

Practice Test- 04

(Biology)

136. Identify which respiratory structure possesses the following features and choose the correct option accordingly.

- (i) Found in mammals only
 - (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

137. Regarding the function of conducting system, mark the wrong entry?

- (A) Brings the air to body temperature
- (B) Warms up the air
- (C) Diffusion of gases
- (D) Cleans up the air

138. Movement of the air into and out of the lungs is carried out by:

- (A) imbibition (B) pressure gradient
- (C) osmosis (D) None

139. Inspiration is initiated by:

- (A) extension of the diaphragm
- (B) contraction of the diaphragm
- (C) extension of the lungs
- (D) contraction of the lungs

140. 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.

- (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

141. During expiration, the diaphragm becomes

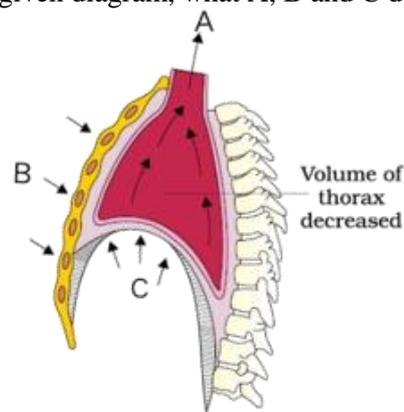
- (A) normal (B) flattened
- (C) dome-shaped (D) oblique

142. Additional muscles in the ...impacts the ability of humans to increase the strength of inspiration and expiration.

Complete the given statement with an appropriate option.

- (A) chest (B) diaphragm
- (C) abdomen (D) lungs

143. 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

144. The ventilation movements of lungs in mammals is governed by:

- (A) diaphragm (B) intercostal muscles
- (C) Both (A) and (B) (D) None of these

145. Which of the following changes occur in diaphragm and intercostal muscles when expiration of air takes place?

- (A) External intercostal muscle relax and diaphragm contracts
- (B) External intercostal muscles contracts and diaphragm relaxes
- (C) External intercostal muscles and diaphragm relax
- (D) External intercostal muscles and diaphragm contract

146. Inspiration occurs when there is a negative pressure in the lungs with respect to atmospheric pressure. This negative pressure achieved when

- (A) intrapulmonary pressure is less than the atmospheric pressure
- (B) intrapulmonary pressure is greater than the atmospheric pressure
- (C) intrapulmonary pressure is equal to the atmospheric pressure
- (D) intrapleural pressure becomes more than the interalveolar pressure

- 147.** In humans, which of the following is not a step in respiration?
 (A) Alveolar diffusion of O₂ and CO₂
 (B) Transport of gases by blood
 (C) Diffusion of O₂ and CO₂ between blood and tissues
 (D) Utilization of CO₂ by cells for catabolic reactions

- 148.** Primary site of gaseous exchange in human is:
 (A) lungs (B) alveoli
 (C) bronchus (D) diaphragm

- 149.** Alveoli of the lungs are lined by:
 (A) simple epithelium
 (B) squamous epithelium
 (C) cuboidal epithelium
 (D) ciliated epithelium

- 150.** Match the following columns.

Column I		Column II	
a.	Tidal volume (TV)	1.	1100 to 1200 mL
b.	Inspiratory Reserve Volume (IRV)	2.	1000 to 1100 mL
c.	Expiratory Reserve Volume (ERV)	3.	2500 to 3000 mL
d.	Residual Volume (RV)	4.	500 mL

Codes:

- (A) A-1, b-2, c-3, d-4 (B) a-4, b-1, c-2, d-3
 (C) a-4, b-1, c-2, d-2 (D) a-4, b-3, c-2, d-1
- 151.** A person breathes in some volume of air by forced inspiration after having a forced expiration. This quantity of air taken in is:
 (A) total lung capacity
 (B) tidal volume
 (C) vital capacity
 (D) inspiratory capacity
- 152.** Name the artery which carries deoxygenated blood?
 (A) Pulmonary artery (B) Pulmonary vein
 (C) Systemic artery (D) Vena cava

- 153.** Choose the correct option for A and B to complete the given data.

Pressure of Gases	Systemic Veins	Systemic Arteries
O ₂	40 mm Hg	95 mm Hg
CO ₂	A	B

- (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

- 154.** Partial pressure of O₂ and CO₂ in atmospheric air compared to those in alveolar air is:

pO ₂	pCO ₂
(A) Higher	Lower
(B) Higher	Higher
(C) Lower	Lower
(D) Lower	Higher

- 155.** Almost same pCO₂ 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

- 156.** Which of the following would have the same O₂ content?

- (A) Blood entering the lungs – Blood leaving the lungs
 (B) Blood entering the right side of the heart – Blood leaving the right side of the heart
 (C) Blood entering the right side of the heart – Blood leaving the left side of the heart
 (D) Blood entering the tissue capillaries

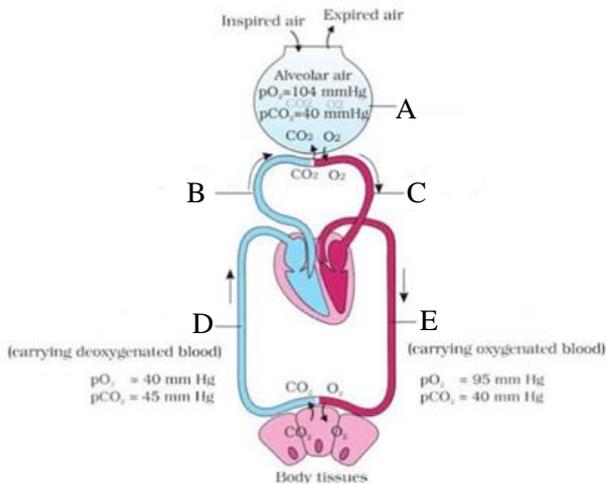
- 157.** The solubility of CO₂ in the blood is:

- (A) 10-15 times higher than that of O₂
 (B) 20-25 times higher than that of O₂
 (C) slightly higher than that of O₂
 (D) slightly lower than that of O₂

- 158.** Vital capacity of lungs is:

- (A) IRV + ERV
 (B) IRV + ERV + RV
 (C) IRV + ERV + TV + RV
 (D) IRV + ERV + TV

159. 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

160. Select the correct option about pulmonary volumes and capacities:

- (i) $VC = IRV + TV + ERV$
 (ii) $FRC = IRV + RV$
 (iii) $IC = IRV + TV$
 (iv) $EC = ERV + RV$
 (v) $TLC = VC + RV$

Options:

- (A) i, ii, iii, v are correct
 (B) ii, iii, iv, v are correct
 (C) i, iii, v are correct
 (D) i, ii, iv are correct

161. Inspiration is initiated by the contraction of diaphragm which increases:

- (1) Volume of thoracic chamber
 (2) Pulmonary volume
 (3) Intra-pulmonary pressure
 (4) Pressure over the lungs

Options:

- (A) 1, 2, 3, 4 (B) 1, 2, 4
 (C) 1, 2 (D) Only 1

162. Inspired air alveoli remains in close contact with blood. The following layers are present between two:

- (a) Alveolar epithelial basement membrane
 (b) Capillary endothelia membrane
 (c) Thin interstitial space
 (d) Alveolar epithelium
 (e) Capillary basement membrane

Mark the correct sequence during diffusion of CO_2 :

- (A) (d), (a), (c), (e), (b)
 (B) (e), (d), (c), (b), (e)
 (C) (b), (e), (c), (a), (d)
 (D) (a), (b), (c), (d), (e)

163. Which part of the brain have respiratory rhythm centre?

- (A) Cerebellum region (B) Brain stem region
 (C) Medulla region (D) Temporal region

164. Pneumotaxic centre of the brain can:

- (A) moderate the function of respiratory rhythm centre
 (B) decrease the heart rate
 (C) increase the heart rate
 (D) increase the flow of blood

165. A chemo sensitive 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)

166. Receptors associated with the aortic arch and carotid artery can recognize the changes in ...A... and H^+ concentration and send necessary signals toB... for remedial actions. Select the right choice for A and B to complete the given 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

167. Name the chronic respiratory disorder caused mainly by cigarette smoking:

- (A) asthma
 (B) respiratory acidosis
 (C) respiratory alkalosis
 (D) emphysema

168. Which of the following conditions are found in the alveoli of lungs?

- I. high pO_2
 - II. low pCO_2
 - III. high pCO_2
 - IV. low pO_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

169. What is true about haemoglobin?

- (A) It is a dipeptide and present in red blood corpuscles in bloodworm.
- (B) It is present in the dissolved state in blood plasma in earthworm.
- (C) It is a dipeptide in mammals and localized in red blood corpuscles.
- (D) It is present in dissolved state in blood plasma in scorpions.

