MULTIPLE CHOICE QUESTIONS

1. Respiration in insects is called direct because
a. The cell exchange O2/ CO2 directly with the air in the tubes
b. The tissues exchange O2/ CO2 directly with coelomic fluid
c. The tissues exchange O2/ CO2 directly with the air outside through body surface
d. Tracheal tubes exchange O2/ CO2 directly with the haemocoel which then exchange with tissues
Solution:
Option (d) is the answer.

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
Solution:
Option (d) is the answer.

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
Solution:
Option (d) is the answer.

4. It is known that exposure to carbon monoxide is harmful to animals because
a. It reduces CO2 transport
b. It reduces O2 transport
c. It increases CO2 transport
d. It increases O2 transport
Solution:
Option (b) is the answer.

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
Solution:
Option (b) is the answer.

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
Solution:
Option (c) is the answer.

7. Mark the incorrect statement in context to O2 binding to Hb
a. Higher pH
b. Lower temperature
c. Lower pCO2
d. Higher PO2
Solution:
Option (d) is the answer.

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.
Solution:
Option (d) is the answer.

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
Solution:
Option (b) is the answer.

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
Solution:
Option (b) is the answer.

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
Solution:
Option (b) is the answer

12. In breathing movements, air volume can be estimated by
a. Stethoscope
b. Hygrometer
c. Sphigmomanometer
d. Spirometer
Solution:
Option (d) is the answer.

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 ReserveVolume (IRV)
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
Solution:
Option (b) is the answer.

14. The oxygen - haemoglobin dissociation curve will show a right shift incase of
a. High pCO_2
b. High pO_2
c. Low pCO_2
d. Less H^+ concentration
Solution:
Option (a) is the answer

15. Match the following and mark the correct options

Animal Respiratory Organ	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
Solution:
Option (b) is the answer.

VERY SHORT ANSWER TYPE QUESTIONS

1. Define the following terms?
a. Tidal volume
b. Residual volume
c. Asthma
Solution:
a. Tidal Volume: Volume of air inhaled and exhaled during a normal breathing cycle without any forced breathing is tidal volume.
b. Residual Volume: Volume of air left in the lungs even after forced exhalation is called as residual volume.
c. Asthma: It is an inflammatory disease of the airways of the lungs

2. A fluid filled double membranous layer surrounds the lungs. Name it and mention its important function.
Solution:
A fluid filled double membranous layer surrounds the lungs is called Pleura. A fluid filled double membranous layer surrounds the lungs is called Pleura.

3. Name the primary site of exchange of gases in our body?
Solution:
The primary site of exchange of gases in our body is Alveoli.

4. Cigarette smoking causes emphysema. Give reason.
Solution:
Excessive cigarette smoking leads to Emphysema due to the presence of various harmful chemicals like nicotine, tar, sulphur etc. Alveoli walls get damaged due to this.

5. What is the amount of O_2 supplied to tissues through every 100 ml. of oxygenated blood under normal physiological conditions?
Solution:
The amount of O_2 supplied to tissues through every 100 ml. of oxygenated blood under normal physiological conditions is around 5ml.

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?
Solution:
A major percentage (97%) of O_2 is transported by RBCs in the blood and the remaining percentage (3%) of O_2 transported through plasma.

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)
Solution:
Tidal Volume (TV) < Residual Volume (RV) < Expiratory Capacity (EC) < Inspiratory Reserve Volume (IRV).

8. Complete the missing terms

a. Inspiratory Capacity (IC) = _____ +IRV
b. _____ = TV + ERV
c. Functional Residual Capacity (FRC) = ERV + ____
Solution:
a. Inspiratory Capacity (IC) = TV + IRV
b. EC = TV + ERV
c. Functional Residual Capacity (FRC) = ERV + RV

9. Name the organs of respiration in the following organisms:
a. Flatworm - _____
b. Birds - _____
c. Frog- _____
d. Cockroach - _____
Solution:
a. Surface of the body
b. Lungs
c. Lungs and moist skin
d. Tracheal tubes.

