Chapter 17

Breathing and Exchange of Gases

MULTIPLE CHOICE QUESTIONS

1. Respiration in insects is called direct because
   a. The cell exchange O_2/ CO_2 directly with the air in the tubes
   b. The tissues exchange O_2/ CO_2 directly with coelomic fluid
   c. The tissues exchange O_2/ CO_2 directly with the air outside through body surface
   d. Tracheal tubes exchange O_2/ CO_2 directly with the haemocoel which then exchange with tissues

2. Regarding the functions of our respiratory system, mark the wrong entry.
   a. Humidifies the air
   b. Warms up the air
   c. Exchange of gases
   d. Cleans up the air

3. A person suffers punctures in his chest cavity in an accident without any damage to the lungs. Its effect could be
   a. Reduced breathing rate
   b. Rapid increase in breathing rate
   c. No change in respiration
   d. Cessation of breathing

4. It is known that exposure to carbon monoxide is harmful to animals because
   a. It reduces CO_2 transport
   b. It reduces O_2 transport
   c. It increases CO_2 transport
   d. It increases O_2 transport

5. Mark the true statement among the following with reference to normal breathing
   a. Inspiration is a passive process where as expiration is active
   b. Inspiration is a active process where as expiration is passive
   c. Inspiration and expiration are active processes
   d. Inspiration and expiration are passive processes

6. A person breathes in some volume of air by forced inspiration after having a forced expiration. This quantity of air taken in is
   a. Total lung capacity
   b. Tidal volume
   c. Vital capacity
   d. Inspiratory capacity

7. Mark the incorrect statement in context to O2 binding to Hb
   a. Higher pH
   b. Lower temperature
   c. Lower pCO_2
   d. Higher PO_2

8. Which of the following statements is incorrect regarding respiratory system?
   a. Each terminal bronchiole give rise to a network of bronchi.
   b. the alveoli are highly vascularised.
   c. The lungs are covered by a double-layered membrane.
   d. The plecral fluid reduces friction on the lung surface.

9. Incidence of Emphysema – a respiratory disorder is high in cigarette smokers. In such cases
   a. The bronchioles are found damaged
   b. The alveolar walls are found damaged
   c. The plasma membrane is found damaged
   d. The respiratory muscles are found damaged

10. Respiratory process is regulated by certain specialized centres in the brain. One of the following centres can reduce the inspiratory duration upon stimulation
   a. Medullary inspiratory centre
   b. Pneumotaxic centre
   c. Apneustic centre
   d. Chemosensitive centre

11. CO_2 dissociates from carbaminohaemoglobin when
    a. pCO_2 is high & pO_2 is low
    b. pO_2 is high and pCO_2 is low
    c. pCO_2 and pO_2 are equal
    d. None of the above

12. In breathing movements, air volume can be estimated by
    a. Stethoscope
    b. Hygrometer
    c. Sphigmomanometer
    d. Spirometer

13. From the following relationships between respiratory volume and capacities and mark the correct answer
    i. Inspiratory capacity (IC) = Tidal Volume + Residual Volume
    ii. Vital Capacity (VC) = Tidal Volume (TV) + Inspiratory Reserve Volume (IRV) + Expiratory Reserve Volume (ERV).
    iii. Residual Volume (RV) = Vital Capacity (VC) – Inspiratory Reserve Volume (IRV)
    iv. Tidal Volume (TV) = Inspiratory Capacity (IC) – Inspiratory Reserve Volume (IRV)

    Options:
    a. (i) Incorrect, (ii) Incorrect, (iii) Incorrect, (iv) Correct
    b. (i) Incorrect, (ii) Correct, (iii) Incorrect, (iv) Correct
    c. (i) Correct, (ii) Correct, (iii) Incorrect, (iv) Correct
    d. (i) Correct, (ii) Incorrect, (iii) Correct, (iv) Incorrect

14. The oxygen - haemoglobin dissociation curve will show a right shift in case of
    a. High pCO_2
    b. High pO_2
    c. Low pCO_2
    d. Less H^+ concentration

15. Match the following and mark the correct options

	Animal		Respiratory Organ
A.	Earthworm	i.	Moist cuticle
B.	Insects	ii.	Gills
C.	Fishes	iii.	Lungs
D.	Birds/Reptiles	iv.	Trachea

Options:

a. A-ii, B-i, C-iv, D-iii
b. A-i, B-iv, C-ii, D-iii
c. A-i, B-iii, C-ii, D-iv
d. A-i, B-ii, C-i.v, D-iii

VERY SHORT ANSWER TYPE QUESTIONS

1. Define the following terms?
   a. Tidal volume
   b. Residual volume
   c. Asthma
2. A fluid filled double membranous layer surrounds the lungs. Name it and mention its important function.
3. Name the primary site of exchange of gases in our body?
4. Cigarette smoking causes emphysema. Give reason.
5. What is the amount of O_2 supplied to tissues through every 100 ml. of oxygenated blood under normal physiological conditions?
6. A major percentage (97%) of O_2 is transported by RBCs in the blood. How does the remaining percentage (3%) of O_2 transported?
7. Arrange the following terms based on their volumes in an ascending order
   a. Tidal Volume (TV)
   b. Residual Volume (RV)
   c. Inspiratory Reserve Volume (IRV)
   d. Expiratory Capacity (EC)
8. Complete the missing terms
   a. Inspiratory Capacity (IC) = _____ +IRV
   b. _____ = TV + ERV
   c. Functional Residual Capacity (FRC) = ERV + ____
9. Name the organs of respiration in the following organisms:
   a. Flatworm - _____
   b. Birds - _____
   c. Frog- _____
   d. Cockroach - _____

10. Name the important parts involved in creating a pressure gradient between lungs and the atmosphere during normal respiration.

SHORT ANSWER TYPE QUESTIONS

1. State the different modes of CO_2 transport in blood.
2. Compared to O_2, diffusion rate of CO_2 through the diffusion membrane per unit difference in partial pressure is much higher. Explain.
3. For completion of respiration process, write the given steps in sequential manner
   a. Diffusion of gases (O_2 and CO_2) across alveolar membrane.
   b. Transport of gases by blood.
   c. Utilisation of O_2 by the cells for catabolic reactions and resultant release of CO_2.
   d. Pulmonary ventilation by which atmospheric air is drawn in and CO_2 rich alveolar air is released out.
   e. Diffusion of O_2 and CO_2 between blood and tissues.
4. Differentiate between
   a. Inspiratory and expiratory reserve volume
   b. Vital capacity and total lung capacity
   c. Emphysema and occupational respiratory disorder

LONG ANSWER TYPE QUESTIONS

1. Explain the transport of O_2 and CO_2 between alveoli and tissue with diagram.
2. Explain the mechanism of breathing with neat labelled sketches.
3. Explain the role of neural system in regulation of respiration.