170. Each hemoglobin 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 molecule of O_2

171. Oxygen dissociation curve is a:

- (A) sigmoid curve
- (B) J-shaped curve
- (C) exponential growth curve
- (D) hyperbolic curve

172. What is Bohr's effect?

- (A) A rise in levels of pCO_2 or fall in pH decreases the oxygen affinity of hemoglobin
- (B) Decrease in levels of pCO_2 or fall in pH decreases the oxygen affinity of hemoglobin
- (C) A rise in levels of pCO_2 or increase in pH decreases the oxygen affinity of hemoglobin
- (D) Shifting of the oxygen-hemoglobin curve to left

173. Under which condition, dissociation of oxygen from oxyhemoglobin in tissues occurs?

- (A) low pO_2 (B) high pCO_2
- (C) high H^+ (D) All of these

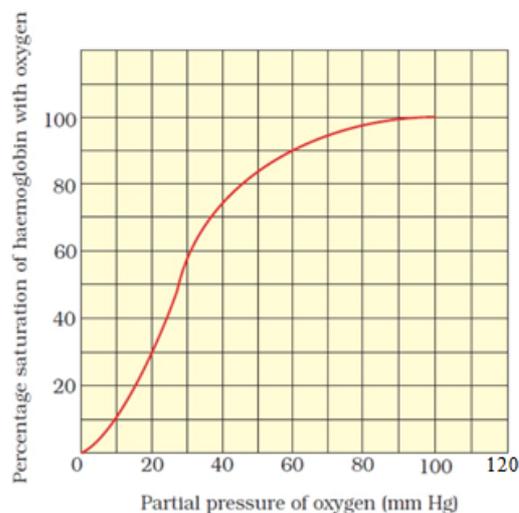
174. Which fact suggests that most of the oxygen is transported from the lungs to the tissues, combined with the hemoglobin rather than dissolved in the blood plasma?

- (A) Oxygen is less soluble in plasma
- (B) Hemoglobin can combine with oxygen
- (C) Oxyhemoglobin can combine with oxygen
- (D) Increase in the CO_2 concentration decrease the oxygen affinity of hemoglobin

175. Which situation would result in the greatest degree of O_2 saturation for hemoglobin, if pO_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

176. Shifting of the given curve to right takes place in the case of:



- (A) rise in pCO_2
- (B) fall in pH
- (C) raise in temperature
- (D) all of the above

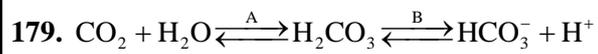
177. Blood carries the CO_2 in three forms. The correct percentages of CO_2 in these forms are:

As carbamino -As Dissolved form – Hemoglobin in RBC bicarbonates in plasma

- (A) 20-25% 70% 7%
- (B) 70% 20-25% 7%
- (C) 20-25% 7% 70%
- (D) 7% 20-25% 70%

178. Read the following statement and select the correct one.

- (A) The H^+ released from carbonic acid combines with hemoglobin to form hemoglobin acid
- (B) Oxyhemoglobin of erythrocytes is alkaline
- (C) More than 70% of CO_2 is transferred from the tissue to the lungs in the form of carbamino compounds
- (D) In a healthy person, the hemoglobin content is more than 25 gm per 100 mL



- Name the enzymes A and B in the above equation
- (A) A-Carbonic anhydrase; B-Carbonic hydratase
 - (B) A-Carbonic hydrates; B-Carbonic anhydrase
 - (C) A-Carbonic anhydrase; B-Carbonic anhydrase
 - (D) A-Carbonic hydratase; B-Carbonic hydratase

180. Reduction in pH of blood will:

- (A) reduce the blood supply to the brain
- (B) decrease the affinity of hemoglobin with oxygen
- (C) release bicarbonate ions by the liver
- (D) reduce the rate of heartbeat

ANSWER KEY

136.(C)
137.(C)
138.(B)
139.(B)
140.(D)
141.(C)
142.(C)
143.(B)
144.(C)
145.(C)
146.(A)
147.(D)
148.(B)
149.(B)
150.(D)
151.(C)
152.(A)

153.(A)
154.(A)
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166.(C)
167.(D)
168.(D)
169.(B)

170.(C)
171.(A)
172.(A)
173.(D)
174.(A)
175.(B)
176.(D)
177.(C)
178.(A)
179.(C)
180.(B)

HINTS AND SOLUTIONS

136. (C)

The diaphragm is a muscular dome shaped septum which separates abdominal cavity from thoracic cavity and helps in respiration.

137. (C)

Diffusion of gases takes place through exchange zone while conducting zone participates in humidification and temperature regulation of inhaled air.

138. (B)

Gaseous exchange occurs because of pressure gradient (from high pressure to low pressure)

139. (B)

Diaphragm is major responsible muscle for inspiration, contraction of diaphragm increases volume of thoracic chamber which cause inflow of gases.

140. (D)

During inspiration there will be increase in volume of thoracic cavity it leads to drop in pressure of lungs, now because of development of pressure gradient gaseous flow occurs from environment to lungs.

141. (C)

During expiration diaphragm becomes relaxed and dome shaped while during inspiration it contracts and becomes flat shaped.

142. (C)

Abdominal muscles are accessory muscles which help in muscles and aid in respiratory process.

143. (B)

The given figure is state of expiration in which air is expired out, rib cage returns to normal position and diaphragm becomes relaxed.

144. (C)

Ventilation movements are mainly performed by diaphragm and helping role is played by intercostal muscles.

145. (C)

During expiration both main muscles diaphragm and external intercostal muscle relax and that's why expiration is also called a passive process.

146. (A)

During inspiration there will be increase in volume of thoracic cavity it leads to drop in pressure of lungs, now because of development of pressure gradient gaseous flow occurs from environment to lungs.

147. (D)

During metabolism in tissues cells utilize oxygen and release carbon dioxide and not vice versa.

148. (B)

Main site of gaseous exchange between lungs and blood is alveoli as they have thin wall (simple squamous epithelium) and very vascular.

149. (B)

Main site of gaseous exchange between lungs and blood is alveoli as they have thin wall (simple squamous epithelium) and very vascular.

150. (D)

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151. (C)

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total inhalation after forceful expiration is vital capacity of lungs, it is sum of tidal volume, inspiratory reserve volume and expiratory reserve volume.

- 152.** (A)
All arteries of body carry oxygenated blood except pulmonary artery and umbilical artery.
- 153.** (A)
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- 154.** (A)
NCERT 11th biology
page no 272.
- 155.** (C)
NCERT 11th biology
page no 272.
- 156.** (B)
NCERT 11th biology
page no 273
blood entering as well as leaving right side of heart is deoxygenated blood so have similar oxygen content.
- 157.** (B)
carbon dioxide react with water and form carbonic acid and because of this chemical reaction it is 20 times more soluble than oxygen in blood plasma.
- 158.** (D)
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page no 272
total inhalation after forceful expiration is vital capacity of lungs, it is sum of tidal volume, inspiratory reserve volume and expiratory reserve volume.
- 159.** (A)
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page no 273.
- 160.** (C)
NCERT 11th biology
page no 272
- 161.** (C)
During inspiration there will be increase in volume of thoracic cavity it leads to drop in pressure of lungs, now because of development of pressure gradient gaseous flow occurs from environment to lungs.
- 162.** (C)
Carbon dioxide is diffused from blood to lungs so it will 1st pass through capillary wall than from interstitium and in last alveolar wall.
- 163.** (C)
Dorsal respiratory group or respiratory rhythm centre is located in medulla.
- 164.** (A)
Pneumotaxic centre of pons decreases output of medullary centre and so it reduces duration of inspiration.
- 165.** (D)
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- 166.** (C)
NCERT 11th biology
page no 275.
- 167.** (D)
Smoking cause damage of alveolar wall known as emphysema, it reduces effective surface area of gas exchange.
- 168.** (D)
In alveoli there is high concentration of oxygen, low concentration of carbon dioxide (and it will reduce proton concentration)
- 169.** (B)
Earthworm only have leukocytes in their blood so haemoglobin is situated in plasma as dissolved state.
- 170.** (C)
each haemoglobin molecule binds with 4 oxygen molecule and each gram of haemoglobin transports 1.34 ml of oxygen.
- 171.** (A)
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172. (A)

If there is increase in CO₂ concentration (along with proton concentrations) or drop in pH it will reduce affinity of oxygen with haemoglobin and assures delivery of oxygen at tissue level.

