**IQRA NATIONAL UNIVERSITY**

**DEPARTMENT OF ALLIED HEALTH SCIENCES**

**Final-Term Examination**

**DPT 2nd Semester**

**Course Title: Human Physiology II Instructor: Dr Sara Naeem**

**Time: 6 Hours //ARBAB HABIB ULLAH 16692// Max Marks: 50**

**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?**

According to the measurement value calculation description the total lung capacity is **5.8L.**

Given data:

* Expiratory reserve volume (ERV) = 1000ml
* Residual volume (RV) = 1200ml
* Inspiratory capacity (IC)= 3000ml
* Tidal volume (TV)= 500ml

Formula;

* Total lung capacity (TLC)= RV+ERV+TV+IRV

Solution;

* Hence; TLC=1200ml+1000ml+500ml+3000ml= **6.5L** is the **TLC.**

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

**PULMONARY EDEMA**Pulmonary edema is a condition in which the lungs fill with fluid. It’s also known as lung congestion, lung water, and pulmonary congestion. When pulmonary edema occurs, the body struggles to get enough oxygen and you start to have shortness of breath. But timely treatment for pulmonary edema and its underlying cause can improve possible outcomes.

**SYMPTOMS** The symptoms for long-term pulmonary edema include:

* shortness of breath when being physically active
* difficulty breathing when lying down
* wheezing
* waking up at night with a breathless feeling that goes away when you sit up
* rapid weight gain, especially in the legs
* swelling in the lower part of the body

**MUSCLES INCLUDING IN INSPIRATION**

* **Scalenes** – elevates the upper ribs.
* **Sternocleidomastoid** – elevates the sternum.
* **Pectoralis major and minor** – pulls ribs outwards.
* **Serratus anterior** – elevates the ribs (when the scapulae are fixed).
* **Latissimus dorsi –** elevates the lower ribs.

**MUSCLES INCLUDING EXPIRATION**

* **Anterolateral abdominal wall** – increases the intra-abdominal pressure, pushing the diaphragm further upwards into the thoracic cavity.
* **Internal intercostals** – depresses the ribs.
* **Innermost intercostals** – depresses the ribs.

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

Every person has a blood type. Blood types are classifications of the properties of a person's blood concerning how the blood reacts to new blood via a blood transfusion, and are often organized into a system of ABO blood types.

ABO BLOOD TYPES:

Blood types are determined and named by the existence of two different antigens present on the surface of red blood cells; A antigens and B antigens. These antigens, which can be sugars or proteins, are essentially markers attached to red blood cell membranes that let the body's immune system know which type of blood is natural to the body and which should be destroyed. For example, someone with A antigens would not be able to receive B antigen blood, as the immune system would attack what it sees as "incompatible" blood. The immune system responds to blood types through the use of antibodies produced by the blood. These antibodies are made to counter antigens of the opposite type - i.e.: anti-A antibodies attack B antigens and anti-B antibodies attack A antigens. The main blood types are:

* **Type A**: This type contains A antigens and produces anti-B antibodies.
* **Type B:** This type contains B antigens and produces anti-A antibodies.
* **Type AB**: This type contains both A and B antigens. As such, type AB blood will attack neither type A nor type B blood because it accepts both antigens as being natural to the body. This means AB blood is able to accept any type of blood during transfusions, making it a **universal acceptor.**
* **Type O**: This type contains no antigens. This means that O blood will not react with antibodies produced by other blood types, making it a universally accepted blood type for transfusions, also called a **universal donor.**

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

**ALVEOLAR RESPIRATORY MEMBRANE (ARM)**

It is the surface area of the alveolar sacks that is responsible for the air particle **oxygen** and **carbon dioxide** exchange in the respiratory track the alveoli are the smallest component which are responsible for exchange of **O2** and **CO2,** respectively: In the lungs, gas exchange takes place in the alveolar sacs. Oxygen (O2) diffuses from the alveoli into the capillaries and RBCs. At the same time, carbon dioxide (CO2) in the capillaries diffuses into the alveoli. The bonding of O2 to hemoglobin in the RBCs causes their color to change from purple to red. During the exchange, the gases must rapidly cross the respiratory membrane that separates the alveolar and capillary lumens.

**FACTORS THAT AFFECT**

The factors that determine how rapidly a gas will pass through the membrane are (1) the thickness of the membrane, (2) the surface area of the membrane, (3) the diffusion coefficient of the gas in the substance of the membrane, and (4) the partial pressure difference of the gas between the two sides of the membrane.

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

**DEAD SPACE**

Dead space is the portion of each tidal volume that does not take part in gas exchange. There are two different ways to define dead space-- anatomic and physiologic. Anatomic dead space is the total volume of the conducting airways from the nose or mouth down to the level of the terminal bronchioles, and is about 150 ml on the average in humans. **The anatomic dead space** fills with inspired air at the end of each inspiration, but this air is exhaled unchanged. Thus, assuming a normal tidal volume of 500 ml, about 30% of this air is "wasted" in the sense that it does not participate in gas exchange. **Physiologic dead space** includes all the non-respiratory parts of the bronchial tree included in anatomic dead space, but also factors in alveoli which are well-ventilated but poorly perfused and are therefore less efficient at exchanging gas with the blood. Because atmospheric PCO2 is practically zero, all the CO2 expired in a breath can be assumed to come from the communicating alveoli and none from the dead space. By measuring the PCO2 in the communicating alveoli (which is the same as that in the arterial blood) and the PCO2 in the expired air, one can use the Bohr Equation to compute the "diluting," non-CO2 containing volume, the physiologic dead space. In healthy individuals, the anatomic and physiologic dead spaces are roughly equivalent, since all areas of the lung are well perfused. However, in disease states where portions of the lung are poorly perfused, the physiologic dead space may be considerably larger than the anatomic dead space. Hence, physiologic dead space is a more clinically useful concept than is anatomic dead space.

**CLINICAL MANIFESTATIONS OF PULMONARY EFFUSION**

Some patients with pleural effusion have no symptoms, with the condition discovered on a chest x-ray that is performed for another reason. The patient may have unrelated symptoms due to the disease or condition that has caused the effusion. Symptoms of pleural effusion include:

* Chest pain
* Dry, nonproductive cough
* Dyspnea (shortness of breath, or difficult, labored breathing)
* Orthopnea (the inability to breathe easily unless the person is sitting up straight or standing erect)