# Prachand NEET (2025)

## Zoology

## Breathing and Exchange of Gases

DPP : 01

**Q1** Select the **incorrect** option.
(A) $pO_2$ of tissues = 40 mmHg
(B) $pCO_2$ of alveoli = 40 mm Hg
(C) $pO_2$ of oxygenated blood = 95 mmHg
(D) $pCO_2$ of tissues = 0.3 mmHg

**Q2** Read the following statements **(I- IV)** w.r.t. pleura.
I. It is double-layered and covers the lungs.
II. Fluid between the layers reduces friction on lung-surface.
III. The outer layer is in contact with the thoracic wall.
IV. The inner layer is in contact with the lungs.
Which of the above statements are **correct**?
(A) I and II only
(B) II and III only
(C) III and IV only
(D) I, II , III and IV

**Q3** Tidal volume and expiratory reserve volume of an athlete are 500 mL and 1100 mL, respectively. What will be his expiratory capacity if the residual volume is 1200 mL?
(A) 1600 mL (B) 1700 mL
(C) 2300 mL (D) 2800 mL

**Q4** On an average, a healthy human breathes _____ times /minute.
Choose the option which fills the blank **correctly.**
(A) 20-40 (B) 1-6
(C) 12-16 (D) 16-25

**Q5** Which of the following lung volumes or capacities can be measured by spirometer?
(A) Functional residual capacity
(B) Residual volume
(C) Total lung capacity
(D) Vital capacity

**Q6** The solubility of $CO_2$ is _____than that of the solubility of $O_2$ in the blood.
Choose the option which fills the blank **correctly.**
(A) 20 - 25 times lesser
(B) slightly higher
(C) slightly greater
(D) 20 - 25 times higher

**Q7** The amount of oxygen transported by RBCs in blood is:
(A) 3% (B) 97%
(C) 49% (D) 25%

**Q8** Which of the following factors favours the formation of oxyhaemoglobin in alveoli?
(A) $pO_2$ ↓, $pCO_2$↑, $H^+$↑, Temperature↑
(B) $pO_2$ ↑, $pCO_2$↑, $H^+$↓, Temperature↑
(C) $pO_2$ ↑, $pCO_2$↓, H+↓, Temperature↓
(D) $pO_2$ ↓, $pCO_2$↑, pH↑, Temperature↓

**Q9** Which of the following equations is **correct**?
(A) $CO_2 \longrightarrow H_2CO_3 \longrightarrow HCO_3^- + H^+$
(B) $CO_2 + H_2O \xrightarrow{\text{Carbonic anhydrase}} H_2CO_3 \xrightarrow{\text{Carbonic anydrase}} HCO_3^- + H^+$
(C) $CO_2 + H_2O \longrightarrow CH_4 + 2O_2$
(D) $CO_2 + H_2O \longrightarrow CO + H_2O_2$

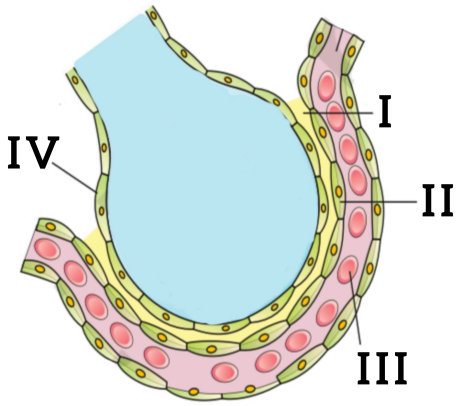
**Q10** Receptors associated with aortic arch and carotid artery can recognise changes in:
(A) $O_2$ and $H^+$ concenteration.
(B) $CO_2$ and $H^+$ concenteration.
(C) $O_2$ concentration and pH.
(D) $O_2$ concentration and temperature.

**Q11** Functional residual capacity (FRC) includes:
(A) volume of air that will remain in the lungs after a normal expiration (ERV+RV).
(B) volume of air remaining in the lungs even after a forcible expiration (RV).
(C) total volume of air a person can expire after a normal inspiration(TV + ERV).
(D) total volume of air accommodated in the lungs at the end of a forced inspiration (VC+RV).