173. (D)

If there is increase in CO₂ concentration (along with proton concentrations) or drop in pH it will reduce affinity of oxygen with haemoglobin and assures delivery of oxygen at tissue level.

174. (A)

carbon dioxide react with water and form carbonic acid and because of this chemical reaction it is 20 times more soluble than oxygen in blood plasma.

175. (B)

Conditions found in lungs are responsible to increase affinity of oxygen with haemoglobin / left shift of oxyhaemoglobin dissociation curve and these conditions are low carbon dioxide content, high oxygen content, low temperature.

176. (D)

Right shift is seen in tissues and conditions responsible for this are conditions which decreases affinity of oxygen and haemoglobin.

177. (C)

carbon dioxide is transported in 3 fractions 1st in dissolved form (5 to 7 %) 2nd bound with haemoglobin (20 to 25 %) 3rd in bicarbonate form in plasma (70 %).

178. (A)

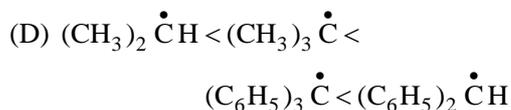
Haemoglobin also acts like a buffer, when bicarbonate releases protons it is trapped by haemoglobin and so it prevents drop any pH.

179. (C)

During carbondioxide transport bicarbonate formation and dissociation both are catalysed with enzyme carbonic anhydrase

180. (B)

If there is increase in CO₂ concentration (along with proton concentrations) or drop in pH it will reduce affinity of oxygen with haemoglobin and assures delivery of oxygen at tissue level.



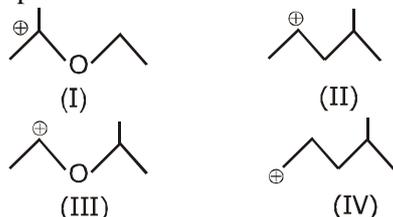
51. Which will be the least stable resonating structure

- (A) $\text{CH}_2 = \text{CH} - \overset{\oplus}{\text{C}}\text{H} - \overset{\ominus}{\text{C}}\text{H} - \text{O} - \text{CH}_3$
 (B) $\overset{\ominus}{\text{C}}\text{H}_2 - \overset{\oplus}{\text{C}}\text{H} - \text{CH} = \text{CH} - \text{OCH}_3$
 (C) $\overset{\ominus}{\text{C}}\text{H}_2 - \text{CH} = \text{CH} - \text{CH} = \overset{\oplus}{\text{O}} - \text{CH}_3$
 (D) $\text{CH}_2 = \text{CH} - \overset{\ominus}{\text{C}}\text{H} - \text{CH} = \overset{\oplus}{\text{O}} - \text{CH}_3$

52. Hyperconjugation involves overlap of the following orbitals

- (A) σ - σ
 (B) σ - p
 (C) p - p
 (D) π - π

53. The correct stability order for the following species is

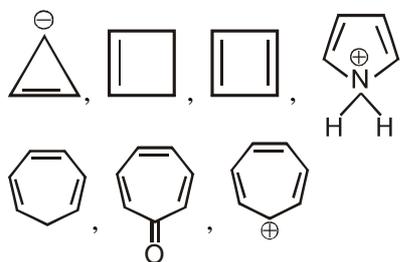


- (A) (II) > (IV) > (I) > (III)
 (B) (I) > (II) > (III) > (IV)
 (C) (II) > (I) > (IV) > (III)
 (D) (I) > (III) > (II) > (IV)

54. Carbon-carbon double bond length will be maximum in which of the following compound ?

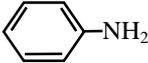
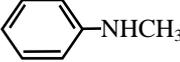
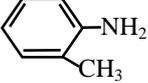
- (A) $\text{CH}_3 - \text{CH} = \text{CH}_2$
 (B) $\text{CH}_3 - \text{CH} = \text{CH} - \text{CH}_3$
 (C) $\text{CH}_3 - \text{C} = \text{C} - \text{CH}_3$
 $\quad \quad \quad | \quad \quad |$
 $\quad \quad \quad \text{CH}_3 \quad \text{CH}_3$
 (D) $\text{CH}_2 = \text{CH}_2$

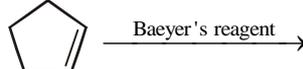
55. How many species out of the following are aromatic ?



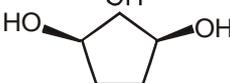
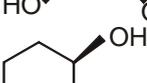
- (A) 2 (B) 4
 (C) 6 (D) 5

56. Which of the following is the strongest base -

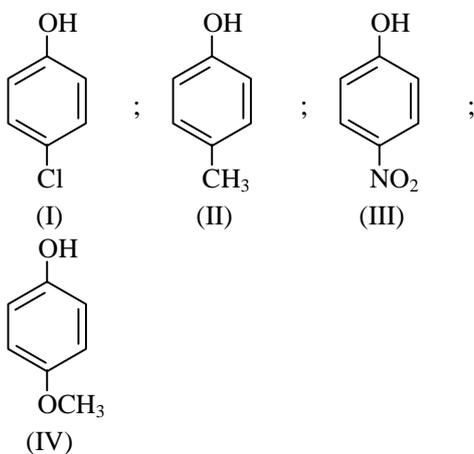
- (A) 
 (B) 
 (C) 
 (D) 

57.  Product

Product will be

- (A) 
 (B) 
 (C) 
 (D) 

58. Arrange the following compounds in order of decreasing acidity :



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

59. With ammoniacal cuprous chloride solution a reddish brown precipitate is obtained on treating with

- (A) CH_4 (B) C_2H_4
 (C) C_2H_2 (D) C_3H_6

60. Which of the following species is not electrophilic in nature?

- (A) Cl^\oplus (B) BH_3
 (C) $\text{H}_3\text{O}^\oplus$ (D) NO_2^\oplus

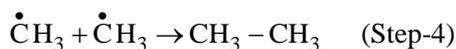
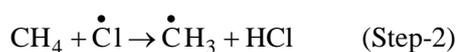
61. Acetylene and dil. H_2SO_4 reacts to produce

- (A) CH_3COOH
 (B) CH_3CHO
 (C) CH_3COCH_3
 (D) None of these

62. Methyl bromide is heated with zinc in closed tube produces –

- (A) Methane (B) Ethane
 (C) Ethylene (D) methanol

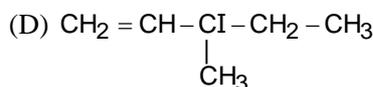
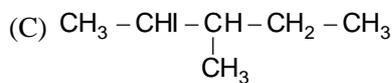
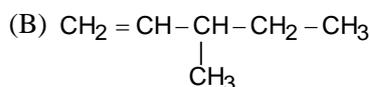
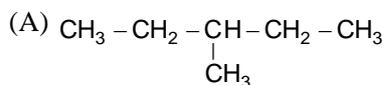
63. In the following reaction sequence



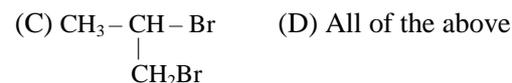
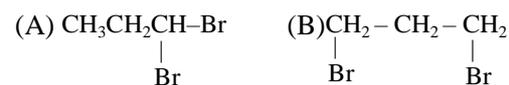
The chain terminating step is

- (A) Step-(1)
 (B) Step-(2)
 (C) Step-(3)
 (D) Step-(4)

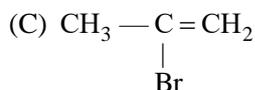
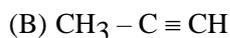
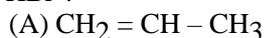
64. A sample of 2,3-dibromo-3-methylpentane is heated with zinc dust. The resulting product formed is isolated and heated with HI in the presence of phosphorus. Identify which is the structure that represents the final organic product formed in the reaction?



