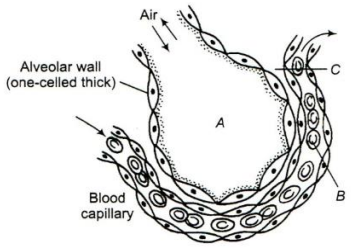
NEET BIOLOGY

BREATHING AND EXCHANGE OF GASES

1. Each haemoglobin molecule can carry maximum of
   a) Two molecules of O_2 b) Three molecules of O_2
   c) Four molecules of O_2 d) One molecules of O_2
2. Hypoxia is caused due to
   a) Lesser O_2 in atmosphere b) Lesser RBC in blood
   c) Lesser CO_2 in atmosphere d) Both (a) and (b)
3. During oxygen transport, the oxyhaemoglobin at the tissue level liberates oxygen to the cells because
   a) O_2 concentration is high and CO_2 is low b) O_2 concentration is low and CO_2 is high
   c) O_2 tension is low and CO_2 tension is high d) O_2 tension is high and CO_2 tension is low
4. O_2 exchange with CO_2 by simple diffusion over the entire body surface takes place in
   I. sponges II. Coelenterates III. Flatworms
   Select the correct option to complete the given statement
   a) I and II b) II and III c) I and III d) All of the above
5. Breathing involves …A… during which atmospheric air is drawn in and …B… by which the alveolar air is released out.
   Choose the correct option for A and B to complete the given NCERT statement
   a) A-expiration; B-osmosis b) A-expiration; B-inspiration
   c) A-inspiration; B-expiration d) A-inspiration; B-diffusion
6. If a large number of people are enclosed in a room, then
   a) Oxygen decreases and carbon dioxide increases
   b) Oxygen increases and carbon dioxide decreases
   c) Both oxygen and carbon dioxide decreases
   d) Both oxygen and carbon dioxide increases
7. The total number of lobes and alveoli present in both the lungs of man are
   a) 17 and 30 million, respectively b) 5 and 300 million, respectively
   c) 19 and 300 million, respectively d) 18 and 300 lakh, respectively
8. Which of the following combines irreversibly with blood haemoglobin?
   a) SO_2 b) O_2 c) CO d) CO_2
9. Identify the correct group of statements
   I. Oxygen is carried by haemoglobin
   II. Oxygen is carried by carbonic anhydrase
   III. CO_2 is carried by haemoglobin
   IV. SO_2 is carried by haemoglobin
   V. Only oxygen is transported by the blood
   VI. Only CO_2 is transported by the blood
   Choose the correct option
   a) I and VI b) II and III c) IV and V d) I and III
10. What is true about RBCs in humans?
    a) They carry about 20-25 per cent of carbon dioxide
    b) They transport 99.5 per cent of oxygen
    c) They transport about 80 per cent oxygen only and the rest 20 per cent of it is transported in dissolved state in blood plasma

d) They do not carry carbon dioxide at all

11. Respiratory centre of the brain is stimulated by
    a) CO_2 content in venous the blood
    b) CO_2 content in arterial the blood
    c) O_2 content in arterial the blood
    d) O_2 content in venous the blood
12. Identify *A*, *B* and *C* in the given diagram and choose the correct option accordingly



    a) A-Alveolar cavity, B-WBC, C-Capillary wall
    b) A-Alveolar cavity, B-RBC, C-Systemic wall
    c) A-Alveolar cavity, B-RBC, C-Capillary wall
    d) A-Alveolar cavity, B-WBC, C-Systemic wall
13. Why breathing is accelerated when the person opens his nose after holding the breathe by closing his nose?
    a) CO_2 build up in the body
    b) CO build up in the body
    c) H^+ decreases in the body
    d) CO_2 decrease in body
14. Listed below are four respiratory capacities (I-IV) and four jumbled respiratory volumes of a normal human adult.

Respiratory Capacity	Respiratory Volume
I.Residual volume	1.
II.Vital capacity	1.
III.Inspiratory reserve volume	1.
IV.Inspiratory capacity	4600 mL

    Which one of the following is the correct matching of two capacities and volumes?
    a) II 3000 mL, III 4600 mL
    b) III 1200 mL, IV 3000 mL
    c) IV 3500 mL, I 1200 mL
    d) I 4600 mL, II 3500 mL
15. Exchange of gases in lungs occurs through
    a) Simple diffusion
    b) Active transport
    c) Osmosis
    d) Plasmolysis
16.

Partial pressure Of Gases	Blood (De oxy genated)	Blood (Oxyge nated)	Tissues
O_2	40	B	40
CO_2	A	40	C

    Choose the correct option for A, B and C to complete the given data
    a) A-40, B-95, C-40
    b) A-45, B-95, C-45
    c) A-35, B-95, C-45
    d) A-35, B-95, C-95
17. Floating ribs of thoracic cage are
    a) 1^{st} to 7^{th} pair
    b) 8^{th} to 9^{th} pair
    c) 8^{th} to 10^{th} pair
    d) 11^{th} to 12^{th} pair
18. At which thoracic vertebra does trachea divide into right and left primary bronchi?
    a) 5
    b) 6
    c) 9
    d) 4
19. The partial pressure of oxygen in the alveolar air is
    a) 45 mm Hg
    b) 95 mm Hg
    c) 104 mm Hg
    d) 110 mm Hg
20. Inspiration is initiated by
    a) Extension of the diaphragm
    b) Contraction of the diaphragm
    c) Extension of the lungs
    d) Contraction of the lungs
21. Why do human beings face difficulty to breath in high elevations?

a) Lower % of O_2 b) Temperature lower c) High pressure d) Low ρO_2

22. During normal respiration without any effort the volume of air inspired or expired is called
a) Tidal volume b) Reserve volume c) Residual volume d) None of these

23. Identify the different parts of the respiratory system in accordance to their location given below
I. Posterior part of the pharynx
II. Present at the glottis
III. In front of oesophagus
Choose the correct option accordingly
a) I-Nasal cavity, II-Larynx, III-Bronchi b) I-Nasopharynx, II-Epiglottis, III-Wind pipe
c) I-Glottis, II-Larynx, III-Trachea d) I-Larynx, II-Epiglottis, III-Trachea

24. The respiratory membranes facilitates the exchange of respiratory gases through diffusion. Oxygen enters the deoxygenated blood through diffusion because
a) Partial pressure of oxygen in alveolar air and capillaries is 40 mm Hg and 100 mm Hg respectively
b) Partial pressure of oxygen in alveolar air and capillaries is 100 mm Hg and 40 mm Hg respectively
c) Partial pressure of oxygen in alveolar air and capillaries is 46 mm Hg and 40 mm Hg respectively
d) Partial pressure of oxygen in alveolar air and capillaries is 40 mm Hg and 46 mm Hg respectively

25. Which of the following gas is quite insignificant for the regulation of respiration rhythm?
a) SO_2 b) N_2 c) CO d) O_2

26. What is vital capacity of our lungs?
a) Inspiratory reserve volume plus tidal volume
b) Total lung capacity minus expiratory reserve volume
c) Inspiratory reserve volume plus expiratory reserve volume
d) Total lung capacity minus residual volume

27. Which of the following statements is not true?
a) The partial pressure of oxygen in deoxygenated blood is 40 mm Hg
b) The partial pressure of oxygen in oxygenated blood is 95 mm Hg
c) The partial pressure of oxygen in the alveolar air is 104 mm Hg
d) The partial pressure of carbon dioxide in deoxygenated blood is 95 mm Hg

28.

Respiratory Gas	Atmospheric Air	Alveoli
O_2	159	A
CO_2	0.3	B

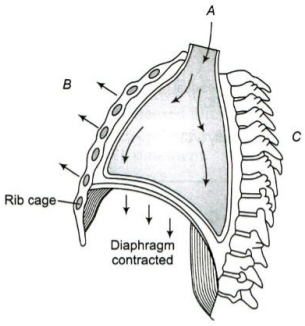
Partial pressure (in mm Hg) of oxygen and carbon dioxide at different part involved in diffusion in comparison to those in atmosphere. Identify A and B and choose the correct option accordingly
a) A-50; B-50 b) A-104; B-40 c) A-40; B-104 d) A-101; B-104

29. When the oxygen supply to the tissue is inadequate, the condition is
a) Dyspnea b) Hypoxia c) Asphyxia d) Apnea

30. Which two of the following changes (I-IV) usually tend to occur in the plain dwellers when they move to high altitudes (3,500 m or more)?
I. Increase in red blood cell size.
II. Increase in red blood cell production.
III. Increased breathing rate.
IV. Increase in thrombocyte count.
Changes occurring are
a) I and III b) III and IV c) I and IV d) I and II

31. Arrange the following in the order of increasing volume
I.Tidal volume
II.Residual volume
III.Expiratory reserve volume
IV.Vital capacity
a) I < II < III < IV b) I < III < II < IV c) I < IV < III < II d) I < IV < II < III

32. Chloride shift occurs in response to
    a) HCO_3^- b) K^+ c) H^+ d) Na^+
33. Which situation would result in the greatest degree of O_2 situation for haemoglobin, if $\wp O_2$ remains constant?
    a) Increased CO_2 level, decreased temperature
    b) Decreased CO_2 level, decreased temperature
    c) Increased CO_2 level, increased temperature
    d) Decreased CO_2 level, increased temperature
34. Blood do not become acidic although it carries CO_2 because
    a) CO_2 is continuously diffused though tissues b) CO_2 combines with H_2O to form H_2CO_3
    c) In CO_2 transport, buffers plays an important role d) CO_2 is absorbed by WBC
35. On high mountains difficulty in breathing is due to
    a) Decrease in partial pressure of oxygen b) Decrease in amount of oxygen
    c) Increase in carbon dioxide concentration d) All of the above
36. What is Bohr's effect?
    a) Raise of pCO_2 or fall in pH decreases the oxygen affinity of haemoglobin
    b) Decrease of pCO_2 or fall in pH decreases the oxygen affinity of haemoglobin
    c) Raise of pCO_2 or increase in pH decreases the oxygen affinity of haemoglobin
    d) Shifting of the oxygen-haemoglobin curve to left
37. One of the major cause of emphysema is
    a) Pollution b) Smog c) Cigarette smoking d) Sanitary condition
38. Animals who use their skin as an accessory respiratory organ are
    I. lizard II. frog
    III. rabbit IV. Zebra
    Choose the correct option
    a) I and II b) Only I c) IV and II d) Only II
39. When the oxygen supply to the tissues is inadequate, the condition is
    a) Hypoxia b) Asphyxia c) Pleuracy d) Anoxia
40. The percentage of oxygen in inhaled air is about
    a) 21% b) 16% c) 79% d) 4%
41. State wheather the given statements are true or false
    I. Respiration in humans is an active process
    II. Diaphragm helps in generating the pressure gradient in the lungs
    Choose the correct option
    a) I – True, II – False b) I – True, II – True c) I – False, II – True d) I – False, II – False
42. When carbon dioxide concentration in blood increases, breathing becomes
    a) Shallower and slow b) There is no effect on breathing
    c) Slow and deep d) Faster and deeper
43. I. Intra pulmonary pressure remains less than the atmospheric pressure
    II. There is negative pressure in the lungs than the atmospheric pressure
    In which of the above two situations inspiration takes place?
    Choose the correct option accordingly?
    a) Only I b) Only II c) Both I and II d) I or II
44. Under which condition, dissociation of oxygen from oxyhaemoglobin in tissues occurs?
    a) Low ρO_2 b) High ρCO_2 c) High H^+ d) All of these
45. In the given diagram, identify what is depicted by A, B and C
    Choose the correct option



a) A-Air going out from lungs, B-Ribs and sternum relaxed, C-Volume of thorax increased
b) A-Air entering lungs, B-Ribs and sternum relaxed, C-Volume of thorax increased
c) A-Air entering lungs, B-Ribs and sternum raised, C-Volume of thorax increased
d) A-Air going out from lungs, B-Ribs and sternum relaxed, C-Volume of thorax decreased

46. Which of the following statement is false?
a) The conducting part of the respiratory system transports the atmospheric air to alveoli
b) Conducting part of the respiratory system clears the air from foreign particles, humidifies and brings it to the body temperature
c) Exchange part of the respiratory system is the actual site at which O_2 and CO_2 exchange takes place
d) None of the above

47. Lungs comprises
a) Network of bronchi b) Bronchioles c) Alveoli d) All of these

48. Which of the following statement is incorrect about nasopharynx?
a) Internal nostrils opens into nasopharynx
b) It is the common passage for air only
c) It is a portion of pharynx
d) Nasopharynx opens through the glottis of the larynx region into the trachea

49. Pneumonia is an infection of
a) Trachea b) Larynx c) Vocal cord d) Lungs

50. Which of the following equation is correct?

a) $KHbO_2 + H^+ \underset{RBC}{\rightleftharpoons} Hb + K + H_2O$

b) $Hb + O_2 \underset{\text{Dissociation in lungs}}{\overset{\text{Association in tissues}}{\rightleftharpoons}} HbO_2$

c) $Na^+ + HCO_3^- \underset{\text{Erythrocyte}}{\rightleftharpoons} NaHCO_3$

d) $HbO_2 \underset{\text{Association in lungs}}{\overset{\text{Dissociation in tissues}}{\rightleftharpoons}} Hb + O_2$

51. Site of aerobic respiration in higher organisms is/are
a) Golgi apparatus b) Mitochondria c) Both (a) and (b) d) Lungs

52. The total thickness of the diffusion membrane of alveolus capillary is
a) Less than 1 cm b) Less than 2 cm c) Less than 1 mm d) More than 1 mm