**Q12** Partial pressure of $O_2$ and $CO_2$ in atmospheric air as compared to that in alveolar air is:
(A) $pO_2$ higher and $pCO_2$ lower.
(B) $pO_2$ and $pCO_2$ are both higher.
(C) $pO_2$ and $pCO_2$ are both lower.
(D) $pO_2$ lower and $pCO_2$ higher.

**Q13** Given below is a list of different steps involved in respiration.
I. Utilisation of $O_2$ by the cells for catabolic reactions.
II. Transport of gases by the blood.
III. Pulmonary ventilation by which atmospheric air is drawn in and $CO_2$ is released out.
IV. Release of resultant $CO_2$.
V. Diffusion of $O_2$ and $CO_2$ between blood and tissues.
VI. Diffusion of gases ($O_2$ and $CO_2$) across alveolar tissues.
Select an option that has **correct** sequence of all the steps:
(A) III→ VI →II →V →I →IV
(B) III →VI →I →V→ II →IV
(C) VI→II→ V→ III→ I→IV
(D) IV→ VI→ II→ V →I→III

**Q14** Refer to the given below diagram.

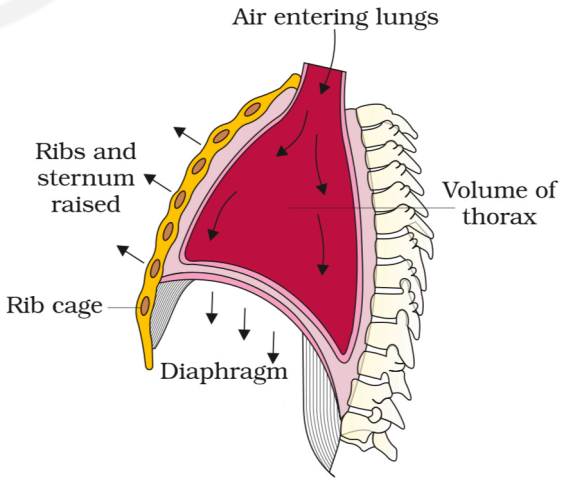



Which of the following represents the endothelium of blood vessels?
(A) I (B) II
(C) III (D) IV

**Q15** At which level of vertebrae of the vertebral column, trachea divides and forms bronchus?
(A) $4^{th}$ thoracic vertebrae
(B) $5^{th}$ thoracic vertebrae
(C) $7^{th}$ thoracic vertebrae
(D) $3^{rd}$ thoracic vertebrae

**Q16** Respiration through skin is called as:
(A) branchial respiration.
(B) cutaneous respiration.
(C) pulmonary respiration.
(D) tracheal respiration.

**Q17** Refer to the given diagram.




Choose the **correct** answer from the options that represent the correct state of the diaphragm and the volume of the thorax.

(A) The volume of the thorax increases and the diaphragm will be in a contracted state.
(B) The volume of the thorax increases and the diaphragm will be in a relaxed state.
(C) The volume of the thorax decreases and the diaphragm will be in a relaxed state.
(D) The volume of the thorax decreases and the diaphragm will be in a contracted state.

**Q18** Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:
**Assertion A:** An epiglottis can cover the glottis during swallowing.
**Reason R:** The covering prevents the entry of food into the pharynx.
In the light of the above statements, choose the **correct** answer from the options given below:
(A) A is true but R is false.
(B) A is false but R is true.
(C) Both A and R are true and R is the correct explanation of A.
(D) Both A and R are true but R is not the correct explanation of A.

**Q19** Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:
**Assertion A:** The part starting with the external nostrils up to the terminal bronchioles constitutes the conducting part.
**Reason R:** The conducting part transports the atmospheric air to the tissues.
In the light of the above statements, choose the **correct** answer from the options given below:
(A) A is true but R is false.
(B) A is false but R is true.
(C) Both A and R are true and R is the correct explanation of A.
(D) Both A and R are true but R is not the correct explanation of A.