65. The product formed by the addition of HBr to propyne in the presence of H_2O_2 is –



66. Which will form 2, 2-Dibromopropane with HBr ?



- (D) Both (B) & (C)

67. How many π -electron are there in the following species –

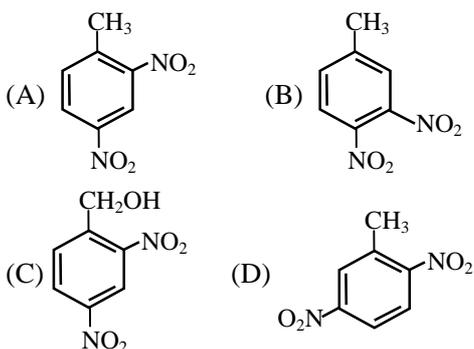


- (A) 2 (B) 4 (C) 6 (D) 8

68. Number of isomers of C_7H_7Cl is -

- (A) 2 (B) 4
(C) 5 (D) 6

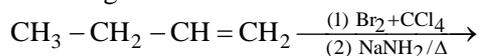
69. p-Nitrotoluene on further nitration gives -



70. $C_3H_7Cl \xrightarrow[\text{KOH}]{\text{alc.}} [B] \xrightarrow{\text{HCl}} [C] \xrightarrow[\text{KOH}]{\text{aq.}} C_3H_8O$
[A] will be

- (A) 1-chloro propane (B) 2-chloro propane
(C) Both of these (D) None of these

71. What is the incorrect intermediates in the following reaction?



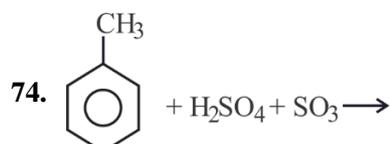
- (A) $CH_3 - CH_2 - \overset{\text{CH}_3 - \text{CH}_2 - \text{C} \equiv \text{CH}}{\underset{\text{Br}}{\text{CH}}} - CH_2\text{Br}$
- (B) $CH_3CH_2 - \overset{\text{Br}}{\text{CH}} = \text{CHBr}$
- (C) $CH_3 - CH_2 - \overset{\text{Br}}{\text{C}} = \text{CH}_2$
- (D) $CH_3 - \overset{\text{Br}}{\text{CH}} = \text{CH} - \text{Br}$

72. When $CH_3CH_2CHCl_2$ is treated with $NaNH_2$, the product formed is

- (A) $CH_3 - CH = CH_2$
(B) $CH_3 - C \equiv CH$
(C) $CH_3CH_2CH \begin{cases} \text{NH}_2 \\ \text{NH}_2 \end{cases}$
(D) $CH_3CH_2CH \begin{cases} \text{Cl} \\ \text{NH}_2 \end{cases}$

73. When HCl gas is passed through propene in the presence of benzoyl peroxide, it gives :

- (A) n-Propyl chloride
(B) 2-Chloropropane
(C) Allyl chloride
(D) No reaction



Major product is

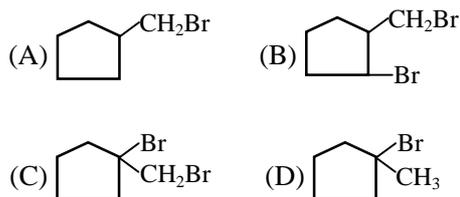
- (A)
- (B)
- (C)
- (D)

75. Correct order of boiling point is -

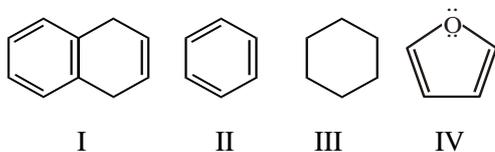
- (A) n-Pentane < neohexane < isohexane < 3-methyl pentane
(B) Neohexane < n-pentane < isohexane < 3-methyl pentane
(C) 3-methyl pentane < neohexane < n-pentane < isohexane

(D) n-Pentane < isohexane < 3-methyl pentane < neohexane

76. The major product formed by monobromination of methylcyclopentane is -

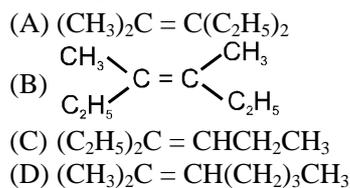


77. Which of the following will show aromatic character -

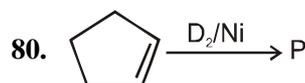
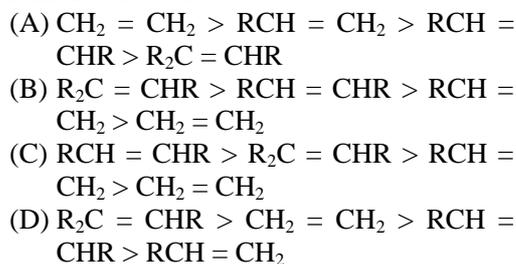


- (A) I, II and III (B) II and III
 (C) I, II and IV (D) All the four

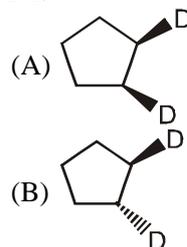
78. An alkene with molecular formula C_8H_{16} on oxidation with hot $KMnO_4$ gives acetone and 3-pentanone. The structure of the alkene is



79. The relative rates of catalytic hydrogenation is in the order of

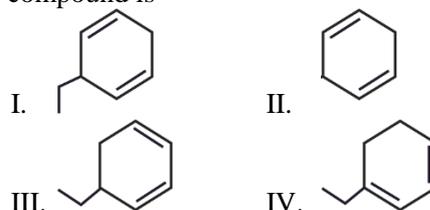


P is



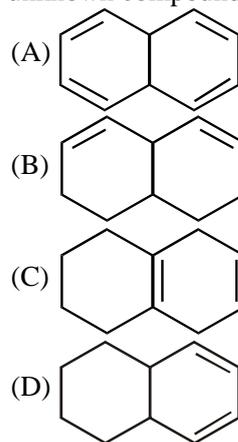
- (C) both are correct
 (D) None

81. The stability order of alkene in following compound is



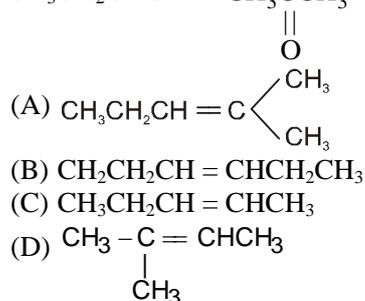
- (A) I < II < III < IV
 (B) II < I < III < IV
 (C) II < III < I < IV
 (D) II < IV < I < III

82. An unknown compound decolorizes bromine in carbon tetrachloride, and it undergoes catalytic reduction to give decalin. When treated with warm, conc. potassium permanganate, this compound give cis-cyclohexane-1,2-dicarboxylic acid and oxalic acid. Possible structure for the unknown compound is

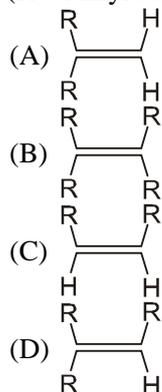


83. In the given reaction
 $\text{CH}_3 - \text{C} \equiv \text{C} - \text{CH}_3 \xrightarrow{\text{NaNH}_3(\ell)} [\text{X}]$
 [X] will be -
 (A) Butane (B) trans-2-butene
 (C) cis-2-butene (D) 1-Butene

84. Which alkene on ozonolysis gives $\text{CH}_3\text{CH}_2\text{CHO}$ and $\text{CH}_3\text{C}(=\text{O})\text{CH}_3$?

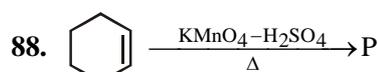
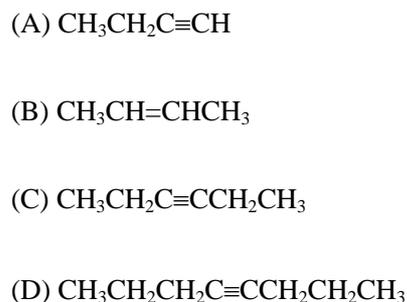