53. During expiration, the diaphragm becomes
a) Dome-shaped b) Oblique c) Normal d) Flattened

54. Which fact suggests that most oxygen is transported from lungs to the tissues combined with haemoglobin rather than dissolved in blood plasma?
a) Oxygen carrying capacity of whole blood is much higher than that of plasma and oxygen content of blood leaving the lungs is greater than that of blood entering the lungs
b) Haemoglobin can combine with oxygen
c) Oxyhaemoglobin can dissociate into haemoglobin and oxygen
d) Increase in carbon dioxide concentration decreases the oxygen affinity of haemoglobin

55. A large proportion of oxygen is left unused in the human blood even after its uptake by the body tissues. This O_2
    a) Raises the p_{CO_2} of blood to 75 mm of Hg
    b) Is enough to keep oxyhaemoglobin
    c) Helps in releasing more O_2 to the epithelial tissues
    d) Acts as a reserve during muscular exercises
56. Which of the following statement is true regarding the human respiratory system?
    a) Tracheal rings are of hyaline cartilage
    b) Dorsal side of the thoracic chamber is formed by sternum
    c) Expiration occurs when there is negative pressure in the lungs
    d) Inspiration occurs when there is positive pressure in the lungs
57. When the nutrients are oxidised without using molecular O_2 called …A… in yearst glucose formed …B… and CO_2. Endoparasite also respire …C… . It gives low energy.
    Choose the correct option for A, B and C
    a) A-fermentation, R-ethyl alcohol, C-anaerobically
    b) A-fermentation, B-methyl alcohol, C-anaerobically
    c) A-fermentation, B-alcohol, C-aerobically
    d) A-fermentation, B-ethyl alcohol, C-aerobically
58. The ventilation movements of the lungs in mammals is governed by
    a) Diaphragm b) Coastal muscles c) Both (a) and (b) d) None of these
59. CO_2 diffuses into …A… and forms HCO_3^- and H^+. At the …B… site where pCO_2 is low, the reaction proceeds in the opposite direction.
    Thus, CO_2 is trapped as …C… at the tissue level and transported to alveoli is released out as …D…
    Select the right choice for A, B, C and D to complete the given NCERT statement
    a) A-WBC, B-diffusion, C-carbonate, D-O_2 b) A-RBC, B-alveolar, C-bicarbonate, D-CO_2
    c) A-RBC, B-alveolar, C-bicarbonate, D-O_2 d) A-RBC, B-alveolar, C-carbonate, D-CO_2
60. Lungs have a large number of narrow tubes called
    a) Alveoli b) Bronchi c) Bronchioles d) Tracheae
61. Conducting part of the respiratory system comprises
    a) External nostrils upto the terminal bronchioles b) Internal nostrils upto trachea
    c) Epiglottis upto trachea d) Larynx upto bronchi
62. Arrange the given steps of respiration mechanism in the order, they occur in the human body
    I. Breathing or pulmonary ventilation
    II. Diffusion across the alveolar membrane
    III. Transport of gases by blood
    IV. Utilisation of O_2 by cells
    V. Diffusion of O_2 and CO_2 between blood and tissues
    Choose the correct option
    a) I → II → III → IV → V b) I → II → III → V → IV c) I → III → II → V → IV d) I → III → II → IV → V
63. How many layers are present in the diffusion membrane of alveolus capillary?
    a) 5 b) 3 c) 2 d) 4
64. Blood analysis of a patient reveals an unusually high quantity of carboxyhaemoglobin content. Which of the following conclusions is most likely to be correct?
    a) Carbon disulphide the patient has been inhaling polluted air containing usually high content of
    b) Chloroform the patient has been inhaling polluted air containing usually high content of
    c) Carbon dioxide the patient has been inhaling polluted air containing usually high content of
    d) Carbon monoxide the patient has been inhaling polluted air containing usually high content of
65. What happens in Hamburger shift?
    a) HCO_3^- ions move out from plasma and Cl^- ions enters into RBC
    b) CO_3^- ions move out from plasma and Cl^- ions enters into RBC

c) H^+ ions move out from plasma and Cl^- ions enters into RBC
d) HCO_3 ions move out from plasma and H^+ ions enters into RBC

66. Correct sequence of the air passage in humans is
a) Nose → Larynx → Pharynx → Bronchioles → Alveoli
b) Nose → Pharynx → Larynx → Bronchioles → Bronchi
c) Nose → Pharynx → Larynx → Bronchioles → Trachea
d) External nostril → Nasal passage → Internal nostril → Pharynx → Larynx → Trachea → Bronchi Bronchiole → Alveoli

67. By which mechanism, oxygen is transported from lungs to cells?
a) Diffusion b) Facilitated diffusion c) Transpiration d) Osmosis

68. $CO_2 + H_2O \xrightleftharpoons{A} H_2CO_3 \xrightleftharpoons{B} HCO_3^- + H^+$
Name the enzymes A and B in the above equation
a) A-Carbonic anhydrase, B-Carbonic hydratase
b) A-Carbonic hydratase, B-Carbonic anhydrase
c) A-Carbonic anhydrase, B-Carbonic anhydrase
d) A-Carbonic hydratase, B-Carbonic hydratase

69. The movement of chloride ions into erythrocytes from the plasma to maintain osmotic balance during transport of gases is known as
a) Chlorination b) Hamburger phenomenon
c) Bicarbonate shift d) Carbon dioxide transport

70. Actual site of exchange of gases in the lungs is
a) Alveoli b) Pleura c) Bronchioles d) Tracheoles

71. Every 100 mL of deoxygenated blood delivers approximately?
a) 3 mL of CO_2 b) 2 mL of CO_2 c) 4 mL of CO_2 d) 1 mL of CO_2

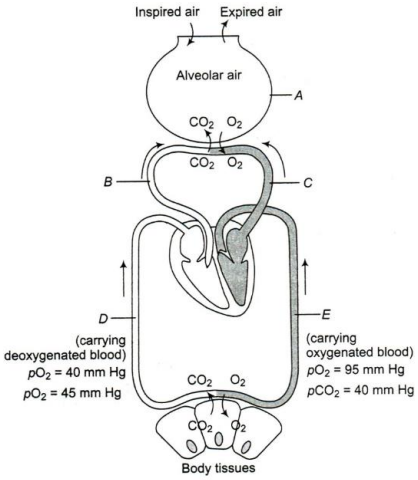
72. Which of the following conditions are found in the alveoli of lungs?
I. high $\mathscr{p}$ O_2 II. Low $\mathscr{p}$ CO_2
III. high $\mathscr{p}$ CO_2 IV. low $\mathscr{p}$ O_2
V. low H^+ VI. High H^+
Choose the correct option
a) I, III and V b) III, IV and VI c) I, IV and VI d) I, II and V

73. Left shift of oxyhaemoglobin curve is noticed under
a) Normal temperature and pH b) Low temperature and high pH
c) Low pH and high temperature d) Low pH and low temperature

74. Humans have to maintain the moderate respiratory rhythms to suit the demands of the body. For fulfilling that purpose, we have the Respiratory rhythm centre in medualla = R
Pneumotaxic centre in pons = PT
Chemosensitive area in medulla = C_1
Peripheral chemoreceptors in aortic arch and carotid artery = C_2
Select the correct path for the regulation of respiration

a) $C_1 \rightarrow PT \rightarrow C_2$ with $\uparrow$ R
b) $PT \rightarrow C_2 \rightarrow C_1$ with $\uparrow$ R
c) $PT \rightarrow R \rightarrow C_2$ with $\uparrow$ C_1
d) $C_2 \rightarrow R \rightarrow PT \rightarrow C_1$

75. Identify *A* to *E* in the given diagram and choose the correct option accordingly



a) A-Alveolus, B-Pulmonary artery, C-Pulmonary vein, D-Systemic vein, E-Systemic arteries
b) A-Alveolus, B-Pulmonary vein, C-Pulmonary artery, D-Systemic vein, E-Systemic arteries
c) A-Alveolus, B-Pulmonary vein, C-Pulmonary artery, D-Systemic arteries, E-Systemic vein
d) A-Alveolus, B-Pulmonary vein, C-Pulmonary artery, D-Systemic arteries, E-Portal vein

76. A chemosensitive area is situated adjacent to the rhythm centre in the brain. This area is highly sensitive to
a) CO_2 concentration b) O_2 concentration c) H^+ concentration d) Both (a) and (c)

77. Vocal cords occur in
a) Pharynx b) Larynx c) Glottis d) Bronchial

78. Total lung capacity is
a) Total volume of air accommodated in lungs at the end a forced inspiration
b) RV + ERV + TU + IRV
c) Vital capacity + residual volume
d) All of the above

79. In the diagram given in the previous question, the function performed by A, B and C are as follows
A – Diffusion of O_2 to blood
B – Diffusion of CO_2
C – Exchange of gases takes place
Select among A, B and C which one is correctly matched and choose the correct option accordingly
a) Only A b) Only B c) Only C d) A, B and C

80. Carbonic anhydrase is found in
a) Blood b) Plasma c) Both (a) and (b) d) None of these

81. Process of exchange of O_2 from the atmosphere with …A… produced by the cells is called …B…, which is commonly known as …C…
Choose the appropriate options for the blanks A, B and C to complete the given NCERT statement
a) A-H_2O, B-breathing, C-respiration b) A-O_2, B-breathing, C-respiration
c) A-CO_2, B-breathing, C-respiration d) A-NO_2, B-breathing, C-respiration

82. The breathing centre initiates the ventilation in response to
a) Increase of air pressure b) Decrease of air pressure
c) Increase of CO_2 in arterial blood d) Increase of O_2 in arterial blood

83. Exchange of O_2 and CO_2 between the blood and tissue is based on
a) Pressure/concentration gradient b) Inspiratory capacity
c) Osmotic gradient d) Tidal volume

84. What are the favourable conditions for oxyhaemoglobin?
a) High ρO_2 b) Low ρCO_2 c) Low H^+ d) All of these

85. When a sea diver goes very deep he has to breathe on compressed air at high pressure. After sometime, he loses his strength to work and feel drowsy. This is because of
a) Compressed air b) More carbon dioxide diffusing into molecules

c) More nitrogen diffusing in blood and body fats d) Nervous system does not work properly

86. Which is called Hamburger shift?
a) Hydrogen shift b) Bicarbonate shift c) Chloride shift d) Sodium shift

87. Hiccups can be best described as
a) Forceful sudden expiration b) Jerky incomplete inspiration
c) Vibration of the soft palate during breathing d) Sign of indigestion

88. Dead space air in man is
a) 500 mL b) 150 mL c) 250 mL d) 1.5 mL

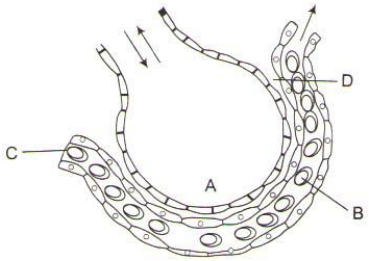
89. Human beings have a significant ability to maintain and moderate the respiratory rhythm to suit the demands of the body tissues. This is achieved by
a) Arterial system b) Systemic vein system
c) Neural system d) Cardiac system

90. The expiratory reserve volume will be
a) 1000 mL b) 2000 mL c) 4000 mL d) 5000 mL

91. Why does the air in the nasal cavity get warmed?
a) Because of the presence of many hairs present in nasal cavity
b) Because the nasal cavity has very good blood supply
c) Because the nasal cavity has mucous membrane
d) All of the above

92. Haemoglobin (Hb) is a
a) Reproductive pigment b) Respiratory pigment
c) Carbohydrate d) Fat

93. The figure given below shows a small part of human lung where exchange of gas takes place. In which one of the options given below, the one part A, B, C or D is correctly identified along with its function.



a) A – Alveolar cavity - main site of exchange of respiratory gases
b) D – Capillary wall - exchange of gases takes place here
c) B - Red blood cell - transport of mainly haemoglobin
d) C - Arterial capillary – passes oxygen to tissues

94. How many molecules of oxygen can bind to a molecule of haemoglobin?
a) One b) Two c) Three d) Four

95. 'XX' is a part of respiratory system that contains C-shaped rings of hyaline cartilage. 'XX' is lined with ciliated, pseudostratified columnar epithelium. Identify 'XX'
a) Nasopharynx b) Glottis c) Larynx d) Trachea

96. The oxygen toxicity is related with
a) Blood poisoning b) Collapsing of alveolar walls
c) Failure of ventilation of lungs d) Both (a) and (b)

97. Arrange the given steps by which the pulmonary volume increases in the sequence of events occurring first
I. Contraction of intercostal muscles
II. Lifting up of the ribs
III. Sternum causing an increase in the volume of the thoracic chamber in dorsoventral axis
IV. Contraction of the diaphragm which increases the volume of the thoracic chamber in antero-posterior axis