**Q20** Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:
**Assertion A:** $CO_2$ bound to haemoglobin in the tissues is released at the alveoli.
**Reason R:** $CO_2$ trapped as bicarbonate at the tissue level and transported to the alveoli is released as $CO_2$.
In the light of the above statements, choose the **correct** answer from the options given below:
(A) A is true but R is false.
(B) A is false but R is true.
(C) Both A and R are true and R is the correct explanation of A.
(D) Both A and R are true but R is not the correct explanation of A.

**Q21** Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:
**Assertion A:** The pneumotaxic centre can moderate the functions of the respiratory rhythm centre.
**Reason R:** Neural signals from this centre can reduce the duration of inspiration.
In the light of the above statements, choose the **correct** answer from the options given below:
(A) A is true but R is false.
(B) A is false but R is true.
(C) Both A and R are true and R is the correct explanation of A.
(D) Both A and R are true but R is not the correct explanation of A.

**Q22** Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:
**Assertion:** During the process of respiration, oxygen is utilised by organisms.
**Reason:** It helps to break down nutrients and derive energy.
In the light of the above statements, choose the **correct** answer from the options given below:
(A) A is true but R is false.
(B) A is false but R is true.
(C) Both A and R are true and R is the correct explanation of A.

(D) Both A and R are true but R is not the correct explanation of A.

**Q23** Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R:
**Assertion A:** A sigmoid curve is obtained when the percentage saturation of haemoglobin with $O_2$ is plotted against the $pCO_2$.
**Reason R:** Every 100mL of oxygenated blood can deliver around 5mL of $O_2$ to the tissues under normal physiological conditions.
In the light of the above statements, choose the **correct** answer from the options given below:
(A) A is true but R is false.
(B) A is false but R is true.
(C) Both A and R are true and R is the correct explanation of A.
(D) Both A and R are true but R is not the correct explanation of A.

**Q24** Given below are two statements:
**Statement I:** Pressure contributed by an individual gas in a mixture of gases is called partial pressure.
**Statement II:** Aquatic arthropods and molluscs exhibit branchial respiration.
In the light of the above statements, choose the *most appropriate* answer from the options given below:
(A) Statement I is correct but Statement II is incorrect.
(B) Statement I is incorrect but Statement II is correct.
(C) Both Statement I and Statement II are correct.
(D) Both Statement I and Statement II are incorrect.

**Q25** Given below are two statements:
**Statement I:** The thickness of the diffusion membrane can affect the rate of diffusion.
**Statement II:** An increase in pulmonary volume decreases the intra-pulmonary pressure.
In the light of the above statements, choose the *most appropriate* answer from the options given below:
(A) Statement I is correct but Statement II is incorrect.
(B) Statement I is incorrect but Statement II is correct.
(C) Both Statement I and Statement II are correct.
(D) Both Statement I and Statement II are incorrect.

**Q26** Given below are two statements:
**Statement I:** Alveoli are thick, bag-like structures with irregular walls.
**Statement II:** Vital capacity is the volume of air a person can breathe in after a forced expiration.
In the light of the above statements, choose the *most appropriate* answer from the options given below:
(A) Statement I is correct but Statement II is incorrect.
(B) Statement I is incorrect but Statement II is correct.
(C) Both Statement I and Statement II are correct.
(D) Both Statement I and Statement II are incorrect.

**Q27** Given below are two statements:
**Statement I:** The larynx is a bony sound-producing box.
**Statement II:** The thickness of the diffusion membrane is less than 1 mm.
In the light of the above statements, choose the *most appropriate* answer from the options given below:
(A) Statement I is correct but Statement II is incorrect.
(B) Statement I is incorrect but Statement II is correct.
(C) Both Statement I and Statement II are correct.
(D) Both Statement I and Statement II are incorrect.