85. Which one of the following alkenes will react faster with H_2 under catalytic hydrogenation conditions?
 (R = Alkyl substituent)

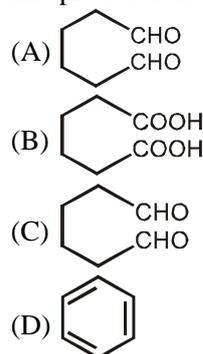


86. The reaction of toluene with Cl_2 in presence of FeCl_3 gives predominantly -
 (A) benzoyl chloride
 (B) benzyl chloride
 (C) o- and p-chlorotoluene
 (D) m-chlorotoluene

87. The hydrocarbon which cannot react with sodium in liquid ammonia is -



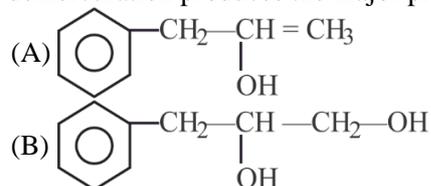
The product P is

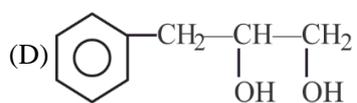
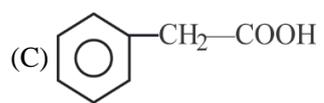


89. But-1-ene may be converted to butane by reaction with
 (A) Zn - HCl
 (B) Sn - HCl
 (C) Zn - Hg
 (D) Pd/ H_2

90.  $\text{CH}_3 - \text{CH} = \text{CH}_2$ on mercuration-

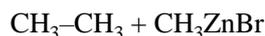
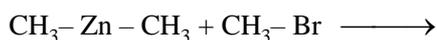
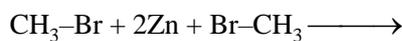
demercuration produces the major product





Answer Key

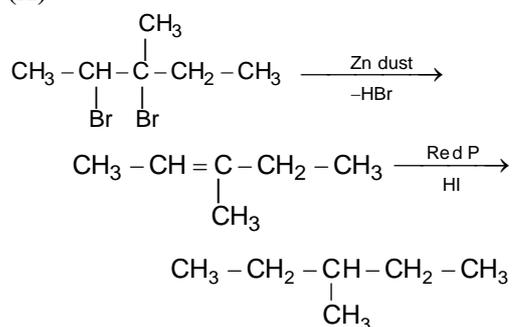
- 46. (C)
- 47. (C)
- 48. (A)
- 49. (B)
- 50. (A)
- 51. (A)
- 52. (B)
- 53. (D)
- 54. (C)
- 55. (A)
- 56. (D)
- 57. (C)
- 58. (A)
- 59. (C)
- 60. (C)
- 61. (B)
- 62. (B)
- 63. (D)
- 64. (A)
- 65. (C)
- 66. (D)
- 67. (C)
- 68. (B)
- 69. (A)
- 70. (C)
- 71. (D)
- 72. (B)
- 73. (B)
- 74. (D)
- 75. (A)
- 76. (D)
- 77. (C)
- 78. (A)
- 79. (A)
- 80. (A)
- 81. (A)
- 82. (D)
- 83. (B)
- 84. (A)
- 85. (C)
- 86. (C)
- 87. (B)
- 88. (B)
- 89. (D)
- 90. (A)



Ethane

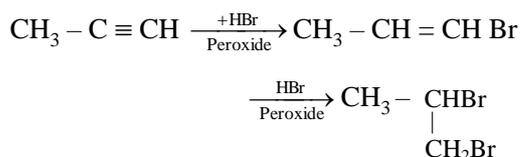
63. (D)

64. (A)

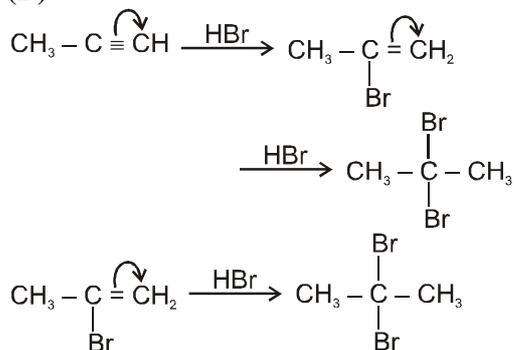


65. [C]

The product formed by the addition of HBr to propyne in the presence of H_2O_2 is $\text{CH}_3\text{CH}(\text{Br})\text{CH}_2\text{Br}$. The addition is contrary to Markownikoff's rule.



66. (D)

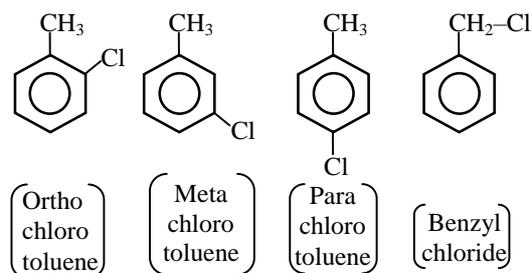


67. [C]

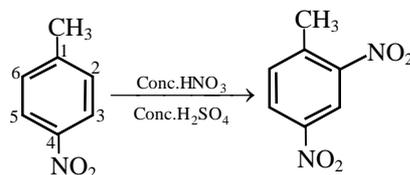
2π electron for each double bond and one lone pair of electrons of carbon. These six electrons are forming a continuous cyclic cloud (aromatic sextet).

68.[B]

The isomers of $\text{C}_7\text{H}_7\text{Cl}$ are

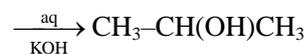
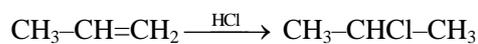
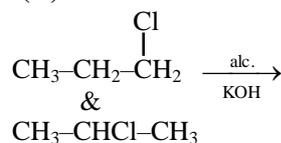


69. [A]

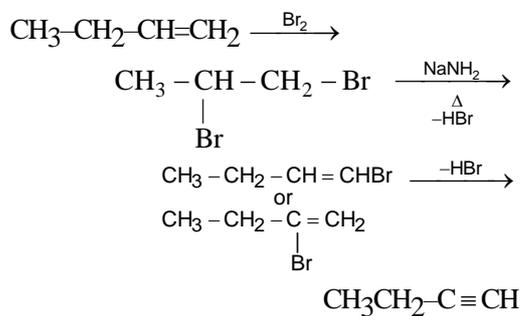


Position 2 is favoured by $-\text{CH}_3$ (o, p-directing group) as well as $-\text{NO}_2$ group (m-directing group.)

70. (C)



71. (D)



72. (B)

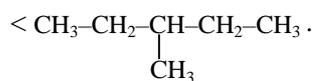
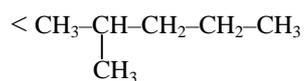
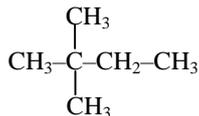
73. (B)

Peroxide effect is noticed only in case of HBr. For HCl follow Markownikoff's rule

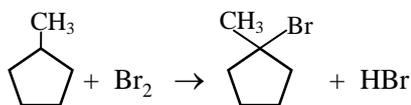
74. (D)

75. [A]

As the branching in alkane increases the boiling point decreases. So the boiling point order is -



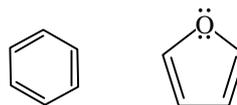
76. [D]



1-Bromo-1-methyl
Cyclopentane

77. [C]

Benzene has 6π electrons (2 from each double bond) present in cyclic continuous form.



benzene

furan

Furan also has 6π electrons present in continuous cyclic cloud, note that one of the pair of electrons present in sp^2 orbital does not involve in overlapping of the sextet; while the unused pair of electrons present in p orbital is involved in overlapping forming sextet 78. (A)

79. (A)

Catalytic hydrogenation \propto

$$\frac{1}{\text{Stability of alkenes}}$$

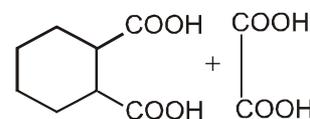
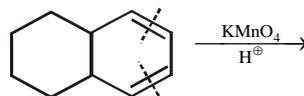
80. (A)

Syn addition of D_2 on double bond.