Choose the correct option

a) I → II → III → IV b) IV → I → II → III c) IV → I → III → II d) I → III → IV → II

98. Almost same $\wp CO_2$ in humans is found in
    a) Oxygenated blood and tissues b) Deoxygenated blood and oxygenated blood
    c) Deoxygenated blood and tissues d) All of the above
99. During swallowing, glottis can be covered by a thin elastic cartilaginous flap called …A… to prevent the entry of food into larynx. Trachea is a straight tube extending up to …B… cavity, which divides at the level of 5th thoracic vertebra into right and left primary …C…
    Choose the correct option for A, B and C from the given four options to complete the above statement with reference to NCERT textbook
    a) A-epiglottis, B-bronchi, C-bronchioles
    b) A-epiglottis, B-mid thoracic, C-bronchi
    c) A-epiglottis, B-hind thoracic, C-bronchi
    d) A-epiglottis, B-pre thoracic, C-bronchi
100. Volume of air breathed in and out, while at rest is called
    a) Residual volume b) Tidal volume c) Vital volume d) Total lung capacity
101. Residual volume is
    a) Lesser than tidal volume b) Greater than inspiratory volume
    c) Greater than vital capacity d) Greater than tidal volume
102. Which part of the brain is called respiratory rhythm centre?
    a) Cerebellum region b) Brain stem region c) Medulla region d) Temporal region
103. Tidal volume is
    a) Volume of air inspired or expired
    b) Additional volume of air, a person can inspire by a forcible inspiration
    c) Additional volume of air, a person can expire by a forcible expiration
    d) Remaining volume of air in the lungs even after a forcible expiration
104. Identify which respiratory structure possesses the following features and choose the correct option accordingly
    I. Found in mammals
    II. Highly muscular and fibrous partition, elevated towards the thorax like a dome
    III. Separates thoracic and abdominal cavity
    a) Pleural membrane b) Phrenic muscle c) Diaphragm d) Mediastinum
105. Haemoglobin is having maximum affinity with
    a) Carbon dioxide b) Carbon monoxide c) Oxygen d) Ammonia
106. Arrange the given steps of expiration in the sequence of event occurring first
    I. Relaxation of the diaphragm and sternum
    II. Reduction of the pulmonary volume
    III. Expulsion of air from the lungs
    IV. Increase in intra pulmonary pressure
    Choose the correct option
    a) I → II → III → IV b) I → II → IV → III c) IV → III → II → I d) IV → II → III → I
107. Factors affecting the rate of diffusion is/are
    a) Pressure gradient b) Solubility of gases
    c) Thickness of membranes d) All of these
108. Which one of the following is the correct statement regarding the process of respiration in humans?
    a) Cigarette smoking may lead to inflammation of nasopharynx
    b) Neural signals from the pneumotoxic centre in the pons region of the brain can't increase the duration of inspiration
    c) Workers in grinding and stone breaking industries may suffer from lung fibrosis
    d) About 90% of CO_2 is carried out by haemoglobin as carbominohaemoglobin

109. Identify the component of respiratory system which displays the features given below and choose the correct option
I. Double layered
II. Fluid contained in it reduces the friction on the lung surface
III. Its outer layer is in contact with thoracic wall
IV. Its inner layer is in contact with lungs
a) Visceral layer b) Peritoneum cavity c) Visceral organs d) Pleura

110. I. On an average a healthy human breathes 12-16 times/minute
II. The volume of air involved in the breathing movements can be estimated by spirometer
III. Diaphragm is very useful in both inspiration and expiration
Which of the above statements are incorrect?
Choose the correct option
a) I and II b) II and III c) I and III d) None of these

111. Blood is a medium to transport O_2 and CO_2. About ...A... per cent of O_2 is transported by ...B... in the blood and the remaining ...C... per cent of O_2 is carried in a dissolved state through the ...D...
Select the right options for A, B, C and D to the complete the given statement
a) A-50, B-RBC, C-50, D-plasma b) A-97, B-RBC, C-3, D-plasma
c) A-90, B-RBC, C-10, D-plasma d) A-80, B-RBC, C-20, D-plasma

112. Name the artery which carries deoxygenated blood
a) Pulmonary artery b) Pulmonary trunk c) Systemic artery d) Vena cava

113. Receptors associated with the aortic arch and carotid artery can recognize the changes in ...A... and H^+ concentration and send necessary signals to the ...B... for remedial actions
Select the right choice for A and B to complete the given NCERT statement
a) A-OH^-; B-rhythm centre b) A-O_2; B-rhythm centre
c) A-CO_2; B-rhythm centre d) A-blood circulation; B-rhythm

114. The factor which does not affect the rate of alveolar diffusion is
a) Solubility of gases b) Thickness of the membranes
c) Pressure gradient d) Reactivity of the gases

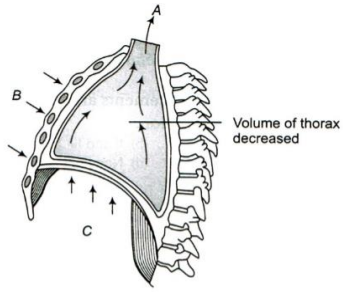
115. How much amount of air can be inspired or expired during normal breathing?
a) 0.5L b) 2.5L c) 1.5L d) 5.5L

116. The partial pressure of CO_2 (pCO_2) is the highest in
a) Trachea b) Alveoli c) Tissues d) Bronchi

117. Dissociation of CO_2 from carbamino haemoglobin takes place when
a) ρCO_2 is less in alveoli and ρO_2 is high b) ρCO_2 is low and ρO_2 is high in alveoli
c) ρCO_2 is equal to ρO_2 in lungs, *i.e.,* low d) ρCO_2 is equal to ρO_2 in tissue, *i.e.,* high

118. Pneumotaxic centre of the brain can
a) Moderate the function of respiratory system b) Decrease the heart rate
c) Increase the heart rate d) Increase the flow of blood

119. In the given diagram, what *A*, *B* and *C* depicts?



a) A-Air goes inside to lungs, B-Ribs and sternum returned to original, position, C-Diaphragm contracted
b) A-Air expelled from lungs, B-Ribs and sternum returned to original position, C-Diaphragm relaxed and arched upward

c) A-Air expelled from lungs, B-Ribs and sternum goes upward, C-Diaphragm relaxed and arched upward
d) A-Air goes inside to lungs, B-Ribs and sternum goes upward, C-Diaphragm relaxed and arched upward

120. Effect of 2-3 DPG on the human blood is that
a) It increases the affinity of O_2 to haemoglobin
b) It decreases the affinity of O_2 to haemoglobin
c) It increases in the blood in plane areas
d) None of the above

121. Two friends are eating together on a dining table. One of them suddenly starts coughing while swallowing some food. This coughing would have been due to improper movement of
a) Diaphragm
b) Neck
c) Tongue
d) Epiglottis

122. The thoracic chamber is formed dorsally by the …A…, ventrally by the …B…, laterally by the …C… and on lower side by the dome-shaped …D…
Select the right choices for A, B, C and D to complete the given NCERT statement
a) A-vertebral column, B-sternum, C-ribs, D-diaphragm
b) A-vertebral column, B-ribs, C-sternum, D-diaphragm
c) A-diaphragm, B-ribs, C-sternum, D-vertebral column
d) A-ribs, B-diaphragm, C-sternum, D-vertebral column

123. Which structure of the lungs is directly involved in O_2/CO_2 exchange between air and blood capillary?
a) Bronchi
b) Trachea
c) Alveoli
d) Secondary bronchi

124. If the level of carboxyhaemoglobin in blood reaches upto……, the functioning of central nervous system is severely affected which results in death.
a) 1 to 2%
b) 0.20 to 0.30%
c) 0.30 to 0.40%
d) 0.1 to 5%

125. When the body is rapidly oxidizing fat, excessive ketone bodies gets accumulated in the body, resulting in the formation of
a) Pyruvic acid
b) Lactic acid
c) Ketoacidosis
d) ATP

126. Which portion of the human respiratory system is called sound box?
a) Larynx
b) Trachea
c) Nasopharynx
d) Glottis

127. Binding of O_2 with haemoglobin is primarily depended upon
I. partial pressure of O_2
II. partial pressure of CO_2
III. hydrogen ion concentration
IV. temperature
Choose the correct option
a) I, II and IV
b) II, III and IV
c) I, III and IV
d) All of these

128. Disease aggravated by pollution is
a) Haemophilia
b) Rheumatism
c) Scurvy
d) Bronchitis

129. In humans, right lung is divided into …A… lobes and left lung is divided into …B… lobes.
Choose the correct option for A and B to complete the given statement
a) A-3; B-2
b) A-2; B-3
c) A-2; B-2
d) A-3; B-4

130. Which vein contains the oxygenated blood in humans?
a) Cardiac vein
b) Hepato pancreatic vein
c) Portal vein
d) Pulmonary vein

131. Rate of breathing is controlled by
a) The amount of freely available oxygen
b) Carbon dioxide
c) Muscular functions of the body
d) None of the above

132. Emphysema is a chronic disorder which is caused due to
a) Damaged trachea
b) Damaged nostrils
c) Damaged alveolar walls
d) Damaged lungs

133. I. $p O_2$ is the major factor which affects the binding of CO_2 with haemoglobin
II. $p CO_2$ is low and $p O_2$ is high in tissues
III. RBC contains a very high concentration of carbonic anhydrase
IV. Every 100 mL of deoxygenated blood delivers approximately 4 mL of CO_2 to alveoli

Select the combination of right statements

a) I, III and IV b) I, II and IV c) I, II and III d) II, III and IV

134. Although much carbon dioxide is carried in blood, yet blood does not become acidic because
   a) CO_2 is continously diffused through the tissues and is not allowed to accumulate
   b) CO_2 combines with water to form H_2CO_3, which is neutralized by Na_2CO_3
   c) In CO_2 transport, blood buffers play an important role
   d) CO_2 is absorbed by leucocytes
135. Which of the following changes usually tends to occur in plain dwellers when they move to the high altitudes?
   I. Increased breathing rate
   II. Increased RBC production
   III. Increased WBC production
   IV. Increased thrombocyte count
   Choose the correct option
   a) I and II b) III and IV c) I and IV d) I and II
136. Asthama is caused by
   a) Infection in the lungs b) Infection in the trachea
   c) Infection of the glottis d) Spasm in the bronchioles and bronchi
137. Blood carries CO_2 mainly, in which form?
   a) Hb. CO_2 b) $NaHCO_3$ c) Carbonic acid d) Hb. CO_2 and CO
138. Movement of the air into and out of the lungs is carried out by
   a) Imbibition b) Pressure gradient c) Osmosis d) Diffusion
139. Partial pressure of O_2 and CO_2 in atmospheric airs compared to those in alveolar air is
   ρO_2 ρCO_2
   a) Higher Lower b) Higher Higher
   c) Lower Lower d) Lower Higher
140. Right lung of rabbit is divided into
   a) Four lobes b) Two lobes c) Six lobes d) Eight lobes
141. Transport of CO_2 by the blood is primarily dependent upon
   a) Solubility of CO_2 in blood b) Carbonic anhydrase
   c) Binding of haemoglobin to CO_2 d) Binding of haemoglobin to O_2
142. The alveoli of lungs are lined by
   a) Simple epithelium b) Squamous epithelium
   c) Cuboidal epithelium d) Columnar epithelium
143. A muscular transverse partition in mammals that separates thorax from abdomen is called
   a) Diaphragm b) Pharynx c) Stomach d) Duodenum
144. Carbon dioxide (CO_2) is released during
   a) Catabolic reactions b) Anabolic reactions c) Amphibolic reactions d) All of the above
145. Respiratory or exchange part of the respiratory system comprises
   a) Lungs and pleural membrane b) Alveoli and their ducts
   c) Bronchus and their protecting covering d) Diaphragm and alveoli
146. The solubility of CO_2 in the blood is
   a) 10-15 times higher than that of O_2 b) 20-25 times higher than that of O_2
   c) Slightly higher than that of O_2 d) Slightly lower than that of O_2
147. I. Increased partial pressure of O_2
   II. Increased partial pressure of CO_2
   III. Increased partial pressure of H^+
   IV. Decreased partial pressure of O_2
   All the above situations favours the dissociation of oxyhaemoglobin except
   a) I and II b) II and III c) I and IV d) Only I

148. Haemoglobin of the human blood forms a stable complex compound with which of the following gas leading to death?
a) Oxygen b) Carbon dioxide c) Carbon monoxide d) Nitrogen

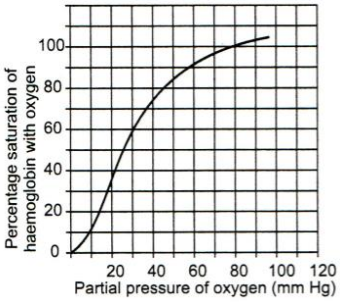
149. Among vertebrates, …A… use gills whereas reptiles, birds and mammals respire through the …B… . Amphibians like frogs can respire through …C… also. Mammals have a well adapted respiratory system
Select appropriate choice for the blanks A, B and C to complete the given NCERT statement
a) A-fishes, B-lungs, C-gills b) A-fishes, B-lungs, C-dry skin
c) A-fishes, B-lungs, C-moist skin d) A-mammals, B-gills, C-moist skin

150. Friction on the lungs surface reduces by
a) Double layered pleura b) Single layered pleura
c) Ribs covering lungs d) Mucous membrane surrounding the lungs

151. Which of the following statements are true/false?
V. The blood transports carbon dioxide comparatively easily because of its highest solubility.
VI. Approximately 8.9% of carbon dioxide is transported being dissolved in the plasma of blood.
VII. The carbon dioxide produced by the tissues, diffuses passively into the blood stream and passes into red blood corpuscles and react with water to form H_2CO_3.
VIII. The oxyhaemoglobin (HbO_2) of the erythrocytes is basic.
IX. The chloride ions diffuse from plasma into the erythrocytes to maintain ionic balance.
a) I, III and V are true , II and IV are false b) I, III and V are false, II and IV are true
c) I, II and IV are true, III and V are false d) I, II and IV are false, III and V are true

152. Air entering the lungs is
a) Warm and filtered b) Contains only oxygen
c) Cool and filtered d) Enriched with CO_2 and NO_2

153. Shifting of the curve to right takes place in the case



a) Raise in ρCO_2 b) Fall in pH c) Raise in temperature d) All of these

154. Hiccup occurs due to
a) Contraction of the air passage b) Contraction of the diaphragm
c) Extension of the abdomen d) Extension of the lungs

155. CO_2 dissociates in alveoli from carbohaemoglobin when
a) $\rho O_2 =$ low, $\rho CO_2 =$ high b) $\rho O_2 =$ high, $\rho CO_2 =$ high
c) $\rho O_2 =$ low, $\rho CO_2 =$ low d) $\rho O_2 =$ high, $\rho CO_2 =$ low