**Q28** Match the **List-I** with **List-II**:

| | **List-I** | | **List-II** |
|---|---|---|---|
| (A) | Asthma | (I) | Proliferation of fibrous |

| | | | |
|---|---|---|---|
| | | | tissues |
| (B) | Emphysema | (II) | Wheezing |
| (C) | Occupational respiratory disorder | (III) | Increases strength of inspiration and expiration |
| (D) | Abdominal muscles | (IV) | Alveolar walls are damaged |

Choose the **correct** answer from the options given below:

(A) A-II, B-IV, C-I, D-III

(B) A-III, B-I, C-IV, D-II

(C) A-III, B-II, C-I, D-IV

(D) A-IV, B-II, C-III, D-I

**Q29** Match **List-I** with **List-II**:

| **List-I** | | **List-II** | |
|---|---|---|---|
| (A) | Coelenterate | (I) | Lungs |
| (B) | Aquatic arthropods | (II) | Moist cuticle |
| (C) | Reptiles | (III) | Body surface |
| (D) | Earthworm | (IV) | Gills |

Choose the **correct** answer from the options given below:

(A) A-III, B-I, C-IV, D-II

(B) A-IV, B-I, C-II, D-III

(C) A-III, B-IV, C-I, D-II

(D) A-IV, B-III, C-I, D-II

**Q30** Match **List-I** with **List-II.**

| **List-I** | | **List-II** | |
|---|---|---|---|
| (A) | Tidal volume | (I) | 2500 mL to 3000 mL |
| (B) | Inspiratory reserve volume | (II) | 1100 mL to 200 mL |
| (C) | Expiratory reserve volume | (III) | 500 mL |
| (D) | Residual volume | (IV) | 1000 mL to1100 mL |

Choose the **correct** answer from the options given below:

(A) A - I, B - IV, C - II, D - III

(B) A - III, B - I, C - IV, D - II

(C) A - III, B - II, C - I, D - IV

(D) A - IV, B - III, C - II, D - I

# Answer Key

| | | | |
|---|---|---|---|
| Q1 | (D) | Q16 | (B) |
| Q2 | (D) | Q17 | (A) |
| Q3 | (A) | Q18 | (A) |
| Q4 | (C) | Q19 | (A) |
| Q5 | (D) | Q20 | (D) |
| Q6 | (D) | Q21 | (C) |
| Q7 | (B) | Q22 | (C) |
| Q8 | (C) | Q23 | (B) |
| Q9 | (B) | Q24 | (C) |
| Q10 | (B) | Q25 | (C) |
| Q11 | (A) | Q26 | (B) |
| Q12 | (A) | Q27 | (B) |
| Q13 | (A) | Q28 | (A) |
| Q14 | (B) | Q29 | (C) |
| Q15 | (B) | Q30 | (B) |

# Hints & Solutions

**Q1 Text Solution:**
**(D)**

- $pO_2$ of tissues = 40 mmHg
- $pCO_2$ of alveoli = 40 mm Hg
- $pO_2$ of oxygenated blood = 95 mmHg
- $pCO_2$ of tissues = 45 mm Hg

**[New NCERT 11th Page no. 187]**

**Q2 Text Solution:**
**(D)**

- Pleura is double-layered and covers the lungs.
- Fluid between the layers reduces friction on the lung surface.
- The outer layer is in contact with the thoracic wall.
- The inner layer is in contact with the lungs.

**[New NCERT 11th Page no. 184, 185]**

**Q3 Text Solution:**
**(A)**
An athlete's tidal volume and expiratory reserve volume are 500 mL and 1100 mL then, the expiratory capacity (TV+ ERV) will be 1600 mL.
**[New NCERT 11th Page no. 187]**

**Q4 Text Solution:**
**(C)**
On an average, a healthy human breathes 12-16 times/minute.
**[New NCERT 11th Page no. 186]**

**Q5 Text Solution:**
**(D)**

- The volume of air involved in breathing movements can be estimated by using a spirometer which helps in clinical assessment of pulmonary functions.
- A spirometer cannot detect the residual volume, and the capacities that include residual volume are not detected by a spirometer, for example, functional residual capacity (ERV + RV) and total lung capacity (RV + ERV+ TV+ IRV).

**[New NCERT 11th Page no. 186, 187]**

**Q6 Text Solution:**
**(D)**
The solubility of $CO_2$ is 20-25 times higher than that of $O_2$, the amount of $CO_2$ that can diffuse through the diffusion membrane per unit difference in partial pressure is much higher compared to that of $O_2$.
**[New NCERT 11th Page no. 188]**

**Q7 Text Solution:**
**(B)**

- Blood is the medium of transport for $O_2$ and $CO_2$.
- About 97% of $O_2$ is transported by RBCs in the blood. The remaining 3% of $O_2$ is carried in a dissolved state through the plasma.