10. Name the important parts involved in creating a pressure gradient between lungs and the atmosphere during normal respiration.
Solution:
1. Diaphragm
2. Internal Intercostal Muscles of the ribs
3. External Intercostal Muscles of the ribs

SHORT ANSWER TYPE QUESTIONS

1. State the different modes of CO_2 transport in blood.
Solution:
1. In Red blood cells carbon dioxide combines with water and forms carbonic acid. It is an unstable form and gets disassociated into hydrogen and bicarbonate ion.
2. Carbon dioxide is also transported through plasma in the form of bicarbonate ions.

2. Compared to O_2, diffusion rate of CO_2 through the diffusion membrane per unit difference in partial pressure is much higher. Explain.
Solution:
As the solubility of carbon dioxide is much higher than oxygen its diffusion rate through the diffusion membrane per unit difference in partial pressure is much higher.

3. For completion of respiration process, write the given steps in sequential manner

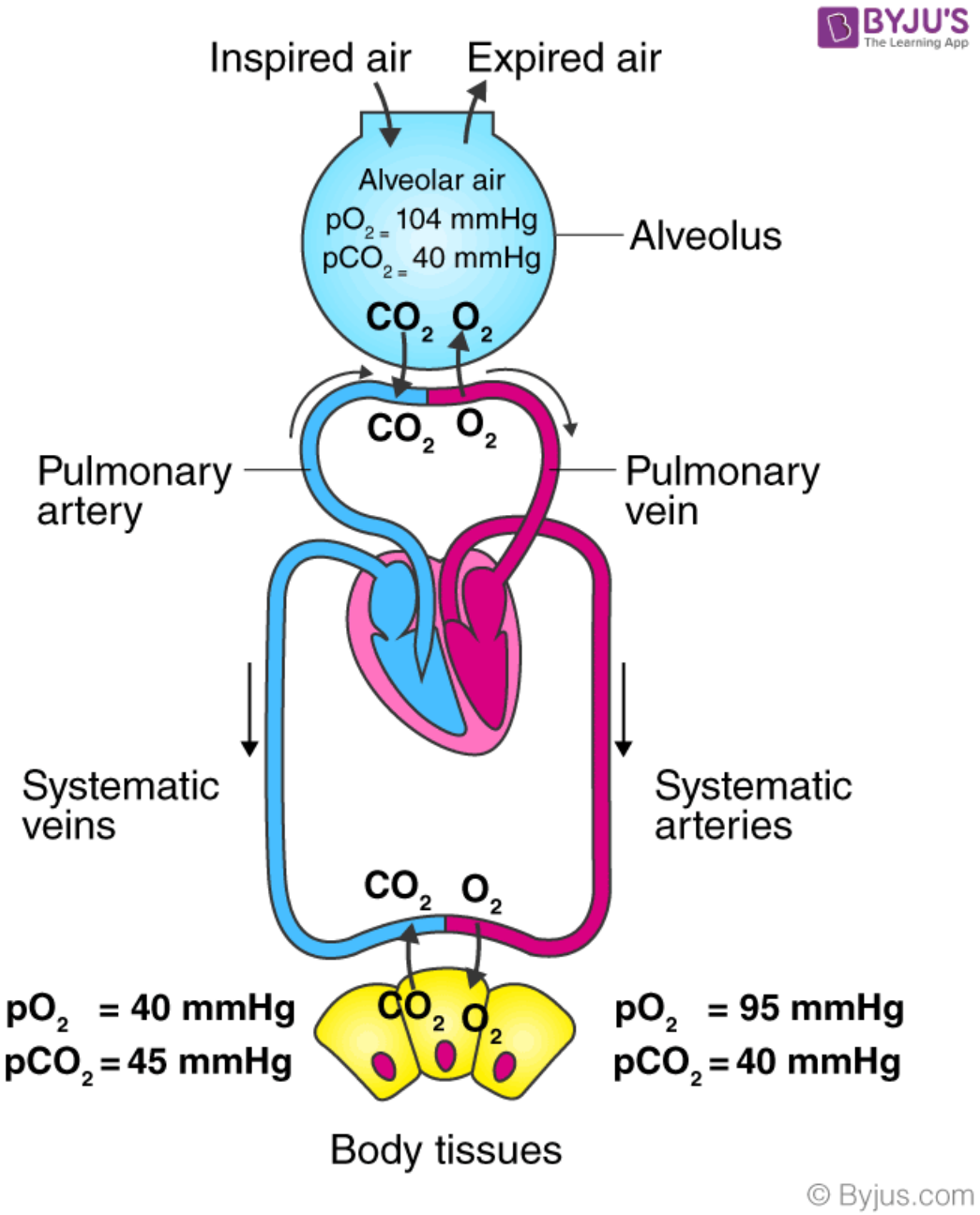
a. Diffusion of gases (O_2 and CO_2) across alveolar membrane.
b. Transport of gases by blood.
c. Utilisation of O_2 by the cells for catabolic reactions and resultant release of CO_2.
d. Pulmonary ventilation by which atmospheric air is drawn in and CO_2 rich alveolar air is released out.
e. Diffusion of O_2 and CO_2 between blood and tissues.
Solution:
The correct sequence would be:
1. Pulmonary ventilation by which atmospheric air is drawn in and CO_2 rich alveolar air is released out.
2. Diffusion of gases (O_2 and CO_2) across alveolar membrane.
3. Transport of gases by blood.
4. Diffusion of O_2 and CO_2 between blood and tissues.
5. Utilisation of O_2 by the cells for catabolic reactions and resultant release of CO_2.