156. Oxyhaemoglobin in the blood is formed when
a) O_2 binds with WBC b) O_2 binds with RBC
c) O_2 binds with Iron d) O_2 binds with plasma

157. The partial pressure of O_2 is the highest in
a) Alveoli b) Bronchi c) Trachea d) Tissues

158. The vital capacity of human lung is equal to
a) 500 mL b) 4600 mL c) 5800 mL d) 2300 mL

159. Oxygen dissociation curve is
a) Sigmoid b) Parabolic c) Hyperbolic d) Straight line

160. Which one is the cofactor of carbonic anhydrase?
a) Iron b) Zinc c) Copper d) Magnesium

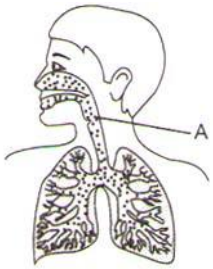
161. Haemoglobin is the red coloured iron containing pigment which is present in
a) WBC b) RBC c) Platelets d) Tissue

162. The area of inner surface of bronchiole is
a) 1 m^2 b) 10 m^2 c) 100 m^2 d) 1000 m^2

163. Diffusion membrane is made up of
a) Thin squamous epithelium of alveoli b) Endothelium of alveolar capillaries
c) Basement substance in between the two mentioned above d) All of the above

164. Primary site of the gaseous exchange in humans is
a) Lungs b) Alveoli c) Bronchus d) Diaphragm

165. What is the function of region labelled as 'A' in the given diagram?



a) Passage to lungs b) Connection of larynx c) Sound producing d) Warm providing

166. Carbon dioxide is transported in blood in the form of
a) Haemoglobin b) Oxyhaemoglobin c) Carbonate d) Bicarbonate

167. Pleural membrane is covering of
a) Heart b) Lung c) Liver d) All of these

168. Among of CO_2 in expired air is about
a) 0.04% b) 0.03% c) 4.5% d) 2.1%

169. Dissociation curve of haemoglobin is
a) Sigmoid b) Parabolic c) Straight line d) Hyperbolic

170. Given below are four matchings of an animal and its kind of respiratory organ
I.Silver fish – Trachea
II.Scorpion – Book lung
III.Sea squirt – Pharyngeal gills
IV.Dolphin - Skin
The correct matchings are
a) II and IV b) III and IV c) I and IV d) I, II and III

171. Why carbon monoxide (CO) poisonous for man?
a) It affects the nerves of the lungs
b) It affects the diaphragm and intercostals muscles
c) It reacts with oxygen reducing percentage of oxygen in air
d) Haemoglobin combines with carbon monoxide instead of oxygen and the product cannot dissociate

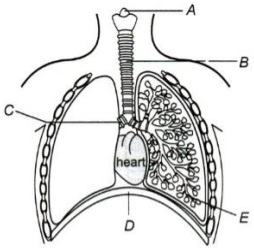
172. Identify the type of pulmonary volume/capacity on the basis of quantity of air present in the lungs given below. (Refer NCERT)
I. ~ 1100 mL – 1200 mL
II. ~ 500 mL
III. ~ 5000 mL – 6000 mL
Choose the correct option
a) I – VC, II – FRC, III – RV b) I – RV, II – TV, III – TLC
c) I – EC, II – IC, III – RV d) I – TV, II – IRV, III - ERV

173. Approximate volume of air a healthy man can expire or inspire per minute is
a) 5000 to 6000 mL b) 6000 to 7000 mL c) 6000 to 8000 mL d) 7000 to 9000 mL

174. Which one of the following has the smallest diameter?

a) Right primary bronchus
b) Left primary bronchus
c) Trachea
d) Respiratory bronchiole

175. Identify A, B, C, D and E in the given diagram of human respiratory system



Choose the correct option
a) A-Epiglottis, B-Trachea, C-Glottis, D-Diaphragm, E-Bronchiole
b) A-Glottis, B-Trachea, C-Bronchus, D-Diaphragm, E-Bronchiole
c) A-Adams apple, B-Trachea, C-Bronchus, D-Diaphragm, E-Bronchiole
d) A-Epiglottis, B-Trachea, C-Bronchus, D-Diaphragm, E-Bronchiole

176. Identify the correct statement with reference to transport of respiratory gases by blood?
a) Haemoglobin is necessary for transport of carbon dioxide and carbonic anhydrase for transport of oxygen
b) Haemoglobin is necessary for transport of oxygen and carbonic anhydrase for transport of carbon dioxide
c) Only oxygen is transported by blood
d) Only carbon dioxide is transported by blood

177. When the body is rapidly oxidizing fats, excess ketone bodies accumulate resulting in
a) Pyruvic acid
b) Lactic acid
c) Ketoacidosis
d) ATP

178. Oxygen (O_2) is utilised by an organism to
a) Directly breakdown the nutrient molecules
b) Indirectly breakdown the nutrient molecules
c) Obtain nourishment from the food
d) Burn the organic compounds indirectly

179. Which of the following statements are not correct?
I. Diffusion membrane is made up of 3 layers
II. Solubility of CO_2 in blood is higher than O_2 by 25 times
III. Breathing volumes are estimated by spirometer
IV. High H^+ in blood favours oxygen dissociation
Choose the correct option
a) I and III
b) III and IV
c) I and IV
d) None of these

180. After deep inspiration, capacity of maximum expiration of lung is called
a) Total lung capacity
b) Functional residual capacity
c) Vital capacity
d) Inspiratory capacity

181. After a deep inspiration and maximum expiration, the capacity of lungs is known as
a) Vital capacity
b) Tidal volume
c) IRV
d) ERV

182. Pick the correct statement.
a) The contraction of internal intercostal muscles lifts up the ribs
b) The RBCs transport oxygen only
c) The thoracic cavity is anatomically an air tight chamber
d) Healthy man can inspire approximately 500 mL of air per minute

183. Almost same $\wp O_2$ in humans is found in
a) Alveoli and tissues
b) Oxygenated blood and deoxygenated blood
c) Alveoli and oxygenated blood

d) Alveoli and deoxygenated blood

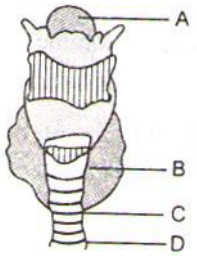
184. Tobacco smoke contains carbon monoxide, which
   a) Reduces the oxygen-carrying capacity of blood
   b) Causes gastric ulcers
   c) Raises blood pressure
   d) Is carcinogenic

185. Which of the following diseases are occupational respiratory disorders?
   a) Silicosis, fibrosis and asbestosis
   b) Emphysema and mountain sickness
   c) Asthma and emphysema
   d) Asthma and AIDS

186. In humans, exchange of gases occurs
   a) By diffusion
   b) Between blood and tissue
   c) Between alveoli and pulmonary blood capillary
   d) All of the above

187.
   a) The H^+ released from carbonic acid combines with haemoglobin to form haemoglobinic acid
   b) Oxyhaemoglobin of erythrocytes is alkaline
   c) More than 70% of carbon dioxide is transferred from tissues to the lungs in the form of carbamino compounds
   d) In a healthy person, the haemoglobin content is more than 25 gm per 100 mL

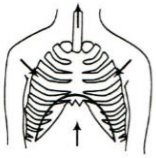
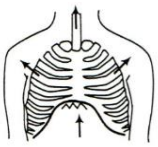
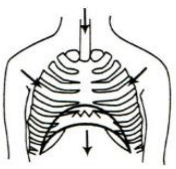
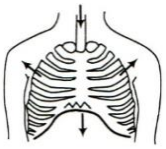
188. The diagram represents the human larynx. Choose the correct combination of labeling from the options given.



   a) A – larynx B – parathyroid C- tracheal cartilage D – trachea
   b) A – nasolarynx B - thyroid C- tracheal cartilage D - trachea
   c) A - trachea B - thyroid C - bronchiole D – tracheal cartilage
   d) A – epiglottis B – thyroid C – tracheal cartilage D - trachea

189. Additional muscles in the …… impacts the ability of humans to increase the strength of inspiration and expiration
   Complete the given NCERT statement with an appropriate option
   a) Chest
   b) Diaphragm
   c) Abdomen
   d) Lungs

190. Exhalation is the process of expulsion of air through respiratory tract.
   Which of the following figure does illustrate the process of exhalation?

   a) 
   b) 
   c) 
   d) 

191. Under normal conditions, what amount of O_2 is delivered by 100 mL of the oxygenated blood?
   a) 5 mL
   b) 4 mL
   c) 3 mL
   d) 2 mL

192. ρCO_2 is higher in tissues due to
   a) Anabolism
   b) Catabolism
   c) Building up of carbohydrates
   d) Building up of proteins

193. During inspiration, the diaphragm
   a) Expands
   b) Shows no change
   c) Contracts and flattens
   d) Relaxes to become dome-shaped

194. During expiration, the diaphragm becomes

a) Normal b) Flattened c) Dome-shaped d) Oblique

195. Severe Acute Respiratory Syndrome (SARS)
a) Is caused by a variant of *Pneumococcus pneumoniae*
b) Is caused by a variant of the common cold virus (corona virus)
c) Is an acute form of asthma
d) Affects non-vegetarians much faster than vegetarians

196. About 1200 mL of air is always known to remain inside the human lungs. It is described as
a) Inspiratory reserve volume b) Expiratory reserve volume
c) Residual volume d) Tidal volume

197. Respiratory centre is present in
a) Cerebellum b) Cerebrum c) Medulla oblongata d) Hypothalamus

198. Exchange of gases in man takes place in
a) Trachea b) Bronchus c) Alveoli d) All of these

199. Which one of the following statements is incorrect?
a) The residual air in lungs slightly decreases the efficiency of respiration in mammals
b) The presence of non-respiratory air sacs, increases the efficiency of respiration in birds
c) In insects, circulating body fluids serve to distribute oxygen to tissues
d) The principle of countercurrent flow facilitates efficient respiration in gills of fishes

200.

Cases	Pressure of Veins	Systemic Arteries
O_2	40 mm kg	95 mm kg
CO_2	A	B

Choose the correct option for A and B to complete the given data
a) A-45 mm Hg; B-40 mm Hg b) A-45 mm Hg; B-45 mm Hg
c) A-45 mm Hg; B-50 mm Hg d) A-45 mm Hg; B-55 mm Hg

201. Larynx is present in between
a) Epiglottis and glottis b) Trachea and bronchiole
c) Epiglottis and trachea d) Bronchus and epiglottis

202. Arrange the given steps of respiration in the sequence of event they occur
I. Diffusion of gases, O_2 and CO_2 across the alveolar membrane
II. Transport of gases by the blood
III. Utilisation of O_2 by the cells for catabolic reactions and the resultant release of CO_2
IV. Pulmonary ventilation by which atmospheric air is drawn in and CO_2 rich alveolar air is released out
V. Diffusion of O_2 and CO_2 between the blood and tissue
Choose the correct option
a) III → V → II → I → IV b) III → II → V → I → IV c) V → IV → III → II → I d) I → II → III → IV → V

203. An …A… in the pulmonary volume …B… the intra pulmonary pressure to less than the atmospheric pressure which forces the air from …C… to move into the lungs, *i. e.*, …D…
Choose the correct options for the blanks A, B, C and D to complete the above statement with reference to NCERT textbook
a) A-increase, B-decrease, C-outside, D-expiration
b) A-decrease, B-increase, C-outside, D-expiration
c) A-decrease, B-increase, C-inside, D-inspiration
d) A-increase, B-decrease, C-outside, D-inspiration

204. A spirometer cannot be used to measure
a) IC b) RV c) ERV d) IPV

205. Binding of CO_2 to oxyhaemoglobin occurs when
a) ρCO_2 is high and ρO_2 is less in tissue b) ρCO_2 is low and ρO_2 is high in tissue
c) ρCO_2 is low and ρO_2 is low in tissue d) ρCO_2 is high and ρO_2 is high in tissue

206. Aerobic respiration involves

I. external respiration
II. transport of gases
III. internal respiration
IV. cellular respiration
Choose the correct combination of options for the given statements
a) I, II and III b) II, III and IV c) I, III and IV d) All of the above

207. CO_2 is carried by haemoglobin is
a) Carboxy haemoglobin b) Carbamino haemoglobin
c) Carbamido haemoglobin d) Deoxyhaemoglobin

208. Partial pressure of the gas is the pressure contributed by
a) All gases in a mixture b) Individual gas in a mixture
c) Pressure exerted by atmosphere on gases d) Atmosphere on O_2 only

209. Which of the following structure is present inside the larynx of the respiratory system?
a) Glottis b) Epiglottis c) Vocal cords d) None of these

210. Which of the following respiratory organs are present in spiders and scorpions?
a) Book lungs b) Gills c) Gill books d) Lungs

211. Nasopharynx opens through the …A… of the larynx region into the …B…
Choose the correct option for A and B to complete the given NCERT statement
a) A-trachea, B-lungs b) A-trachea, B-glottis c) A-glottis, B-lungs d) A-glottis, B-trachea

212. When temperature decreases oxyhaemoglobin curve will become
a) More steep b) Straight c) Parabola d) All of these

213. Skin is an accessory organ of respiration in
a) Human b) Frog c) Rabbit d) Lizard

NEET BIOLOGY

BREATHING AND EXCHANGE OF GASES

: ANSWER KEY :