**[New NCERT 11th Page no. 189]**

**Q8 Text Solution:**
**(C)**

- The binding of oxygen with haemoglobin is primarily related to the partial pressure of $O_2$. The partial pressure of $CO_2$, hydrogen ion concentration and temperature are the other factors that can interfere with this binding.
- In the alveoli, where there is high $pO_2$, low $pCO_2$, lesser $H^+$ concentration and lower temperature, the factors are all favourable for the formation of oxyhaemoglobin.

**[New NCERT 11th Page no. 189]**

**Q9 Text Solution:**
**(B)**
RBCs contain a very high concentration of the enzyme (carbonic anhydrase) and minute quantities of the same are present in the plasma too. This enzyme facilitates the following reaction

in both directions:

$$CO_2 + H_2O \xrightarrow{\text{Carbonic anhydrase}} H_2CO_3$$

$$\xrightarrow{\text{Carbonic anydrase}} HCO_3^- + H^+$$

**[New NCERT 11th Page no. 190]**

**Q10 Text Solution:**

**(B)**

Receptors associated with the aortic arch and carotid artery can recognise changes in $CO_2$ and $H^+$ concentration and send necessary signals to the respiratory rhythm centre for remedial action.

**[New NCERT 11th Page no. 190]**

**Q11 Text Solution:**

**(A)**

Functional Residual Capacity (FRC): Volume of air that will remain in the lungs after a normal expiration. This includes ERV+RV.

**[New NCERT 11th Page no. 187]**

**Q12 Text Solution:**

**(A)**

The partial pressure of oxygen ($pO_2$) in atmospheric air is much higher than in alveolar air and the partial pressure of carbon dioxide ($pCO_2$) in atmospheric air is lower than in alveolar air.

**[New NCERT 11th Page no. 187]**

**Q13 Text Solution:**

**(A)**

Respiration involves the following steps:

(I) Breathing or pulmonary ventilation by which atmospheric air is drawn in and $CO_2$ rich alveolar air is released out.

(II) Diffusion of gases ($O_2$ and $CO_2$) across the alveolar membrane.

(III) Transport of gases by the blood.

(IV) Diffusion of $O_2$ and $CO_2$ between blood and tissues.

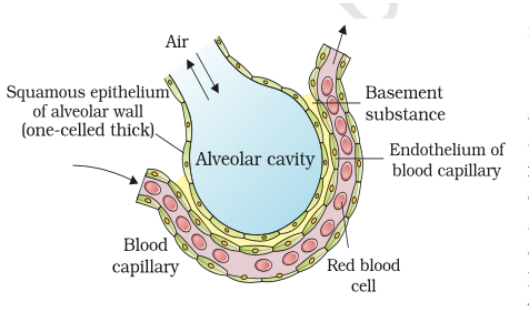
(V) Utilisation of $O_2$ by the cells for catabolic reactions.

(VI) Resultant release of $CO_2$.

**[New NCERT 11th Page no. 185]**

**Q14 Text Solution:**

**(B)**




**[New NCERT 11th Page no. 188]**

**Q15 Text Solution:**

**(B)**

At the level of the 5th thoracic vertebrae of the vertebral column, the trachea divides and forms a bronchus.

**[New NCERT 11th Page no. 184]**

**Q16 Text Solution:**

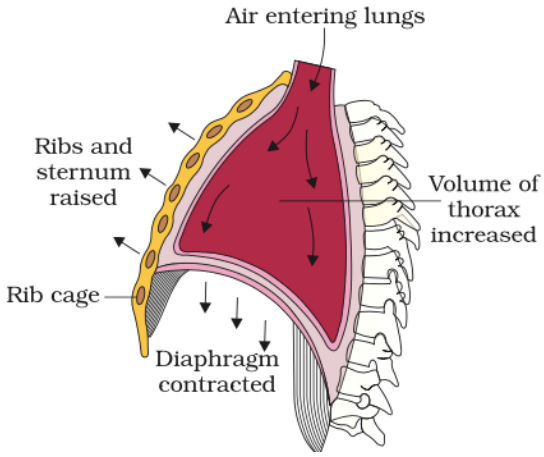
**(B)**

- Respiration through the skin is called as cutaneous respiration.
- Amphibians like frogs can respire through their moist skin (cutaneous respiration).

