

Solutions

S1. Ans.(a)

The correct answer is option (a) as Conditions favourable for formation of oxyhaemoglobin in alveoli are high pO_2 , less H^+ concentration

low pCO_2 and low temperature.

Option (b), (c) and (d) are not correct as they do not favour the formation of oxyhaemoglobin.

S2. Ans.(d)

Expiratory capacity = Tidal volume + Expiratory reserve volume

Functional residual capacity = Expiratory reserve volume + Residual volume

Vital capacity = Expiratory reserve volume + Tidal volume + Inspiratory reserve volume

Inspiratory capacity = Tidal volume + Inspiratory reserve volume

S3. Ans.(a)

Therefore, the sequence is (D), (A), (C), (B), (E).

S4. Ans.(c)

The vital capacity (VC) of the lung is the maximum amount of air a person can expel from the lungs after a maximum inhalation. It is equal to the sum of inspiratory reserve volume (IRV), tidal volume (TV), and expiratory reserve volume (ERV).

S5. Ans.(c)

Option(c) is the correct answer pneumotaxic centre is present in the pons region of the brain that can moderate the functions of the respiratory rhythm centre.

S6. Ans.(d)

Option (d) is the correct answer because statements (a), (c) and (e) are correct.

Vital capacity includes ERV, TV, and

IRV

Vital capacity is the maximum volume of air a person can breathe in after a forced expiration or the maximum volume of air a person can breathe out after a forced inspiration.

S7. Ans.(b)

Option (b) is the correct answer because every 100 ml of oxygenated blood can deliver around 5 ml O_2 to the tissues under normal physiological conditions.

S8. Ans.(d)

Option (d) is correct because the parts starting with the external nostrils upto the terminal bronchioles constitute the conducting part; whereas the alveoli and their ducts form the respiratory or exchange part of the respiratory system.

S9. Ans.(d)

$pO_2 = 104$ mm Hg; $pCO_2 = 40$ mmHg

S10. Ans.(d)

Favourable conditions required for the formation of oxyhaemoglobin at the alveoli is: High pO_2 . Low

pCO_2 . Less H^+ . Lower temperature

S11. Ans.(b)

In tissues, higher H^+ concentration favours the dissociation of oxygen from oxyhaemoglobin. In the alveoli, high pO_2 , low pCO_2 , lesser H^+ concentration

and lower temperature are the factors favourable for the formation of oxyhaemoglobin.

S12. Ans.(d)

Inspiration is initiated by the contraction of diaphragm which increases the volume of thoracic chamber in the antero-posterior axis. The contraction of external inter- costal muscles lifts up the ribs and the sternum causing an

increase in the volume of the thoracic chamber in the dorso-ventral axis. A similar rise in pulmonary volume is caused by the overall increase in thoracic volume. An increase in pulmonary volume decreases the intra-pulmonary pressure.

S13. Ans.(a)

Pneumotaxic centre can moderate the functions of the respiratory rhythm centre. It is present in the pons region of brain. Alveoli is the primary site for gaseous exchange. Nearly 70 per cent of carbon dioxide is transported by RBC as bicarbonate (HCO_3^-) with the help of the enzyme carbonic anhydrase.

A sigmoid curve is obtained when percentage saturation of haemoglobin with O_2 is plotted against the PO_2 . This curve is called the Oxygen dissociation curve.

S14. Ans.(c)

Total Lung Capacity: Total volume of air accommodated in the lungs at the end of a forced inspiration. This includes RV, ERV, TV and IRV or vital capacity + residual volume.

S15. Ans.(b)

Asthma is a difficulty in breathing causing wheezing due to inflammation of bronchi and bronchioles.

It can be due to increasing air-borne allergens and pollutants. Asthma is an allergic condition. Many people in urban areas are suffering from this respiratory disorder.

S16. Ans.(a)

Tidal Volume = 500 ml

Expiratory Reserve Volume = 1000 ml

Expiratory Capacity = TV + ERV = 500 + 1000 = 1500 ml

S17. Ans.(a)

Asthma is a chronic lung disease that inflames and narrows the airways. It is the result of chronic inflammation of conducting zone of airways, especially the bronchi and bronchioles.

Emphysema is a chronic disorder in which alveolar walls are damaged due to which respiratory surface is decreased.

S18. Ans.(b)

Tidal volume – Normal volume of air displaced between normal inhalation and exhalation. It is about 500 ml.

Inspiratory reserve volume – Maximal amount of additional air that can be drawn into lungs by determined effort; it is 2500-3000 ml. Expiratory reserve volume – Forceful expiration after normal inspiration; It is volume is 1000-1100 ml. Residual volume – volume remaining in lungs after forceful expiration, measures 1100-1200 ml.

S19. Ans.(b)

Silicosis is caused by inhalation of dust containing silica. Defense mechanism of the body can not fully cope with the situation. Long exposure can give rise to inflammation leading to serious lung damage. It is a form of occupational lung disease. Workers in such industries should wear protective masks.

S20. Ans.(a)

Residual volume (RV) : Volume of air remaining in lungs even after a forcible expiration. It is about 1100-1200 ml.

S21. Ans.(d)

Spirometer is used in the estimation of the volume of air involved in breathing movements. Vital capacity, tidal volume, inspiratory reserve and expiratory reserve can all be measured with a spirometer. Residual volume can not be measured by the spirometer because it is impossible to breath out completely.

S22. Ans.(d)

Lungs do not collapse between breaths and some air always remains in the lungs which can never be expelled because there is a negative intrapleural pressure pulling at the lung walls.

S23. Ans.(d)

The partial pressure of oxygen in the alveoli (104mmHg) of the lungs is more than that in the blood. (95mmHg)

Res pi- rato ry Gas	Atm o- sphe ric Air	Alve oli	Blood (Deox y- genat ed)	Blood (Oxy- genat ed)	Tis - su es
O ₂	159	104	40	95	40
CO ₂	0.3	40	45	40	45

S24. Ans.(c)

Reduction in pH of blood will decrease the affinity of haemoglobin with oxygen.

S25. Ans.(a)

A chemosensitive area is situated adjacent to the rhythm centre which is highly sensitive to CO₂ and H⁺ ions. Increase in these substances can activate this centre which in turn can signal the rhythm centre to make necessary adjustments in the respiratory process by which these substances can be eliminated. The role of oxygen in the regulation of respiratory rhythm is quite insignificant.

S26. Ans.(b)

Bicarbonate = 70 percent of CO₂

RBCs = 20-25 percent of CO₂

Plasma = 7 percent of CO₂

NEET