1)	c	2)	d	3)	c	4)	d	113)	c	114)	d	115)	a	116)	c
5)	c	6)	a	7)	b	8)	c	117)	b	118)	a	119)	b	120)	b
9)	d	10)	a	11)	b	12)	c	121)	d	122)	a	123)	c	124)	a
13)	a	14)	c	15)	a	16)	b	125)	c	126)	a	127)	d	128)	d
17)	d	18)	a	19)	c	20)	b	129)	a	130)	d	131)	d	132)	c
21)	d	22)	a	23)	b	24)	b	133)	a	134)	c	135)	d	136)	d
25)	d	26)	d	27)	d	28)	b	137)	b	138)	b	139)	a	140)	a
29)	b	30)	a	31)	b	32)	a	141)	b	142)	b	143)	a	144)	a
33)	b	34)	c	35)	a	36)	a	145)	b	146)	b	147)	d	148)	c
37)	c	38)	d	39)	a	40)	a	149)	c	150)	a	151)	a	152)	a
41)	c	42)	d	43)	c	44)	d	153)	d	154)	b	155)	d	156)	b
45)	c	46)	d	47)	d	48)	b	157)	a	158)	b	159)	a	160)	b
49)	d	50)	d	51)	b	52)	c	161)	b	162)	c	163)	d	164)	b
53)	a	54)	a	55)	d	56)	a	165)	c	166)	d	167)	b	168)	c
57)	d	58)	c	59)	b	60)	c	169)	a	170)	d	171)	d	172)	b
61)	a	62)	b	63)	b	64)	d	173)	c	174)	d	175)	d	176)	b
65)	a	66)	d	67)	a	68)	c	177)	c	178)	b	179)	d	180)	c
69)	b	70)	a	71)	c	72)	d	181)	a	182)	c	183)	c	184)	a
73)	b	74)	c	75)	a	76)	d	185)	a	186)	d	187)	a	188)	d
77)	b	78)	d	79)	d	80)	c	189)	c	190)	a	191)	a	192)	b
81)	c	82)	c	83)	a	84)	d	193)	c	194)	c	195)	b	196)	c
85)	c	86)	c	87)	c	88)	b	197)	c	198)	c	199)	a	200)	a
89)	c	90)	a	91)	b	92)	b	201)	c	202)	a	203)	d	204)	b
93)	b	94)	d	95)	d	96)	c	205)	a	206)	d	207)	b	208)	b
97)	b	98)	c	99)	b	100)	b	209)	c	210)	a	211)	d	212)	a
101)	d	102)	c	103)	a	104)	c	213)	b						
105)	b	106)	b	107)	d	108)	c								
109)	d	110)	d	111)	b	112)	c								

NEET BIOLOGY

BREATHING AND EXCHANGE OF GASES

: HINTS AND SOLUTIONS :

1 **(c)**
Four molecules of O_2
Each haemoglobin molecule can carry a maximum of four molecules of O_2
$Hb_4 + 4O_2 \rightarrow Hb_4O_8$
Binding of oxygen with haemoglobin is primarily related to the partial pressure of O_2, partial pressure of CO_2, hydrogen ion concentration and temperature

2 **(d)**
Hypoxia *is the shortage of oxygen supply to the body due to*
(i) less air at mountains
(ii) anaemia
(iii) cyanide poisoning which inactivates the enzymes of the cells involved in cellular respiration

3 **(c)**
Due to low oxygen tension and high carbon dioxide tension, oxyhaemoglobin at the tissue level liberates the oxygen to the cells. This oxyhaemoglobin after reaching tissue dissociates into oxygen and haemoglobin because the amount of oxygen in tissue is low. Oxygen dissociates from the haemoglobin and diffuses into the tissue.

4 **(d)**
Mechanism of breathing varies among the different groups of animals depending mainly on their habitats and level of organization. Lower invertebrates like sponges, coelenterates, flatworms, etc., exchange of O_2 with CO_2 by simple diffusion over their entire body surface

5 **(c)**
A-inspiration; B-expiration

6 **(a)**
Respiration is an intracellular catabolic process of oxidation reduction, in which the complex organic food materials are broken down to form CO_2, H_2O and energy. If a large number of people are enclosed in a room the O_2 of room is utilized in respiration and CO_2 released.

7 **(b)**
In man, the total number of lobe present in both the lungs is 5 of which three lobes, *i. e.*, anterior, posterior, and azygous are present in right lung and two lobes called left anterior and left posterior in the left lung. The basic functional units of lungs are alveoli. The number of alveoli in human beings is 300 million.

8 **(c)**
Haemoglobin has 250 times more affinity for carbon monoxide than oxygen.

9 **(d)**
CO_2 and O_2 both are carried by haemoglobin

10 **(a)**
Nearly 20-25% of carbon dioxide is transported by RBCs. It is carried by haemoglobin as carbamino haemoglobin. 70% of carbon dioxide is carried as bicarbonates.
About 97% of oxygen is transported by RBCs in the blood. The remaining 3% of oxygen is carried in dissolved state through the plasma.

11 **(b)**
Respiratory centre is stimulated when there is more CO_2 in the arterial blood. In normal conditions, there is less amount of CO_2 in the arterial blood

13 **(a)**
Breathing gets accelerated when the person opens his nose after holding the breath by closing his nose due to increase CO_2 in arterial blood

14 **(c)**

Respiratory Capacity	Respiratory Volume
Residual volume	1200mL
Vital capacity	4600mL
Inspiratory reserve volume	3000 mL
Inspiratory capacity	3500 mL

15 **(a)**
Exchange of gases in lungs is called external respiration. In this gaseous exchange, oxygen passes from alveoli to pulmonary capillary blood and carbon dioxide, come to alveoli from pulmonary capillary. Exchange of gases through alveocapillary membrane is a purely physical diffusion phenomenon. No chemical reaction is involved.

16 **(b)**
A-45, B-95, C-45.
Partial pressure of respiratory gases in-mm Hg

Respiratory gases	Inspired air on atmospheric air	Alveolar air	Deoxygenated blood	Oxygenated blood	Expired air	Tissue cells
ρO_2	158	100	40	95	116	40
ρCO_2	0.3	40	45	40	32	45

17 **(d)**
Usually, there are 12 pairs of ribs in humans. The first seven pairs of ribs are known as true ribs, 8^{th}, 9^{th} and 10^{th} pairs are called false ribs and last two pairs (*i.e.*, 11^{th} and 12^{th} pairs) are known as floating ribs.

18 **(a)**
Trachea is a straight tube extending upto the mid thoracic cavity, which divides at the level of 5th thoracic vertebra into the right and left bronchi. Each bronchi undergoes repeated division to form secondary and tertiary bronchi ending up to very thin terminal bronchioles

19 **(c)**
The partial pressure of oxygen in the alveolar air is 100-105 mm Hg.

20 **(b)**
Inspiration is initiated by the contraction of diaphragm, which increases the volume of thoracic chamber in the antero-posterior axis. The contraction of the external inter-costal muscles lifts up the ribs and the sternum causing an increase in the volume of thoracic chamber in the dorso-ventral axis. The overall increase in the thoracic volume causes a similar increase in the pulmonary volume

21 **(d)**
Inspiration takes place when those is negative pressure of O_2 inside the body than outside. In the mountains, there is less pressure of O_2 (negative) than inside, that's why, breathing is difficult in mountain regions

22 **(a)**
Tidal Volume (TV) is volume of air inspired or expired in relaxed position (500 mL). It consists of 150 mL of dead space volume and 350 mL of alveolar volume.

23 **(b)**
1. Posterior part of the pharynx-Nasopharynx
2. Present at the glottis-Epiglottis
3. The front of oesphagus- Trachea

24 **(b)**
Partial pressure of oxygen in alveolar air and capillaries is 100 mm Hg and 40 mm Hg, respectively.
Partial pressure of respiratory gases in-mm Hg

Respiratory gases	Inspired air on atmospheric air	Alveolar air	Deoxygenated blood	Oxygenated blood	Expired air	Tissue cells
ρO_2	158	100	40	95	116	40
ρCO_2	0.3	40	45	40	32	45

25 **(d)**
CO_2, H^+, plays a very significant role in the respiration rhythms. The role of oxygen in the regulation of respiratory rhythm is quite in significant

26 **(d)**

Total lung capacity is the sum of vital capacity and residual volume. Vital capacity of our lungs is total lung capacity minus residual volume.

27 **(d)**

Each gas in the mixture exerts a part of the total pressure proportional to its concentration, *ie*, the partial pressure. This is denoted as $p, e.g., p_{O_2}$, p_{CO_2}.

Partial pressure (mm Hg) of respiratory gases

Gas	Inspi-red Air	Alve-olar Air	Deoxyg-enated Blood	Oxyge-nated Blood	Exp-ired Air
O_2	158	100	40	95	116
CO_2	0.3	40	46	40	32

28 **(b)**

Respiratory Gases	Atmospheric Air	Alveoli Air
ρO_2	159	104
ρCO_2	0.3	40

29 **(b)**

Apnea – no breathing

Dyspnea – painful breathing

Asphyxia – oxygen starvation due to low atmospheric oxygen

Hypoxia – inadequate supply of oxygen to tissue

30 **(a)**

When a person moves to higher altitudes, the po_2 and total atmospheric pressure decrease. Hypoxia stimulates the JG-cells of the kidney to release erythropoietin hormone, which stimulates erythropoesis in bone marrow causing polycythemia. Hypoxia will also increase breathing rate. Initially, the size of RBCs will also increase but with increase in number of RBCs, the size of RBCs becomes normal.

31 **(b)**

TV (500 mL) < ERV (1100 mL) < RV (1200 mL) < VC (4600 mL).

32 **(a)**

Chloride shift occurs in response to HCO_3^-. To maintain electrostatic neutrality of plasma, many chloride ions diffuse from plasma into RBCs and bicarbonate ions pass out. The chloride content of RBCs increases, when oxygenated blood becomes deoxygenated. This is called chloride shift or Hamburger shift.

33 **(b)**

Increased temperature dissociates the O_2 from oxyhaemoglobin and low temperature favours the binding of O_2 to haemoglobin

34 **(c)**

Blood do not become acidic due to the buffering action of bicarbonates

$H_2O + CO_2 \rightleftharpoons H_2CO_3 \rightleftharpoons H^+ + HCO_3^-$

35 **(a)**

On high mountains, difficulty in breathing is due to decrease in partial pressure of oxygen. Partial pressure of gases decreases with height.

36 **(a)**

Bohr's effect A rise in ρCO_2 or fall in pH decreases the oxygen affinity of haemoglobin, raising the P_{50} value and shifts the curve to the right. This is called Bohr's effect. Conversely, a fall in ρCO_2 and rise in the pH increases oxygen affinity of haemoglobin. (P_{50} value is the value of ρO_2 at which haemoglobin is 50% saturated with oxygen to form haemoglobin

37 **(c)**

Cigarette smoking

38 **(d)**

Zebra, lizard and rabbit respire through the lungs

Frog – Respiration

(i) Gills Respiration from the gills takes place in tadpole stage of frog

(ii) Cutaneous Respiration It is also called skin respiration. It takes place when the frog lives in water

(iii) Lung Respiration When frog comes on the terrestrial surface it performs respiration from the lungs

39 **(a)**

In hypoxia, oxygen supply to the tissue is inadequate.

41 **(c)**

I. False, II. True

Respiration is a passive process, which creates a pressure gradient with the lungs and the atmosphere

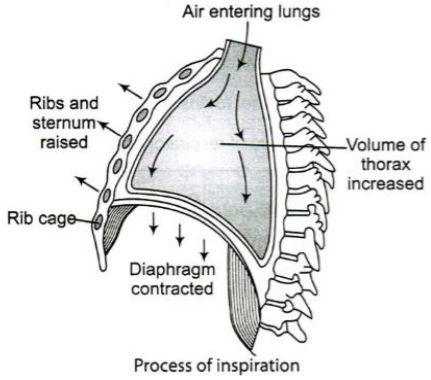
42 **(d)**

When carbon dioxide concentration in blood increases, breathing becomes faster and deeper. The effect of increased carbon dioxide is to decrease the affinity of haemoglobin for oxygen. Thus, due to Bohr's effect, the carbon dioxide released in respiring in respiring tissue accelerates the delivery of oxygen by faster and deeper breathing.

43 **(c)**
Both I and II.
The movement of the 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 (intra pulmonary pressure) is less than the atmospheric pressure, *i.e.,* there is a negative pressure in the lungs with respect to the atmospheric pressure.
Expiration takes place when the intra pulmonary pressure is higher than the atmospheric pressure, *i.e.,* there is positive pressure in the lungs with respect to the atmospheric pressure

44 **(d)**
In the tissues, there is
(a) Low ρO_2 (b) High ρCO_2
(c) High H^+ (d) High temperature
All these conditions are favourable for the dissociation of oxygen from oxyhaemoglobin

45 **(c)**
A – Air entering lungs
B – Ribs and sternum raised
C – Volume of thorax increased
Pulmonary volume increases by the following steps
(i) Contraction of the diaphragm
(ii) Contraction of intercostal muscle
(iii) Lifting of the ribs
(iv) Sternum causing an increase in the volume of thoracic chamber in dorso ventral axis



46 **(d)**
None of the above

47 **(d)**
Inside the lungs, each bronchus divides into numerous bronchioles, each of which terminates into an elongated saccule called the alveolar duct, which bears air sacks or alveoli on its surface.
Alveoli provides a large surface for gaseous exchange. The number of alveoli in the human lungs has been estimated to be approximately 750 million

48 **(b)**
Nasopharynx is a portion of pharynx. It is the common passage for food and air. Nasopharynx opens through the glottis into the trachea

49 **(d)**
Pneumonia is an infection of lungs by *Diplococcus pneumoniae* which leads to the accumulation of mucous and lymph in alveoli, impairing gaseous exchange

50 **(d)**
In tissues, dissociation of oxyhaemoglobin and the formation of carboaminohaemoglbin takes place.
In lungs, dissociation of carboxyamino haemoglobin and the formation of haemoglobin takes place

51 **(b)**
In higher organisms, the sites of aerobic respiration are
(i) **Cytoplasm** Where, glycolysis takes place
(ii) **Mitochondria** Where, Kreb's cycle takes place

52 **(c)**
The total thickness of the diffusion membrane is less than 1 milimeter.
The diffusion membrane is made up of three major layers (figure) namely, the thin squamous epithelium of alveoli, the endothelium of alveolar capillaries and the basement substance in between them. However, its total thickness is much less than a millimeter. Therefore, all the factors in our body are favourable for the diffusion of O_2 from alveoli to tissues and that of CO_2 from the tissues to alveoli

53 **(a)**
Diaphragm is made up of involuntary muscles and found in mammals only. During expiration, diaphragm is relaxed and dome-shaped, whereas during inspiration diaphragm is contracted and flat.