4. Differentiate between
a. Inspiratory and expiratory reserve volume
b. Vital capacity and total lung capacity
c. Emphysema and occupational respiratory disorder
Solution:
a. Inspiratory reserve volume is the maximum volume of air that can be inhaled after normal inspiration whereas expiratory volume is the maximum volume of air that can be exhaled after normal exhalation.
b. Vital capacity is the maximum volume of air that can be exhaled after normal inspiration whereas total lung capacity is the volume of air in the lungs after maximum inspiration.
c. Emphysema is a disorder in which the alveolar walls are damaged whereas occupational respiratory disorder is caused due to the proliferation of the fibrous connective tissue of the upper lungs.

LONG ANSWER TYPE QUESTIONS

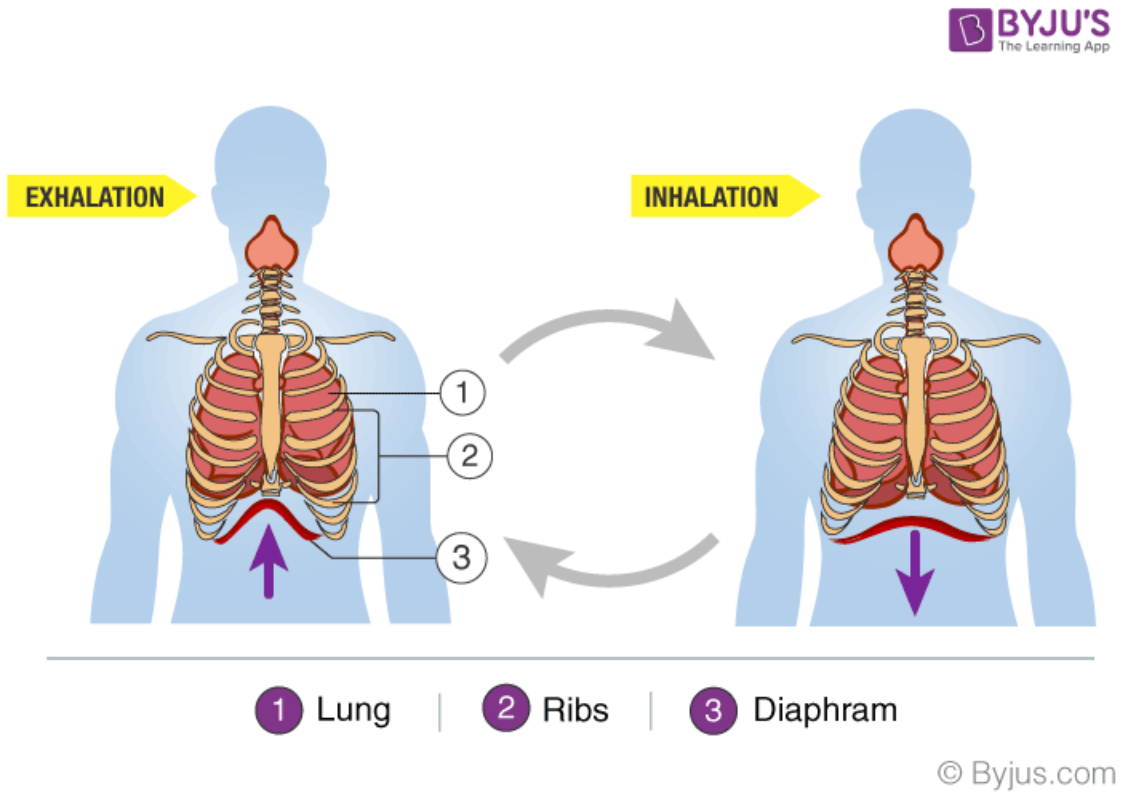
1. Explain the transport of O2 and CO2 between alveoli and tissue with diagram.
Solution:
Transportation of Oxygen.
1. Oxygen which we inhaled reaches the alveoli
2. As the partial pressure of oxygen is greater in alveoli the diffusion causes from oxygen to capillaries and combines with haemoglobin to form oxyhaemoglobin.
3. The oxygenated blood reaches the organ which has low partial pressure than alveoli.
4. The bond between oxygen and hemoglobin will be unstable in these organs and breaks releasing oxygen into the organs.
Transportation of Carbon Dioxide:

1. The carbon dioxide which is released is carried out by various organs to the alveoli via capillaries which have lower intra pulmonary pressure than the organs.
2. Intra pulmonary pressure is lower in the alveoli than the capillaries so the carbon dioxide will diffuse to alveoli from the capillaries.
3. In Red blood cells carbon dioxide combines with water and forms carbonic acid. It is an unstable form and gets disassociated into hydrogen and bicarbonate ion.
4. Carbon dioxide is also transported through plasma in the form of bicarbonate ions.