**[New NCERT 11th Page no. 183]**

**Q17 Text Solution:**

**(A)**




**[New NCERT 11th Page no. 186]**

**Q18 Text Solution:**

**(A)**

During swallowing glottis can be covered by a thin elastic cartilaginous flap called epiglottis to prevent the entry of food into the larynx.

**[New NCERT 11th Page no. 184]**

**Q19 Text Solution:**

**(A)**

- The part starting with the external nostrils up to the terminal bronchioles constitutes the conducting part.
- The conducting part transports the atmospheric air to the alveoli, clears it from foreign particles, humidifies and also brings the air to body temperature.

**[New NCERT 11th Page no. 185]**

**Q20 Text Solution:**

**(D)**

- $CO_2$ bound to haemoglobin in the tissues is released at the alveoli.
- $CO_2$ trapped as bicarbonate at the tissue level and transported to the alveoli is released as $CO_2$.

**[New NCERT 11th Page no. 190]**

**Q21 Text Solution:**

**(C)**

The centre present in the pons region of the brain called the pneumatic centre, can moderate the functions of the respiratory rhythm centre. Neural signals from this centre can reduce the duration of inspiration and thereby alter the respiratory rate.

**[New NCERT 11th Page no. 190]**

**Q22 Text Solution:**

**(C)**

- During the process of respiration, oxygen is utilised by organisms.
- It helps to break down nutrients and derive energy.

**[New NCERT 11th Page no. 183]**

**Q23 Text Solution:**

**(B)**

- A sigmoid curve is obtained when the percentage saturation of haemoglobin with $O_2$ is plotted against the $pO_2$.
- Every 100 ml of oxygenated blood can deliver around 5 ml of $O_2$ to the tissues under normal physiological conditions.

**[New NCERT 11th Page no. 189]**

**Q24 Text Solution:**

**(C)**

- Pressure contributed by an individual gas in a mixture of gases is called partial pressure.
- Aquatic arthropods and molluscs exhibit branchial respiration.

**[New NCERT 11th Page no. 183, 187]**

**Q25 Text Solution:**

**(C)**

- The thickness of the diffusion membrane can affect the rate of diffusion.
- An increase in pulmonary volume decreases the intra-pulmonary pressure.

**[New NCERT 11th Page no. 186, 187]**

**Q26 Text Solution:**

**(B)**

- Alveoli are thin, bag-like structures with irregular walls.
- Vital capacity is the volume of air a person can breathe in after a forced expiration.

**[New NCERT 11th Page no. 184, 187]**

**Q27 Text Solution:**

**(B)**

- The larynx is a cartilaginous box that helps in sound production.
- The thickness of the diffusion membrane is less than 1 mm.

**[New NCERT 11th Page no. 184, 188]**

**Q28 Text Solution:**

**(A)**

| | |
|---|---|
| Asthma | Wheezing |
| Emphysema | Alveolar walls are damaged |
| Occupational respiratory disorder | Proliferation of fibrous tissues |
| Abdominal muscles | Increases strength of inspiration and expiration |

**[New NCERT 11th Page no. 186, 190, 191]**

**Q29 Text Solution:**

**(C)**

| | |
|---|---|
| Coelenterate | Body surface |
| Aquatic arthropods | Gills |
| Reptiles | Lungs |
| Earthworm | Moist cuticle |

**[New NCERT 11th Page no. 183]**

**Q30 Text Solution:**

**(B)**

| | |
|---|---|
| Tidal volume | 500 mL |
| Inspiratory reserve volume | 2500 mL to 3000 mL |
| Expiratory reserve volume | 1000 mL to 1100 mL |
| Residual volume | 1100 mL to 1200 mL |

**[New NCERT 11th Page no. 186, 187]**