54 **(a)**
Oxygen carrying capacity of whole blood is much higher than that of plasma and oxygen content of blood leaving the lungs is greater than that of blood entering the lungs thus, most oxygen is transported from lungs to the tissue combined with haemoglobin rather than dissolved in blood plasma.

55 **(d)**

Our tissue are able to utilized only 25% of O_2 carried by arterial blood. The venous blood is stil 75% saturated withO_2. This O_2 acts as a reserve during muscular exucise.

56 **(a)**

Trachea It is about four and half inches long with 'C' shaped rings of hyaline cartilage in its walls. These rings of cartilage makes the wall non-collapsible. It is internally lined by pseudostratified ciliated squamous epithelium. Cilia pushs out the mucous

57 **(d)**

A-fermentation, B-ethyl alcohol, C-aerobically

58 **(c)**

The ventilation movement of the lungs is governed by diaphragm and intercoastal muscles

59 **(b)**

A-RBC, B-alveolar, C-bicarbonate, D-CO_2

60 **(c)**

Bronchioles are formed by branching of tertiary bronchi. Bronchioles divide into terminal bronchioles, respiratory bronchioles. Bronchioles are without cartilaginous rings.

61 **(a)**

Respiratory System

Conducting Portion	Respiratory Portion
The conducting portion provides a passage for the air. It conditions the incoming air by warming, moistening and cleaning it. It consists of nasopharynx, larynx, trahea, bronchi, bronchioles and terminal bronchioles	The respiratory portion consisting bronchioles, alveolar ducts and alveolar sacs, serves to get rid the body of CO_2 and pick up oxygen. This system is derived from the endoderm

62 **(b)**

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, *i.e.,* O_2 and CO_2 across alveolar membrane

(iii) Transport of the gases by blood

(iv) Diffusion of O_2 and CO_2 between the blood and tissue

(v) Utilisation of O_2 by the cells for catabolic reactions and the resultant release of CO_2

63 **(b)**

The diffusion membrane is made up of three major layers (figure) namely, the thin squamous epithelium of alveoli, the endothelium of alveolar capillaries and the basement substance in between them. However, its total thickness is much less than a millimeter. Therefore, all the factors in our body are favourable for the diffusion of O_2 from alveoli to tissues and that of CO_2 from the tissues to alveoli

64 **(d)**

Carbon monoxide forms a stable compound with haemoglobin called **carboxyhaemoglobin** as affinity of haemoglobin for carbon monooxide is 250 times greater than its affinity for oxygen. In this form, haemoglobin does not carry oxygen resulting in death too.

$Hb + CO \rightarrow Hb\,CO$

Haemoglobin Carboxyhaemoglobin

65 **(a)**

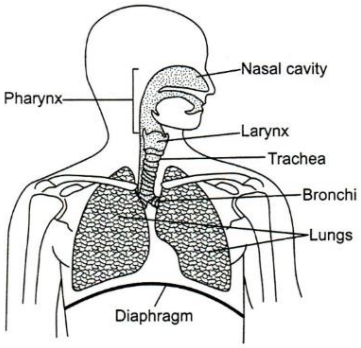
$CO_2 + H_2O \xrightarrow{\text{Carbonic Anhydrase}} H_2CO_3 \rightleftharpoons HCO_3^- + H^+$

To maintain the neutrality of the plasma, HCO_3^- ions diffuses out into the plasma and ions enter into the RBC. The chloride content of the RBCs increases when oxygenated blood becomes deoxygenated

This is known as Hamburger shift or chloride shift. Because of it, the Cl^- content of the red cells in the venous blood is significantly greater than in arterial blood

66 **(d)**

Pair of external nostrils opens above the upper lips, which leads to nasal passage. It opens into the nasopharynx. Nasopharynx opens through the glottis of the larynx region into the trachea. Trachea is a straight tube extending upto mid-thoracic cavity, which divides at the right and left bronchi. Each bronchi undergoes repeated division to form secondary and tertiary bronchi and bronchioles ending up in very thin terminal bronchioles, which gives rise to a number of very thin, irregular walled, vascularized bag like structure called alveoli



Human respiratory organs

67 **(a)**

Oxygen is transported from the lungs to the cells by simple **diffusion**. The respiratory membrane (alveolar capillary membrane) has a limit of gaseous exchange between alveoli and pulmonary blood. This is called diffusing capacity.

68 **(c)**

RBCs contain very high concentration of enzymes, carbonic anhydrase and minute quantities of the same is present in the plasma too. *This enzyme facilities the following reaction in both directions*

$$CO_2 + HO_2 \xrightleftharpoons{\text{Carbonic anhydrase}} H_2CO_3 \xrightleftharpoons{\text{Carbonic anhydrase}} HCO_3^- + H^+$$

69 **(b)**

The movement of chloride ions into erythrocytes from the plasma to maintain osmotic balance during transport of gases is known as **Hamburger phenomenon**.

70 **(a)**

Exchange part of the respiratory system is the actual site through which the exchange of O_2 between the blood and atmospheric air takes place. Alveoli is the part of lungs at which thin exchange takes place

71 **(c)**

Every 100 mL of deoxygenated blood delivers approximately 4 mL of CO_2 to alveoli under the normal physiological conditions

72 **(d)**

In the alveoli, there is

(i) High ρO_2

(ii) Low ρCO_2

(iii) Lesser H^+ concentration

All these factors are favourable for the formation of oxyhaemoglobin

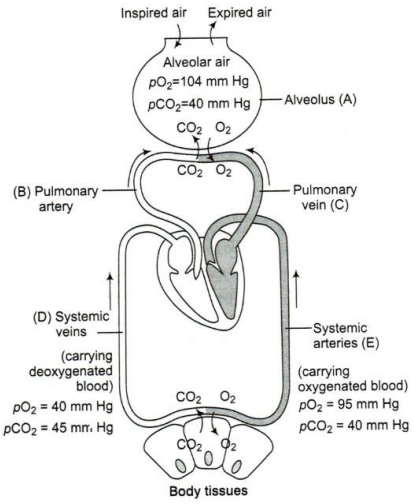
73 **(b)**

Due to rise in temperature, decrease in pH and increase in carbon dioxide concentration, the rate of oxyhaemoglobin dissociation is also increased. So, the oxygen dissociation curve shifts to right, while left shift of oxyhaemoglobin curve is noticed under low carbon dioxide concentration, low temperature and high pH.

74 **(c)**

Brain Part	**Control/Function**
Cerebellum –	Coordination of muscular movement
Cerebrum –	Voluntary function
Medulla oblongata –	Respiration
Hypothalamus –	Temperature

75 **(a)**



Diagrammatic representation of exchange of gases at the alveolus and the body tissues with blood and transport of oxygen and carbon dioxide

76 **(d)**

Chemical Control of Respiration

A chemosensitive area is situated near the respiratory centre, medulla. It is highly sensitive to the change of CO_2 concentration or change in blood pH as blood CO_2 concentration influences its pH by forming HCO_3^- , within the RBCs using the enzyme, carbonic anhydrase

77 **(b)**

Vocal cords occur in larynx (sound box).

78 **(d)**

Total Lung Capacity Total volume of the air accommodated in the lungs at the end of forced inspiration. This includes RV, ERV, TV and IRV. It is the sum of vital capacity and the residual volume

79 **(d)**

A – **Alveolar cavity** through which the diffusion of oxygen to blood takes place. From blood, CO_2 goes to the alveolar cavity

B – **Blood** transports O_2 and CO_2 from all over the body

C – **Capillary wall** is the actual site through which the exchange of O_2 and CO_2 takes place. It lies close to the alveolar wall

80 **(c)**
Carbonic anhydrase is found in the blood and the minute quantity of same is in plasma

81 **(c)**
A-CO_2, B-Breathing, C-Respiration

82 **(c)**
Breathing centre initiates the ventilation in response to
(i) High CO_2 in arterial blood
(ii) Less pH in arterial blood
(iii) High H^+ concentration in arterial blood

83 **(a)**
Pressure/Concentration gradient.
Alveoli are the primary site of exchange of gases. Exchange of gases also occur between the blood and tissue. O_2 and CO_2 are exchanged in these sites by simple diffusion, mainly based on pressure concentration gradient

84 **(d)**
All of these
In the alveoli, there is
(i) High ρO_2
(ii) Low ρCO_2
(iii) Lesser H^+ concentration
All these factors are favourable for the formation of oxyhaemoglobin

85 **(c)**
Sea diver feels fatigued and drowsy because of the diffusion of more nitrogen into blood and then from blood, nitrogen diffuses into muscles and body fats.

86 **(c)**
Chloride shift occurs in response, to HCO_3^-. To maintain electrostatic neutrality of plasma many chloride ions diffuse from plasma into RBCs and bicarbonate ions pass out. The chloride content of RBCs increases when oxygenated blood become deoxygenated. This is called chloride shift or Hamburger shift.

87 **(c)**
Hiccups is the spasmodic contraction of the diaphragm followed by a spasmodic closure of the glottis, *i.e.*, a sharp inspiratory sound. Stimulus is usually irritation of sensory nerve endings of digestive tract.

88 **(b)**
Dead space is the air that inhaled by the body in breathing but does not take part in gas exchange. In man, it is 150 mL.

89 **(c)**
Neural system in humans regulates and modulates the respiratory rhythm.
Respiratory centre is located in the medulla oblongata and pons varoli. These centre regulates the rate and the depth of breathing by controlling the contraction of diaphragm and other respiratory muscles
Medulla oblongata contains inspiratory rhythm centre in the dorsal portion of the respiratory centre or in ventral portion of the brain

90 **(a)**
Expiratory reserve volume is the extra amount of air that can be expired forcibly after a normal expiration. It is about 1000-1500 mL. Inspiratory Reserve Volume = 2000 mL.
Vital capacity = 4000mL
Total lung capacity = 5000mL

91 **(b)**
Nasal Cavity It is the first part of the respiratory system. It opens to the exterior through nostrils. The small hairs present in the cavity helps to filter the particles of dust and other foreign matter. The air in the nasal cavity gets warmed (because nasal cavity has very good blood supply) and moistened before it enters to the lungs

92 **(b)**
Haemoglobin is an iron containing deep red coloured respiratory pigment. It becomes bright red when combined with oxygen.

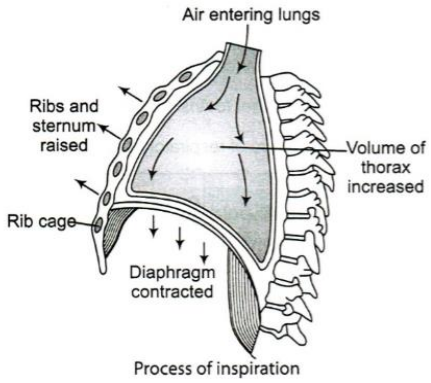
93 **(b)**
Alveoli are the primary sites of exchange of gases. The exchange of gases ($O_2$and CO_2) between the alveoli and the blood capillary occurs by simple diffusion.

94 **(d)**
Each haemoglobin molecule has four iron atoms, each of which can combine with a molecule of oxygen through coordinate bond. Hence, total four molecules of oxygen can bind (or combine) with one molecule of haemoglobin.

95 **(d)**
Trachea

97 **(b)**
Pulmonary volume increases by the following steps
(i) Contraction of the diaphragm

(ii) Contraction of intercostal muscle
(iii) Lifting of the ribs
(iv) Sternum causing an increase in the volume of thoracic chamber in dorso ventral axis



Process of inspiration

98 **(c)**
Deoxygenated blood and tissues both have the same partial pressure of O_2 and CO_2

99 **(b)**
A-epiglottis, B-mid thoracic, C-bronchi

100 **(b)**
Tidal volume is the volume of air inspired or expired or expired with each normal breath. This is about 500 mL in adult person.

101 **(d)**
Residual volume (1200mL) is greater than tidal volume (500mL).

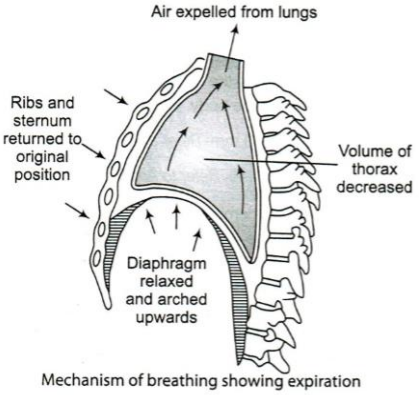
102 **(c)**
Medulla region.
Neural system in humans regulates and modulates the respiratory rhythm.
Respiratory centre is located in the medulla oblongata and pons varoli. These centre regulates the rate and the depth of breathing by controlling the contraction of diaphragm and other respiratory muscles
Medulla oblongata contains inspiratory rhythm centre in the dorsal portion of the respiratory centre or in ventral portion of the brain

103 **(a)**
Volume of the air inspired or expired. **Pulmonary volume** is the volume of air present in the lungs it is divided into four different types according to the volume of air present in the lungs
(i) **Tidal Volume** (TV) The volume of the air inspired or expired involuntarily in each normal breath. It is about 500 mL of air in average young adult man
(ii) **Inspiratory Reserve Volume** (IRV) The maximum volume of the air, which a person can inhale over and above tidal volume by deepest, possible voluntary inspiration. It is about 3000 mL
(iii) **Expiratory Reserve Volume** (ERV) The volume of the air which can be expired over and above the tidal volume with maximum effort. It is about 1100 mL
(iv) **Residual Volume** (RV) The volume of the air left in the lungs even after the maximum forceful expiration. It is about 1200 mL

104 **(c)**
Diaphragm is a characteristic of mammals. It is highly muscular and fibrous partition, elevated towards the thorax like a dome. Its important function is to aid in respiration. It separates the thoracic and abdominal cavities. It is also called phrenic muscle

105 **(b)**
Haemoglobin is having 250 times more affinity for carbon monoxide as compared to oxygen, forming a cherry-red compound carboxyhaemoglobin.