2. Explain the mechanism of breathing with neat labelled sketches.
Solution:

Mainly two processes are involved in breathing
A. Inspiration
B. Expiration
A. Inspiration: It is the process of taking in external air or oxygen into the lungs. It starts when the diaphragm contracts and leads to increased volume of thoracic chamber. After which the intercostal muscles contracts and leads to the pulling of ribs and sternum which also increases the volume of the thoracic chamber now, the increased volume of thoracic chamber also increases the pulmonary volume. Which further decrease the intra pulmonary pressure less than the atmospheric pressure and causes the entry of external oxygen into lungs called inspiration.
B. Expiration: Expiration begins when the diaphragm relaxes. This leads to a decreased volume of thoracic chamber. After which the intercostal muscles relaxes and leads to the relaxation of ribs and sternum which also decreases the volume of the thoracic chamber which then increases the pulmonary pressure less than the atmospheric pressure and cause exit of external oxygen called expiration.



3. Explain the role of neural system in regulation of respiration.
Solution:
There are various centres in the neural system that plays significant a role in the regulation and control of respiration. Those are:
Pneumotaxic centre, Respiratory Rhythm centre or Medullary inspiratory centre, Apneustic centre and chemosensitive centre.
1. Pneumotaxic centre:
It is present in the dorsal part (back) of the pons varoli of the brain. It decreases the time duration of the inspiration and alter the respiration rate.
2. Respiratory Rhythm Centre or Medullary inspiratory Centre:

It is present in the medulla of the brain. It regulates the respiratory rhythm.
3. Apneustic centre is present in the lower part of the pons varoli of the brain. It increases the duration of inspiration.
4. Chemosensitive centre is present in the medulla oblongata and the pons area of the brain.