CBSE TEST PAPER-02

CLASS - XI BIOLOGY

(Breathing and Exchange of Gases)

General Instruction:

- All questions are compulsory.
- Question No. 1 to 3 carries one marks each. Question No. 4 to 6 carry two marks each. Question No. 7 and 8 carry three marks each. Question No. 9 carry five marks.

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1. Define vital capacity.

2. What is the role of carbonic anhydrase in RBC's?

3. What is carbaminohaemoglobin?

4. What is chloride shift? Explain.

5. Explain briefly the first step is respiration?

6. Write a note on bronchitis and its prevention.

7. Differentiate between vital lung capacity and total lung capacity.

8. Explain the mechanism of breathing in humans.

9. Describe in brief the respiratory organs of man.

CBSE TEST PAPER-02

CLASS - XI BIOLOGY (Body fluids and circulation)

[ANSWERS]

Ans 01. The maximum volume of air a person can breathe in after a forced expiration is known as Vital Capacity. This includes ERV, TV, and IRV or the maximum volume of air a person can breathe out after a forced inspiration.

Ans 02. About 70% of CO_2 reacts with water to form carbonic acid in RBCs in the presence of enzyme carbonic anhydrase.

$$CO_2 + H_2O \rightleftharpoons H_2CO_3$$

Ans 03. Carbaminohaemoglobin is formed when CO_2 combines with haemoglobin in blood to facilitate the transport of CO_2.

Ans 04. The diffusion of chloride ions from blood plasma into RBC's is known as chloride shift.

a) Occurs from plasma to RBC's in the human body.

b) It maintains ionic balance and electrochemical neutrality.

Ans 05. First step in respiration is called breathing. In breathing atmospheric air is taken in by inspiration and alveolar air is released out by expiration. The exchange of O_2 and CO_2 between deoxygenated blood and alveoli, transport of gases throughout body by blood, exchange of O_2 and CO_2 between the oxygenated blood and tissues and utilization of O_2 by the cells are the other steps involved in it.

Ans 06. It is "inflammation of the bronchi and is characterized by hypertrophy hyperplasia seromucous glands and goblet cells lining the bronchi"

Symptoms are coughing with thick greenish-yellow sputum. It shows infection, that excessive secretion of mucus. It is caused by pollutants as well as the cigarette smoking. Prevention of Bronchitis –

1) Avoiding exposure to allergens.

2) Treatment involves antibiotic theory & bronchodilator dugs, etc.

Ans.07.

	Vital Capacity (VC)	Total lung Capacity. (CT2C)
1.	Sum total of tidal volume, expiratory reserve and inspiratory reserve volume.	Sum total of vital capacity and residual volume.
2.	VC = Vt + ERV + IRV	TLC = VC + RV
3.	Value is 3500-4500ml.	Value is 5000 – 6000ml
4.	Represents maximum amount of air that a person can expel after filling the lungs to the maximum.	Represents maximum total amount of air which can be present in lungs after maximum inspiratory effort.

Ans 08.

- Breathing involves two stages: Inspiration during which atmospheric air is drawn in and Expiration by which the alveolar air is released out.
- The movement of air into and out of the lungs is carried out by creating a pressure gradient between the lungs and the atmosphere. Inspiration can occur if the pressure within the lungs (intrapulmonary pressure) is less than the atmospheric pressure, i.e., there is a negative pressure in the lungs with respect to atmospheric pressure.
- Similarly, expiration takes place when the intrapulmonary pressure is higher than the atmospheric pressure.
- The diaphragm and a specialised set of muscles – external and internal intercostals between the ribs, help in generation of such gradients.
- Inspiration is initiated by the contraction of the diaphragm which increases the volume of the thoracic chamber in the anteroposterior axis. The contraction of external intercostal muscles lifts up the ribs and the sternum causing an increase in the volume of the thoracic chamber in the dorsoventral axis.
- The overall increase in the thoracic volume causes a similar increase in pulmonary volume. An increase in pulmonary volume decreases the intrapulmonary pressure to less than the atmospheric pressure which forces the air from outside to move into the lungs, i.e., inspiration.
- Relaxation of the diaphragm and the intercostal muscles returns the diaphragm and sternum to their normal positions and reduce the thoracic volume and thereby the pulmonary volume. This leads to an increase in intrapulmonary pressure to slightly

above the atmospheric pressure causing the expulsion of air from the lungs, i.e., expiration.

- On an average, a healthy human breathes 12-16 times/minute. The volume of air involved in breathing movements can be estimated by using a spirometer.

Ans 09. The following are the main respiratory organs:-

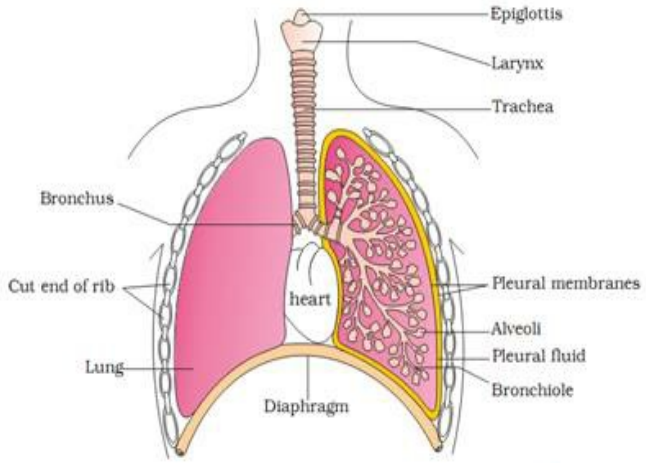

Figure 17.1 Diagrammatic view of human respiratory system (Sectional view of the left lung is also shown)

1) Nostrils – These are the paired openings situated at the anterior and posterior ends of the nasal chambers. They are lined up with ciliated epithelium and mucous cells. These prevent the entrance of dust into lungs and help in warming and moistening the air. The nasal chamber opens interiorly by the external nostril and posterior internal nostril into the pharynx.

2) Larynx – It is situated at the anterior part of the trachea and communicates with the pharynx. The glottis is protected by a stiff cartilage called epiglottis. The larynx contains pairs of vocal cords which set into vibrations when the air enters into it and produces the sound.

3) Trachea – It is a long ringed tube. It is supported c – shaped elastic cartilaginous rings to prevent its collapsing. It is lined internally with the mucous membrane to hold the dust particles, bacteria and other foreign bodies. It also warms the air.

4) Bronchi – Inside the thorax, the trachea bifurcates into two branchy and each of which enters into one lung. In each lung, the bronchus again redivides into numerous small branches known as bronchioles. These bronchioles further divide at its ends to form respiratory bronchioles.

5) Lungs – There are two large bag-like spongy structures which are the main respiratory organs. These are enclosed by double pleural membranes. The lungs are divided externally

by lobes. The right lung consists of four lobes and left by two lobes. Inside the lungs, the respiratory bronchioles give rise to alveolar ducts, alveolar sac and finally alveoli. Each lung contains millions of alveoli. Each alveolus is exceptionally thin walled. Its walls are highly permeable and richly supplied with blood capillaries.

The blood is supplied to the lungs by a pair of pulmonary arteries. These bring blood which poor in oxygen & rich in CO_2. The exchange of gases occurs in the alveoli of the lungs. The oxygenated blood from alveolar capillaries is called by the pair of pulmonary vein to be conveyed to the heart.