106 **(b)**
Relaxation of the diaphragm and intercostal muscles returns the diaphragm and sternum to their normal positions and reduces the thoracic volume and thereby the pulmonary volume. This leads to an increase in intra-pulmonary pressure to slightly above the atmospheric pressure, causing the expulsion of air from the lungs, *i.e.,* expiration



Mechanism of breathing showing expiration

107 **(d)**
Pressure/Concentration gradient, solubility of gases as well as the thickness of the membranes involved in diffusion are some important factors that affects the rate of diffusion

108 **(c)**
Workers in grinding and stone breaking industries may suffer for lung disease.
Occupational Respiratory Disorders In certain industries, especially those involving grinding or stone breaking, so much dust is produced. In that

condition, the respiratory diseases like, silicosis, fibrosis and asbestoses occurs. Long exposure can give rise to inflammation leading to fibrosis and thus, causing serious lung damage

109 **(d)**
Humans have two lungs, which are covered by a double layered pleura with pleural fluid between them. Pleural fluid reduces the friction on the lung-surface. The outer pleural membrane is in close contact with the thoracic lining whereas, the inner pleural membrane is in the contact with the lung surface

110 **(d)**
Diaphragm is very useful in both expiration and inspiration. On an average, a healthy human breathes 12-16 times/minute. The volume of the air involved in breathing movements can be estimated by using a spirometer, which helps in the clinical assessment of pulmonary functions

111 **(b)**
A-97, B-RBC, C-3, D-Plasma

112 **(c)**
Systemic artery carries deoxygenated blood from the right ventricle to the lungs for the oxygenation of deoxygenated blood

113 **(c)**
A-CO_2; B-rhythm

114 **(d)**
Alveoli (thin, irregular-walled and vascularized bag-like structure at the end of bronchiole) are the primary sites of exchange of gases. O_2 and CO_2 are exchanged in these sites by simple diffusion mainly based on pressure/concentration gradient. Solubility of the gases as well as thickness of the membranes involved in diffusion are also some important factors that can affect the rate of diffusion. Reactivity of the gases does not affect the rate of alveolar diffusion.

115 **(a)**
Tidal volume is the volume of air inspired or expired with each normal breath. This is about 500 mL (0.5 L) in adult person.

116 **(c)**
The partial pressure of $CO_2 (\rho CO_2)$ is the highest in tissues.
Partial pressure of respiratory gases in-mm Hg

Respiratory gases	Inspired air on atmospheric air	Alveolar air	Deoxygenated blood	Oxygenated blood	Expired air	Tissue cells
ρO_2	158	100	40	95	116	40
ρCO_2	0.3	40	45	40	32	45

117 **(b)**
ρCO_2 is low and ρO_2 is high in alveoli.
When ρCO_2 is high and ρO_2 is low as in the tissues, more binding of CO_2 occurs whereas when the ρCO_2 is low and ρO_2 is high as in the alveoli, dissociation of CO_2 from carbamino haemoglobin takes place, *i.e.,* CO_2 which is bound to haemoglobin from the tissues is delivered to alveoli

118 **(a)**
Another centre present in the pons region of the brain called pneumotaxic centre can moderate its functions of the respiratory rhythm centre. Neural signal from this centre can reduce the duration of inspiration and thereby, after the respiratory rate

119 **(b)**
A – Air Expelled from Lungs
B – Ribs and sternum returned to original position
C – Diaphragm relaxed and arched upward

120 **(b)**
2-3 DPG (2-3 diphosphoglycerate) concentration increases in hilly areas. This decreases the affinity of O_2 to haemoglobin and facilitates the unloading of O_2 to tissues

121 **(d)**
The epiglottis is a flap that is made up of elastic cartilage tissue covered with a mucous membrane, attached to the entrance of the larynx. It prevents the entry of food into the larynx, and directs it to the oesophagus. Due to improper movement of epiglottis, one may suddenly start coughing while swallowing some food.

122 **(a)**
A-vertebral column, B-sternum, C-ribs, D-diaphragm

123 **(c)**

Primary bronchus of lungs divide to form secondary bronchi which divide to form tertiary bronchi. The tertiary bronchi subdivided into bronchioles. The bronchioles open to alveol through alveolar duct, atria and alveolar sacs. The alveoli have very thin wall consisting of squamous epithelium. The wall of alveoli has extensive network of blood capillaries. Due to very intimate contact of blood capillaries with the alveoli, the exchange of gases takes place easily.

124 **(a)**

Carbon monoxide is a poisonous gas. It combines with haemoglobin more rapidly than oxygen to form carboxy haemoglobin. A carbon monoxide pressure of about 0.7 mm Hg (conc. of about 1%) in alveolar air can be lethal.

125 **(c)**

Ketoacidosis is a type of metabolic acidosis, which is caused by the high concentration of ketone bodies formed by the breakdown of fatty acids and the deamination of amino acids. Generally, it takes place when there is no adequate glucose for the oxidation in body

126 **(a)**

Larynx is a cartilaginous box, which helps in sound production and hence called sound box. Until puberty, there is a little difference in the size of larynx (sound box) in males and females. Thereafter, it grows larger and become prominent in males. Therefore, it is called Adam's apple in man. It is the first part of the trachea present in the neck

127 **(d)**

All of these.

Four molecules of O_2

Each haemoglobin molecule can carry a maximum of four molecules of O_2

$Hb_4 + 4O_2 \rightarrow Hb_4O_8$

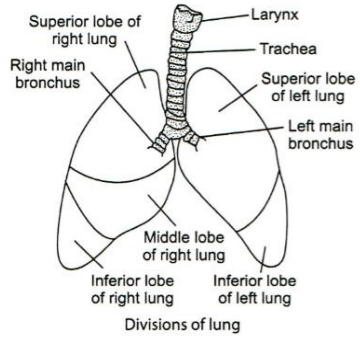
Binding of oxygen with haemoglobin is primarily related to the partial pressure of O_2, partial pressure of CO_2, hydrogen ion concentration and temperature

128 **(d)**

Bronchitis is aggravated by pollution. It involves permanent swelling and inflammation of bronchi, cough with thick mucus and pus cells are spitted out.

129 **(a)**

In humans, right lung is divided into three lobes and left lung is divided into two lobes



Divisions of lung

130 **(d)**

Pulmonary vein is the only vein in body, which carries oxygenated blood rather than deoxygenated blood. It carries the blood from the lungs to the left auricle of heart. From left auricle, blood goes to the left ventricle. Left ventricle distributes that blood all over the body

131 **(d)**

Breathing is entirely under nervous control. A 'respiratory centre', located bilaterally in medulla oblongata and pons Varolii of the brain not only regulates normal breathing, but also automatically adjusts the breathing rate to the varying requirements of body during various stress conditions such as exercise, fear, pain, anger, fever, worry, etc, and in activities like speaking, playing a musical instrument, yogic exercise, etc, because of this oxygen (p_{O_2}) and carbon dioxide (p_{CO_2}) in blood remain almost static in all conditions. Also we may voluntarily hold out breath for sometime, but not for a longer time due to this nervous control.

132 **(c)**

Emphysema is a chronic disorder in which the alveolar walls are damaged due to which the respiratory surface is decreased. One of the major causes of this condition is smoking

133 **(a)**

In tissues ρCO_2 is high and ρO_2 is low

ρCO_2 in tissues – 45 mm of Hg

ρO_2 in tissues – 40 mm of Hg

Partial pressure of respiratory gases in-mm Hg

Respiratory gases	Inspired air on atmospheric air	Alveolar air	Deoxygenated blood	Oxygenated blood	Expired air	Tissue cells
ρO_2	158	100	40	95	116	40
ρCO_2	0.3	40	45	40	32	45

134 **(c)**
Blood does not become acidic due to buffering action. Bicarbonates act as buffering agents.
$H_2O + CO_2 \rightleftharpoons H_2CO_3 \rightleftharpoons H^+ + HCO_3^-$

135 **(d)**
When a person moves to higher altitudes, ρO_2 and total atmospheric pressure decreases. Hypoxia stimulates the juxta-glomerular cells of the kidney to release erythropoietin hormone, which stimulates erythropoiesis in the bone marrow, causing polycythemia. Hypoxia increases the breathing rate and number of RBC

136 **(d)**
Asthma is the difficulty in breathing causing wheezing due to the inflammation of bronchi and bronchioles

137 **(b)**
Blood carries carbon dioxide mainly as sodium bicarbonate ($NaHCO_3$).

138 **(b)**
The movement of the 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 (intra pulmonary pressure) is less than the atmospheric pressure, *i.e.,* there is a negative pressure in the lungs with respect to the atmospheric pressure.
Expiration takes place when the intra pulmonary pressure is higher than the atmospheric pressure, *i.e.,* there is positive pressure in the lungs with respect to the atmospheric pressure

139 **(a)**
Partial pressure of O_2 is higher in atmosphere as compared to the alveolar air. Due to this pressure gradient, O_2 goes inside the body and same phenomena happens in case of CO_2 but in opposite direction

140 **(a)**
Right lung of rabbit is divided into four lobes namely the anterior azygous, right anterior, right posterior and posterior azygous.

141 **(b)**
CO_2 Transport Transport of CO_2 by blood is much easier than oxygen due to high solubility of CO_2. About 7% of CO_2 is transported dissolved in plasma, 23% loosely bind with the haemoglobin and forms bicarbonates and about 70% of CO_2 reacts with water to form carbonic acid in erythrocytes in the presence of enzyme carbonic anhydrase. The carbonic acid (H_2CO_3) dissociates into H^+ and HCO_3^- ions
$CO_2 + H_2O \xrightarrow{\text{Carbonic Anhydrase}} H_2CO_3 \rightleftharpoons HCO_3^- + H^+$

142 **(b)**
Alveoli represents the ultimate structural and physiological units of lung. The wall of alveoli consists of two types of alveolar epithelial cells. Type-I alveolar cells are the predominate squamous epithelial cells. Type-II alveolar cells are scattered among Squamous cells.

144 **(a)**
CO_2 (carbon dioxide) is released during the catabolic reactions

145 **(b)**
Alveoli and their ducts.
Respiratory System

Conducting Portion	Respiratory Portion
The conducting portion provides a passage for the air. It conditions the incoming air by warming, moistening and cleaning it. It consists of nasopharynx, larynx, trahea, bronchi, bronchioles and terminal bronchioles	The respiratory portion consisting bronchioles, alveolar ducts and alveolar sacs, serves to get rid the body of CO_2 and pick up oxygen. This system is derived from the endoderm

146 **(b)**
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 as compared to that of O_2

147 **(d)**
High pressure of O_2 increases the oxygenation of haemoglobin

148 **(c)**
98.5% of O_2 is transported by blood with the help of haemoglobin. The molecule of haemoglobin has 250 times more affinity with CO as compare to O_2 and thus, prevent O_2 transport which leads to death.

149 **(c)**
A-fishes, B-lungs, C-moist skin

150 **(a)**
Humans have two lungs, which are covered by a double membrane called pleura, with pleural fluid between them. Pleural fluid reduces the friction on the lung surface. The outer pleural membrane is in close contact with the thoracic lining whereas the inner pleural membrane is in the contact with the lung surface

151 **(a)**
CO_2 transport in blood : Transport of CO_2 by blood is must easier/simple than that of O_2 due to high solubility of CO_2 in water.
Most of the CO_2, *i. e.*, 70% of CO_2 is transported as bicarbonate (HCO_3^-) in blood. 23% as carbaminohaemoglobin ($HbCO_2$) and 7% of CO_2 is dissolved in the plasma.
CO_2 produced by the tissues, diffuses passively into the blood plasma and reacts with water forming carbonic acid. The reaction occurs very rapidly inside RBCs because of the presence of enzyme carbonic anhydrase.
Chloride shift : To maintain electro-chemical neutrality of plasma many chloride ions diffuse from plasma into RBCs and bicarbonates pass out. The chloride content of RBCs increases when oxygenated blood becomes deoxygenated. This is termed as **chloride shift or Hamburger shift**.

Haldane's effect : Oxygenated blood behaves as strong acid. More and more oxyhaemoglobin is formed in lungs, which releases H^+ , *i. e.*, increasing the acidity of blood. This H^+ combines with bicarbonate forming carbonic acid and soon dissociates.