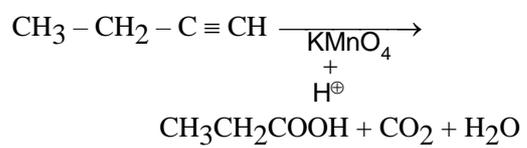
81. (A)

Stability of alkene \propto conjugation and No. of hyperconjugative α -H atom.

82. (D)



83. (B)



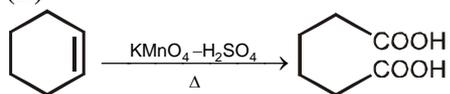
84. (A)

85. (C)

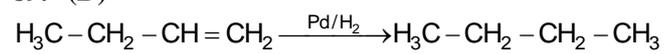
86. (C)

87. (B)

88. (B)



89. (D)



Butene - 1

Butane

90. (A)

(Physics)

1. A body of mass m is moving in a circle of radius r with a constant speed v . The force on the body is $\frac{mv^2}{r}$ and is directed towards the centre. What is the work done by this force in moving the body over half the circumference of the circle
- (A) $\frac{mv^2}{\pi r^2}$ (B) zero
(C) $\frac{mv^2}{r^2}$ (D) $\frac{\pi v^2}{mv^2}$
2. If the unit of force and length each be increased by four times, then the unit of energy is increased by
- (A) 16 times (B) 8 times
(C) 2 times (D) 4 times
3. A man pushes a wall and fails to displace it. He does
- (A) Negative work
(B) Positive but not maximum work
(C) No work at all
(D) Maximum work
4. The same retarding force is applied to stop a train. The train stops after 80 m. If the speed is doubled, then the distance will be
- (A) The same (B) Doubled
(C) Halved (D) Four times
5. A body moves a distance of 10 m along a straight line under the action of a force of 5 N. If the work done is 25 joules, the angle which the force makes with the direction of motion of the body is
- (A) 0° (B) 30°
(C) 60° (D) 90°
6. You lift a heavy book from the floor of the room and keep it in the book-shelf having a height 2 m. In this process you take 5 seconds. The work done by you will depend upon
- (A) Mass of the book and time taken
(B) Weight of the book and height of the book-shelf
(C) Height of the book-shelf and time taken
(D) Mass of the book, height of the book-shelf and time taken
7. A body of mass m kg is lifted by a man to a height of one metre in 30 sec. Another man lifts the same mass to the same height in 60 sec. The work done by them are in the ratio
- (A) 1:2 (B) 1 : 1
(C) 2:1 (D) 4:1
8. A force $F = (5\hat{i} + 3\hat{j})$ newton is applied over a particle which displaces it from its origin to the point $r = (2\hat{i} - 1\hat{j})$ metres. The work done on the particle is
- (A) - 7 joules (B) + 13 joules
(C) + 7 joules (D) + 11 joules
9. A force acts on a 30 gm particle in such a way that the position of the particle as a function of time is given by $x = 3t - 4t^2 + t^3$, where x is in metres and t is in seconds. The work done during the first 4 seconds is
- (A) 5.28 J (B) 450 mJ
(C) 490 mJ (D) 30 mJ
10. A body of mass 10 kg is dropped to the ground from a height of 10 metres. The work done by the gravitational force is ($g = 9.8\text{m/sec}^2$)
- (A) - 490 Joules (B) + 490 Joules
(C) - 980 Joules (D) + 980 Joules
11. Which of the following is a scalar quantity
- (A) Displacement (B) Electric field
(C) Acceleration (D) Work
12. A force $\vec{F} = 5\hat{i} + 6\hat{j} - 4\hat{k}$ acting on a body, produces a displacements $\vec{s} = 6\hat{i} + 5\hat{k}$. Work done by the force is
- (A) 18 units (B) 10 units
(C) 12 units (D) 15 units
13. A force of 5 N acts on a 15 kg body initially at rest. The work done by the force during the first second of motion of the body is
- (A) 5 J (B) $\frac{5}{6}$ J
(C) 6 J (D) 75J
14. The work done against gravity in taking 10 kg mass at 1m height in 1sec will be
- (A) 49 J (B) 98 J
(C) 196 J (D) None of these

15. A body of mass 6kg is under a force which causes displacement in it given by $S = \frac{t^2}{4}$ metres where t is time. The work done by the force in 2 seconds is
 (A) 12 J (B) 9 J
 (C) 6 J (D) 3 J
16. A body of mass 10kg at rest is acted upon simultaneously by two forces 4 N and 3N at right angles to each other. The kinetic energy of the body at the end of 10 sec is
 (A) 100 J (B) 300 J
 (C) 50 J (D) 125 J
17. A cylinder of mass 10kg is sliding on a plane with an initial velocity of 10m/s. If coefficient of friction between surface and cylinder is 0.5, then before stopping it will describe
 (A) 12.5 m (B) 5 m
 (C) 7.5 m (D) 10 m
18. A force of $(3\hat{i} + 4\hat{j})$ Newton acts on a body and displaces it by $(3\hat{i} + 4\hat{j})$ m. The work done by the force is
 (A) 10 J (B) 12 J
 (C) 16 J (D) 25 J
19. A 50kg man with 20kg load on his head climbs up 20 steps of 0.25m height each. The work done in climbing is
 (A) 5 J (B) 350 J
 (C) 100 J (D) 3430 J
20. A force $\vec{F} = 6\hat{i} + 2\hat{j} - 3\hat{k}$ acts on a particle and produces a displacement of $\vec{s} = 2\hat{i} - 3\hat{j} + x\hat{k}$. If the work done is zero, the value of x is
 (A) -2 (B) 1/2
 (C) 6 (D) 2
21. A particle moves from position $\vec{r}_1 = 3\hat{i} + 2\hat{j} - 6\hat{k}$ to position $\vec{r}_2 = 14\hat{i} + 13\hat{j} + 9\hat{k}$ under the action of force $4\hat{i} + \hat{j} + 3\hat{k}$ N. The work done will be
 (A) 100 J (B) 50 J
 (C) 200 J (D) 75 J
22. A force $(\vec{F}) = 3\hat{i} + c\hat{j} + 2\hat{k}$ acting on a particle causes a displacement: $(\vec{s}) = -4\hat{i} + 2\hat{j} + 3\hat{k}$ in its own direction. If the work done is 6J, then the value of 'c' is
 (A) 0 (B) 1
 (C) 6 (D) 12
23. In an explosion a body breaks up into two pieces of unequal masses. In this
 (A) Both parts will have numerically equal momentum
 (B) Lighter part will have more momentum
 (C) Heavier part will have more momentum
 (D) Both parts will have equal kinetic energy
24. Which of the following is a unit of energy
 (A) Unit (B) Watt
 (C) Horse Power (D) None
25. If force and displacement of particle in direction of force are doubled. Work would be
 (A) Double (B) 4 times
 (C) Half (D) $\frac{1}{4}$ times
26. A body of mass 5 kg is placed at the origin, and can move only on the x-axis. A force of 10 N is acting on it in a direction making an angle of 60° with the x-axis and displaces it along the x-axis by 4 metres. The work done by the force is
 (A) 2.5 J (B) 7.25 J
 (C) 40 J (D) 20 J
27. A force $\vec{F} = (5\hat{i} + 4\hat{j})$ N acts on a body and produces a displacement $\vec{S} = (6\hat{i} - 5\hat{j} + 3\hat{k})$ m. The work done will be
 (A) 10 J (B) 20 J
 (C) 30 J (D) 40 J
28. A uniform chain of length 2m is kept on a table such that a length of 60cm hangs freely from the edge of the table. The total mass of the chain is 4kg. What is the work done in pulling the entire chain on the table
 (A) 7.2 J (B) 3.6 J
 (C) 120 J (D) 1200 J
29. A particle is acted upon by a force of constant magnitude which is always perpendicular to the velocity of the particle, the motion of the particle takes place in a plane. It follows that
 (A) Its velocity is constant
 (B) Its acceleration is constant
 (C) Its kinetic energy is constant
 (D) It moves in a straight line

