood group to the body. This means that AB with accept blood from any type of blood group person without reacting with them and this makes the AB blood group the universal receiver.

**Q4. Explain respiratory membrane . What are the factors that affect diffusion of gases across the membrane**

**Ans: RESPIRATORY MEMBRANE:**

Respiratory membrane is the membrane which works as a wall between the air and the blood inside the alveoli within the capillaries, during respiration the gases have to travel across this membrane. It contains the capillary wall, pulmonary capillaries and their membranes. The respiratory membrane is 0.6 micrometers thick, it is so thin in order to make the gas exchange rapid and fast the other reason of it being so thin is that is is made up of only two cells alveolar epithelial and pulmonary capillary cell.

### **RESPIRATORY MEMBRANE LAYERS:**

Despite being so thin, respiratory membrane consists of different layers.

1. The first layer is the layer of lining fluid with surfactant.
2. Second layers is the alveolar epitheliam
3. The third layer is the alveolar epithelium basement membrane
4. It is a thin space known as interstitial space between the epithelial and the capillary basement membrane
5. Capillary basement membrane comes after the interstitial space
6. The sixth layer is the capillary endothelium
- 7.

## **PART B**

### **FACTORS THAT AFFECT RATE OF DIFFUSION:**

Following are the factors that effects the rate of diffusion of gases

1. Surface area of the membrane through with the gas exchange with occur

2. Thickness of the same membrane
3. the diffusion coefficient of gas in the molecules of membrane.
4. the difference of the gas's partial pressure between the both sides of membrane

**Q5. What is the difference between anatomical dead space and physiological dead space. What are the clinical manifestations of pulmonary effusion.**

**Ans : ANATOMICAL DEAD SPACE:**

Anatomical dead space refers to the volume of air in the bits and pieces of the respiratory tract that is in charge of directing the air towards the alveoli and bronchiols but do not take a direct part in the process of respiration. Areas where the gaseous exchange does not take place are pharynx, trachea, nose, bronchi etc.

**PHYSIOLOGICAL DEAD SPACE:**

In physiological dead space not only the parts of anatomical dead space are included but also the elements present in the alveoli which are poorly furnished and unable to take part in the gaseous exchange will also be included.

Physiological dead space is equal to the sum of anatomical and alveolar dead space.

$$VD_{phys} = (VD_{ana}) + (VD_{clv})$$

**ANATOMICAL VERSUS PHYSIOLOGICAL DEAD SPACE:**

the anatomical and physiological dead space are almost equal in healthy individuals because of the well furnished areas of the lungs but in unhealthy people the physiological dead space may be greater than the anatomical dead space because of lack of proper perfusion.

**PART B:**

**PULMONARY/ PLEURAL EFFUSION:**

**P**leura is a thin membrane that lines the lungs and the inside of the chest cavity, pleural effusion is the build up of extra fluids in the layers of the pleura membrane. Under normal condition there are only teaspoons of fluid in the membrane to help the lungs to move smoothly in the chest cavity but in pleural effusion unusual amount of fluid is collected.

**CLINICAL MANIFESTATION/ SYMPTOMS:**

Following are the symptoms of pleural effusion:

1. Pleuritic pain ( pain in chest while breathing deeply)
2. Often asymptomatic small pleural effusions

3. Shortness of breath
4. Fever
5. Cough
6. The history of the patient often shows diagnosis of some diseases like uremia, liver disease, malignancy etc
7. Inability to lie flat
8. Persistent hiccups