152 **(a)**
Air entering the lungs is warm and filtered.
Nasal Cavity It is the first part of the respiratory system. It opens to the exterior through nostrils. The small hairs present in the cavity helps to filter the particles of dust and other foreign matter. The air in the nasal cavity gets warmed (because nasal cavity has very good blood supply) and moistened before it enters to the lungs

153 **(d)**
The relationship between the ρO_2 and the percent saturation of haemoglobin when represented on a graph is called as oxygen haemoglobin dissociation curve. It is sigmoid in shape. Rise in ρCO_2, H^+ ions (fall in pH), temperature and diphosphoglyceric acid shifts the HbO_2 dissociation curve to the right. (As more O_2 dissociate from the oxyhaemoglobin)

154 **(b)**
Hiccups occurs due to spasmodic contraction of diaphragm (possible due to the irritation of phrenic nerve which controls the diaphragm)

155 **(d)**
Carbohaemoglobin dissociates in the alveoli, where there is high O_2 partial pressure and low ρCO_2. Due to the pressure gradient, CO_2 dissociates from the haemoglobin and O_2 combines to from oxyhaemoglobin

156 **(b)**
O_2 binds with RBC
Haemoglobin is a red coloured iron containing pigment, present in the RBCs. O_2 binds with haemoglobin in reversible manner to from oxyhaemoglobin

157 **(a)**
Partial pressure of respiratory gases in-mm Hg

Respiratory gases	Inspired air on atmospheric air	Alveolar air	Deoxygenated blood	Oxygenated blood	Expired air	Tissue cells
ρO_2	158	100	40	95	116	40
ρCO_2	0.3	40	45	40	32	45

158 **(b)**
Vital Capacity (VC) = IRV + TV + ERV
= 3000 + 500 + 1100 = 4600 mL

159 **(a)**
When a graph is plotted between percent saturation of haemoglobin and oxygen tension, a curve is obtained which is termed as $O_2 - Hb$ dissociation curve. Oxygen-haemoglobin dissociation curve is sigmoid or S-shaped.

160 **(b)**
Carbonic anhydrase is an enzyme that accelerates the reaction between carbon dioxide and water to form carbonic acid in the RBCs. Zinc acts as cofactor of carbonic anhydrase.

161 **(b)**
Haemoglobin is a red coloured iron containing pigment, present in the RBCs. O_2 binds with haemoglobin in reversible manner to from oxyhaemoglobin

162 **(c)**
There are as many as 750 million of alveoli in both the lungs of adult man, which provide about 100 sq metre surface area or respiration.

163 **(d)**
Diffusion membrane is made up of three layers
(i) Thin sequamous epithelium of alveoli. (ii) Endothelium of alveolar capillaries. (iii) Basement substance in between the squamous in epithelium of alveoli and endothelium of alveolar capillaries

164 **(b)**
Alveoli are the primary site of exchange of gases. Exchange of gases also occur between the blood and tissue. O_2 and CO_2 are exchanged in these sites by simple diffusion, mainly based on pressure concentration gradient

165 **(c)**
Larynx is present on tip of trachea and is made up of cartilages. It is a short tubular chamber and opens into the laryngopharynx by a slit-like aperture called glottis. It is more prominent in male than female due to male hormones. Inside the larynx, vocal cords are present. Sound is produced by true vocal cords.

166 **(d)**
About 7% of carbon dioxide is transported as dissolved in plasma, 23% as carbaminohaemoglobin and 70% as bicarbonates. Most of the carbon dioxide that dissolved in blood plasma reacts with water to form carbonic acid. All carbonic acid of RBCs dissociates into hydrogen and bicarbonate ions, that bicarbonate ions diffuse from RBCs to blood plasma.

167 **(b)**
Each lung is enclosed in two membranes called pleurae (sing. Pleura).

168 **(c)**
Amount of CO_2 in expired air is 4.4%. The air we breathe in contains about 0.04% CO_2. The air we breathe out contains about 4% CO_2. In other words, exhaled air contains about 100 times the concentration of CO_2 that inhaled air does.

169 **(a)**
Dissociation curve of **haemoglobin** shows oxygen tension and % saturation of haemoglobin with oxygen. Normally dissociation curve is **sigmoid** or S-shaped.

170 **(d)**
Dolphins are aquatic mammals which breath by lungs.

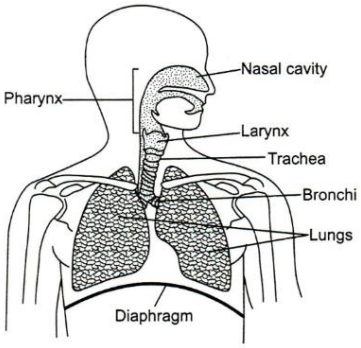
171 **(d)**
If a person respires in air containing normal amount of oxygen (21%) and small amount of carbon monoxide, he suffers from suffocation because haemoglobin combines with carbon monoxide to form a stable compound. The affinity of haemoglobin to carbon monoxide is about 250 times more than for oxygen. 0.1% of carbon monoxide blocks 50% Hb of the body due to which the oxygen carrying capacity of blood is decreased. This is called hypoxia.

172 **(b)**
I. Residual volume
II. Tidal volume
III. Total lung capacity

173 **(c)**
A healthy man can inspire or expire approximately 6000 to 8000 mL of air per minute

175 **(d)**
A-Epiglottis, B-Trachea, C-Bronchus, D-Diaphragm, E-Bronchiole.
Pair of external nostrils opens above the upper lips, which leads to nasal passage. It opens into the nasopharynx. Nasopharynx opens through the glottis of the larynx region into the trachea. Trachea is a straight tube extending upto mid-thoracic cavity, which divides at the right and left bronchi. Each bronchi undergoes repeated division to form secondary and tertiary bronchi and bronchioles ending up in very thin terminal

bronchioles, which gives rise to a number of very thin, irregular walled, vascularized bag like structure called alveoli



Human respiratory organs

176 **(b)**

Transportation of oxygen from lungs to body tissues and of CO_2 from tissues to the lungs is vital role of blood.

Transport of carbon dioxide : Most of the CO_2 that dissolves in blood plasma reacts with water to form carbonic acid :

$CO_2 + H_2O \rightarrow H_2CO_3$

An enzyme carbonic anhydrase present in RBCs, which accelerates the carbonic acid formation about 5000 times. About 70% of the CO_2 received by blood from the tissue immediately enter into RBCs and hydrated to carbonic acid. All carbonic acid of RBCs dissociates into hydrogen and bicarbonate ions (H^+ and HCO_3^-). The H^+ mostly combine with haemoglobin for keeping the pH of blood (7.4) in steady state, whereas the bicarbonate ion diffuse from RBCs into the plasma. To maintain electrostatic neutrality of plasma many chloride ions in turn diffuse from plasma into RBCs. This is termed **chloride** or **Hamburger shift**.

177 **(c)**

Ketoacidosis is a type of metabolic acidosis, which is caused by high concentrations of ketone bodies, formed by the breakdown of fatty acids and the deamination of amino acids.

178 **(b)**

Oxygen (O_2) is utilised by the living entities to indirectly break down the nutrients like glucose, to derive energy for performing various activities, etc.

CO_2 (carbon dioxide) which is a harmful gas, releases during the catabolic reactions. It is therefore, evident that O_2 has to be continuously provided to the cells and CO_2 produced by the cells have to be released out

179 **(d)**

Correct statements are

I. Diffusion membrane is made-up of the three layers

II. Solubility of CO_2 in blood is higher than O_2 by 25 times

III. Breathing volumes are estimated by spirometer

IV. High H^+ in blood favours oxygen dissociation

180 **(c)**

Vital capacity is the largest possible expiration after largest possible inspiration.

Vital Capacity (VC) = IRV + TV + ERV

= 3000 + 500 + 1100

=4600mL

181 **(a)**

Vital capacity is the amount of air, which one can inhale and exhale with maximum effort.

183 **(c)**

Partial pressure of O_2 in alveoli and oxygenated blood are almost same. Alveoli has 104 mm of Hg, whereas oxygenated blood has 95 mm of Hg.

Percentage of gases in different parts of body

Air	Oxygen%	Carbon dioxide %	Nitrogen %	Water vapours
Inhaled Air	20.84	0.03-0.04	79	Variable
Alveolar Air	13.1	5.3	79	Saturated
Exhaled Air	15.7	4.0	79.7	Saturated

184 **(a)**

Carbon monoxide has higher affinity to combine with haemoglobin of blood than oxygen. Tobacco smoke also contains carbon monoxide, so it reduces the oxygen carrying capacity of blood.

185 **(a)**

Occupational Respiratory Disorders In certain industries, especially those involving grinding or stone breaking, so much dust is produced. In that condition, the respiratory diseases like, silicosis, fibrosis and asbestoses occurs. Long exposure can give rise to inflammation leading to fibrosis and thus, causing serious lung damage

186 **(d)**

All of these.

Alveoli are the primary site of exchange of gases. Exchange of gases also occur between the blood and tissue. O_2 and CO_2 are exchanged in these sites by simple diffusion, mainly based on pressure concentration gradient

Pressure/Concentration gradient, solubility of gases as well as the thickness of the membranes involved in diffusion are some important factors that affects the rate of diffusion

187 **(a)**

Haemoglobinic acid is a very weak acid formed inside the red blood cells when hydrogen ions produced by the dissociation of carbonic acid combine with the haemoglobin.

188 **(d)**

A – Epiglottis
B – Thyroid gland
C – Tracheal cartilage
D - Trachea

189 **(c)**

We can voluntarily take deep breath by an effort. In the process of deep inspiration, chest distention is brought about by the external intercostal muscles and the abdominal muscles

190 **(a)**

Given diagram A clearly indicates that
(i) ribs going downward
(ii) diaphragm contract or going upward
These two sign indicates that the diagram A depicts the process of expiration

191 **(a)**

Under the normal physiological conditions, 100 mL of the oxygenated blood can deliver around 5 mL O_2 to the body

192 **(b)**

In the tissues, where partial pressure of CO_2 is high due to catabolism, CO_2 diffuses into blood (RBCs and plasma) and forms HCO_3^- and H^+. At the alveolar site, where ρCO_2 is low, the reaction proceeds in the opposite direction, leading to the formation of H_2O and CO_2. Thus, CO_2 gets trapped as bicarbonate at the tissue level and transported to the alveoli and released as CO_2

193 **(c)**

Periodically, filling the lung with atmospheric air and then emptying, is called breathing or ventilation of lungs. Breathing in is called inspiration or inhalation and breathing out is called expiration or exhalation. During inhalation or inspiration, the diaphragm contracts putting backwards by partial flattening and increase the thoracic cavity lengthwise.

194 **(c)**

Expiration is a process by which CO_2 is expelled out from the lungs. Muscle fibres of the diaphragm relax make it convex, and decreasing the volume of thoracic cavity.

195 **(b)**

SARS (Severe Acute Respiratory Syndrome) spread recently in China, Hong Kong and Singapore. It is a viral disease caused by Paramyxo virus. Paramyxo virus of SARS is related to corona virus family (corona virus causes common cold).

196 **(c)**

Residual Volume (RV) is the volume of air present in lungs even after a forcible expiration, averaging about 1200 mL.

197 **(c)**

Brain's Part	Control/Function
Cerebellum	Coordination of muscular movement
Cerebrum	Voluntary function
Medulla oblongata	Respiration
Hypothalam -us	Temperature

198 **(c)**

In alveoli, exchange of gases takes place in man.

199 **(a)**

Residual air is the air that remains in lungs after the most forceful expiration. It is about 1200 mL. As the residual air remains in the lungs, therefore, it has no effect on respiration efficiency.

200 **(a)**

A-45 mm, B-40 mm.
Partial pressure of respiratory gases in-mm Hg

Respiratory gases	Inspired air on atmospheric air	Alveolar air	Deoxygenated blood	Oxygenated blood	Expired air	Tissue cells
ρO_2	158	100	40	95	116	40
ρCO_2	0.3	40	45	40	32	45

201 **(c)**
Larynx is present in between the epiglottis and trachea

202 **(a)**
Major steps involving respiration are
Step I Utilisation of O_2 by cell for catabolic reactions
Step II Diffusion of O_2 and CO_2 between blood and tissues
Step III Transportation by blood
Step IV Diffusion of gases (O_2 and CO_2) through alveolar membrane
Step IV CO_2 goes out and atmospheric air is drawn in

203 **(d)**
A-increases, B-decreases, C-outside, D-inspiration

204 **(b)**
Residual volume remains in the lungs even after the forcible expiration. That's why, spirometer can't measure the volume of residual volume

205 **(a)**
When ρCO_2 is high and ρO_2 is low as in the tissues, more binding of CO_2 occurs whereas when the ρCO_2 is low and ρO_2 is high as in the alveoli, dissociation of CO_2 from carbamino haemoglobin takes place, *i.e.,* CO_2 which is bound to haemoglobin from the tissues is delivered to alveoli

206 **(d)**
Aerobic Respiration Cells utilise O_2 from atmospheric air or from water to oxidise the nutrients. *It involves*
(i) **External Respiration** Gaseous exchange of O_2 and CO_2 between the blood and air (or water)
(ii) **Transport** of gases to tissues
(iii) **Internal Respiration** Gaseous exchange between the blood and tissues
(iv) **Cellular Respiration** Oxidation of nutrients in the cells and liberation of energy

207 **(b)**
CO_2 is carried by haemoglobin as carbamino haemoglobin (about 20-25%). This binding is related to the partial pressure of CO_2. ρO_2 is a major factor, which could effect this binding

208 **(b)**
Pressure contributed by the individual gas in a mixture of gases is called partial pressure and is represented as ρO_2 for oxygen and ρCO_2 for carbon dioxide

209 **(c)**
Vocal cords Vocal cords are two pairs of folds of mucous membrane that extends into the lumen from the sides of larynx. Sound is produced by the vocal cords

210 **(a)**
Book lungs are named so because their folds resemble the leaves in a book. In this, the exchange of gases takes place between the interlamellar spaces and the venous blood through the thin membranous walls of the lamellae.

211 **(d)**
A-glottis; B-trachea

212 **(a)**
The oxygen haemoglobin dissociation curve is sigmoid, which represents the relationship between oxygen concentration and percentage saturation of haemoglobin. The rise in temperature or fall in pH shifts the curve to the right, while at decreased temperature and rise in pH, the curve becomes more steep.

213 **(b)**
Respiration by skin is called cutaneous respiration. Skin is an additional respiratory organ in amphibians, *e. g.*, toads and frogs.