30. A ball of mass m moves with speed v and strikes a wall having infinite mass and it returns with same speed then the work done by the ball on the wall is
 (A) Zero (B) mv J
 (C) m/v J (D) v/m J
31. A force $\vec{F} = (5\hat{i} + 3\hat{j} + 2\hat{k})$ N is applied over a particle which displaces it from its origin to the point $\vec{r} = (2\hat{i} - \hat{j})$ m. The work done on the particle in joules is
 (A) -7 (B) $+7$
 (C) $+10$ (D) $+13$
32. The kinetic energy acquired by a body of mass m is travelling some distance s , starting from rest under the actions of a constant force, is directly proportional to
 (A) m° (B) m
 (C) m^2 (D) \sqrt{m}
33. If a force $\vec{F} = 4\hat{i} + 5\hat{j}$ causes a displacement $\vec{s} = 3\hat{i} + 6\hat{k}$, work done is
 (A) 4×6 unit (B) 6×3 unit
 (C) 5×6 unit (D) 4×3 unit
34. A man starts walking from a point on the surface of earth (assumed smooth) and reaches diagonally opposite point. What is the work done by him
 (A) Zero (B) Positive
 (C) Negative (D) Nothing can be said
35. It is easier to draw up a wooden block along an inclined plane than to haul it vertically, principally because
 (A) The friction is reduced
 (B) The mass becomes smaller
 (C) Only a part of the weight has to be overcome
 (D) g ? becomes smaller
36. Two bodies of masses 1 kg and 5 kg are dropped gently from the top of a tower. At a point 20 cm from the ground, both the bodies will have the same
 (A) Momentum (B) Kinetic energy
 (C) Velocity (D) Total energy
37. Due to a force of $(6\hat{i} + 2\hat{j})$ N the displacement of a body is $(3\hat{i} - \hat{j})$ m, then the work done is
 (A) 16 J (B) 12 J
 (C) 8 J (D) Zero
38. A ball is released from the top of a tower. The ratio of work done by force of gravity in first, second and third second of the motion of the ball is
 (A) 1 : 2 : 3 (B) 1 : 4 : 9
 (C) 1 : 3 : 5 (D) 1 : 5 : 3
39. A particle moves under the effect of a force $F = Cx$ from $x = 0$ to $x = x_1$. The work done in the process is
 (A) Cx_1^2 (B) $\frac{1}{2}Cx_1^2$
 (C) Cx_1 (D) zero
40. A cord is used to lower vertically a block of mass M by a distance d with constant downward acceleration $\frac{g}{4}$. Work done by the cord on the block is
 (A) $Mg\frac{d}{4}$ (B) $3Mg\frac{d}{4}$
 (C) $-3Mg\frac{d}{4}$ (D) Mgd
41. Two springs have their force constant as k_1 and k_2 ($k_1 > k_2$). When they are stretched by the same force
 (A) No work is done in case of both the springs
 (B) Equal work is done in case of both the springs
 (C) More work is done in case of second spring
 (D) More work is done in case of first spring
42. A spring of force constant 10 N/m has an initial stretch 0.20 m. In changing the stretch to 0.25 m, the increase in potential energy is about
 (A) 0.1 joule (B) 0.2 joule
 (C) 0.3 joule (D) 0.5 joule
43. Two springs of spring constants 1500 N/m and 3000 N/m respectively are stretched with the same force. They will have potential energy in the ratio
 (A) 4 : 1 (B) 1 : 4
 (C) 2 : 1 (D) 1 : 2
44. A spring 40 mm long is stretched by the application of a force. If 10 N force required to stretch the spring through 1 mm, then work done in stretching the spring through 40 mm is
 (A) 84 J (B) 68 J
 (C) 23 J (D) 8 J
45. A position dependent force $F = 7 - 2x + 3x^2$ newton acts on a small body of mass 2 kg and displaces it from $x = 0$ to $x = 5$ m. The work done in joules is
 (A) 70 (B) 270
 (C) 35 (D) 135

ANSWER KEY

1. (B)
2. (A)
3. (C)
4. (D)
5. (C)
6. (B)
7. (B)
8. (C)
9. (A)
10. (D)
11. (D)
12. (B)
13. (B)
14. (B)
15. (D)

16. (D)
17. (D)
18. (D)
19. (D)
20. (D)
21. (A)
22. (C)
23. (A)
24. (D)
25. (B)
26. (D)
27. (A)
28. (B)
29. (C)
30. (A)

31. (B)
32. (A)
33. (D)
34. (A)
35. (C)
36. (C)
37. (A)
38. (C)
39. (B)
40. (C)
41. (C)
42. (A)
43. (C)
44. (D)
45. (D)

HINT AND SOLUTIONS

1. (B)

Work done by centripetal force is always zero, because force and instantaneous displacement are always perpendicular.

$$W = \vec{F} \cdot \vec{S} = F_s \cos \theta = F_s \cos(90^\circ) = 0$$

2. (A)

Work = Force \times Displacement (length) If unit of force and length be increased by four times then the unit of energy will increase by 16 times.

3. (C)

No displacement is there.

4. (D)

Stopping distance $S \propto u^2$. If the speed is doubled then the stopping distance will be four times.

5. (C)

$$W = F_s \cos \theta \Rightarrow \cos \theta = \frac{W}{F_s} = \frac{25}{50} = \frac{1}{2} \Rightarrow \theta = 60^\circ$$

6. (B)

Work done = Force \times displacement = Weight of the book \times Height of the book shelf

7. (B)

Work done does not depend on time.

8. (C)

$$W = \vec{F} \cdot \vec{s} = (5\hat{i} + 3\hat{j}) \cdot (2\hat{i} - 2\hat{j}) \\ = 10 - 6 = 4 \text{ J}$$

9. (A)

$$v = \frac{dx}{dt} \Rightarrow 3 - 8t + 3t^2$$

$$v_0 = 3 \text{ m/s and } v_4 = 19 \text{ m/s}$$

$$W = \frac{1}{2} m (v_4^2 - v_0^2)$$

$$\text{According to work energy theorem} \\ = \frac{1}{2} \times 0.03 \times (19^2 - 3^2) = 5.28 \text{ J}$$

10. (D)

As the body moves in the direction of force therefore work done by gravitational force will be positive.

$$W = F_s = mgh = 10 \times 9.8 \times 10 = 980 \text{ J}$$

11. (D)

12. (B)

$$W = \vec{F} \cdot \vec{s} = (5\hat{i} + 6\hat{j} - 4\hat{k}) \cdot (6\hat{i} + 5\hat{k}) \\ = 30 - 20 = 10 \text{ units}$$

13. (B)

$$W = F_s = F \times \frac{1}{2} at^2$$

$$\left[\text{from } s = ut + \frac{1}{2} at^2 \right]$$

$$\circ W = F \left[\frac{1}{2} \left(\frac{F}{m} \right) t^2 \right]$$

$$= \frac{F^2 t^2}{2m} = \frac{25 \times (1)^2}{2 \times 15} = \frac{25}{30} = \frac{5}{6} \text{ J}$$

14. (B)

$$\text{Work done} = mgh = 10 \times 9.8 \times 1 = 98 \text{ J}$$

15. (D)

$$s = \frac{t^2}{4} \therefore ds = \frac{t}{2} dt$$

$$F = ma = \frac{md^2s}{dt^2} = \frac{6d^2}{dt^2} \left[\frac{t^2}{4} \right] = 3N \text{ Now}$$

$$W = \int_0^2 F ds = \int_0^2 3 \frac{t}{2} dt = \frac{3}{2} \left[\frac{t^2}{2} \right]_0^2$$

$$= \frac{3}{4} [(2)^2 - (0)^2] = 3 \text{ J}$$

16. (D)

$$\text{Net force on body} = \sqrt{4^2 + 3^2} = 5 \text{ N}$$

$$\therefore a = F/m = 5/10 = 1/2 \text{ m/s}^2$$

$$\text{Kinetic energy} = \frac{1}{2} mv^2$$

$$\frac{1}{2} m(at)^2 = 125 \text{ Joule}$$

17. (D)

$$s = \frac{u^2}{2\mu g} = \frac{10 \times 10}{2 \times 0.5 \times 10} = 10 \text{ m}$$

18. (D)

$$W = \vec{F} \cdot \vec{s} = (3\hat{i} + 4\hat{j}) \cdot (3\hat{i} + 4\hat{j}) = 9 + 16 = 25 \text{ J}$$

19. (D)

$$\text{Total mass} = (50 + 20) = 70 \text{ kg Total height}$$

$$= 20 \times 0.25 = 5 \text{ m}$$

$$\therefore \text{Work done} = mgh = 70 \times 9.8 \times 5 = 3430 \text{ J}$$

20. (D)

$$W = \vec{F} \cdot \vec{s} = (6\hat{i} + 2\hat{j} - 3\hat{k}) \cdot (2\hat{i} - 3\hat{j} + x\hat{k}) = 0$$
$$12 - 6 - 3x = 0 \Rightarrow x = 2$$

21. (A)

$$W = \vec{F} \cdot (\vec{r}_2 - \vec{r}_1) = (4\hat{i} + \hat{j} + 3\hat{k})$$
$$(11\hat{i} + 11\hat{j} + 15\hat{k})$$
$$W = 44 + 11 + 45 = 100 \text{ Joule}$$

22. (C)

$$W = (3\hat{i} + c\hat{j} + 2\hat{k}) \cdot (-4\hat{i} + 2\hat{j} + 3\hat{k}) = 6 \text{ Joule}$$
$$W = -12 + 2c + 6 = 6$$
$$\Rightarrow c = 6$$

23. (A)

Both part will have numerically equal momentum and lighter part will have more velocity.

24. (D)

Watt and Horsepower are the unit of power

25. (B)

Work = Force \times Displacement If force and displacement both are doubled then work would be four times

26. (D)

$$W = FS \cos\theta = 10 \times 4 \times \cos 60^\circ = 20 \text{ Joule}$$

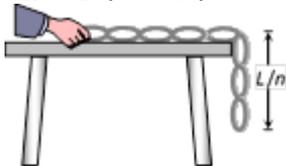
27. (A)

$$W = \vec{F} \cdot \vec{s} = (5\hat{i} + 4\hat{j}) \cdot (6\hat{i} - 5\hat{j} + 3\hat{k})$$
$$= 30 - 20 = 10 \text{ J}$$

28. (B)

Fraction of length of the chain hanging from the table

$$= \frac{1}{n} = \frac{60 \text{ cm}}{200 \text{ cm}} = \frac{3}{10} \quad \left| n = \frac{10}{3} \right|$$



$$W = \frac{mgL}{2n^2} = \frac{4 \times 10 \times 2}{2 \times (10/3)^2} = 3.6 \text{ J}$$

29. (C)

When a force of constant magnitude which is perpendicular to the velocity of particle acts on a particle, work done is zero and hence change in kinetic energy is zero.

30. (A)

The ball rebounds with the same speed. So change in its Kinetic energy will be zero i.e. work done by the ball on the wall is zero.

31. (B)

$$W = \vec{F} \cdot \vec{r} = (5\hat{i} + 3\hat{j} + 2\hat{k}) \cdot (2\hat{i} - \hat{j})$$
$$= 10 - 3 = 7 \text{ J}$$

32. (A)

K.E. acquired by the body = work done on the body

$$\text{K.E.} = \frac{1}{2}mv^2 = Fs \text{ i.e. it does not depend upon the}$$

mass of the body although velocity depends upon the

$$\text{mass } v^2 \propto \frac{1}{m} \text{ [If } F \text{ and } s \text{ are constant]}$$

33. (D)

$$W = \vec{F} \cdot \vec{r} = (4\hat{i} + 5\hat{j} + 0\hat{k}) \cdot (3\hat{i} + 0\hat{j} + 6\hat{k})$$
$$= 4 \times 3 \text{ units}$$

34. (A)

As surface is smooth so work done against friction is zero. Also the displacement and force of gravity are perpendicular so work done against gravity is zero.

35. (C)

Opposing force in vertical pulling = mg But opposing force on an inclined plane is mg sin θ , which is less than mg.

36. (C)

Velocity of fall is independent of the mass of the falling body.

37. (A)

$$\text{Work done} = \vec{F} \cdot \vec{s} = (64\hat{i} + 2\hat{j}) \cdot (3\hat{i} - \hat{j})$$
$$= 6 \times 3 - 2 \times 1 = 18 - 2 = 16 \text{ J}$$

38. (C)

When the ball is released from the top of tower then ratio of distances covered by the ball in first, second and third second $h_I : h_{II} : h_{III} = 1:3:5$

[because $h_n \propto (2n - 1)$]

\therefore Ratio of work done $mgh_I : mgh_{II} : mgh_{III} = 1:3:5$

39. (B)

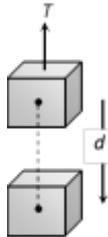
$$W \int_0^{x_1} F \cdot dx = \int_0^{x_1} Cx dx = C \left[\frac{x^2}{2} \right]_0^{x_1} = \frac{1}{2} Cx_1^2$$

40. (C)

When the block moves vertically downward with acceleration $\frac{g}{4}$ then tension in the cord

$$T = M \left(g - \frac{g}{4} \right) = \frac{3}{4} Mg \quad \text{Work done by the cord}$$

$$\vec{F} \cdot \vec{s} = Fs \cos \theta$$



$$= Td \cos(180^\circ) = - \left(\frac{3Mg}{4} \right) \times d = - \frac{3}{4} Mgd$$

41. (C)

$W = \frac{F^2}{2k}$ If both springs are stretched by same force then $W \propto \frac{1}{k}$. As $k_1 > k_2$ therefore $W_1 < W_2$ i.e. more work is done in case of second spring.

42. (A)

$$\text{D.P.E.} = \frac{1}{2} k(x_2^2 - x_1^2)$$

$$= \frac{1}{2} \times 10[(0.25)^2 - (0.20)^2]$$

$$= 5 \times 0.45 \times 0.05 = 0.1J$$

43. (C)

$$U = \frac{F^2}{2k} \Rightarrow \frac{U_1}{U_2} = \frac{k_2}{k_1}$$

(if force are same)

$$\frac{U_1}{U_2} = \frac{3000}{1500} = \frac{2}{1}$$

44. (D)

$$\text{Here } k = \frac{F}{x} = \frac{10}{1 \times 10^{-3}} = 10^4 N/m$$

$$W = \frac{1}{2} kx^2 = \frac{1}{2} \times 10^4 \times (40 \times 10^{-3})^2 = 8J$$

45. (D)

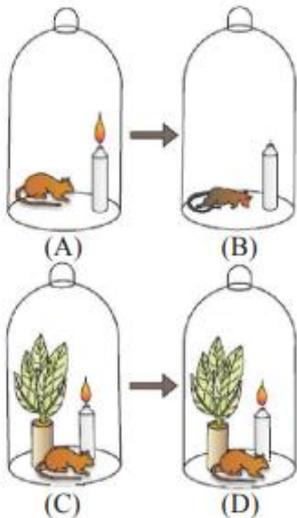
$$\begin{aligned} W &= \int_0^5 F dx = \int_0^5 (7 - 2x + 3x^2) dx \\ &= [7x - x^2 + x^3]_0^5 \\ &= 35 - 25 + 125 = 135 J \end{aligned}$$

(Botany)

91. CO₂ is essential for photosynthesis was explained by:-
 (A) Moll's half leaf experiment
 (B) Bal jar experiment
 (C) Hill reaction
 (D) Absorption spectrum

92. Which scientist showed that plant purify the damaged air:-
 (A) Joseph Priestley
 (B) Jon Ingenhousze
 (C) Julious Von Saches
 (D) T.W. Engelmann

93.



- Above set up of experiment is related with :-
 (A) Engelmann experiment
 (B) John Engenhouzze experiment
 (C) Priestely's experiment
 (D) Van Neil experiment

94. Which one is not correct matched:-

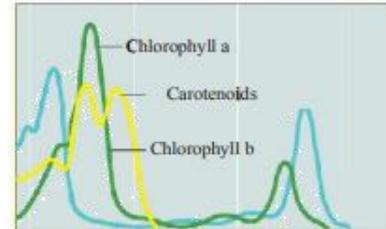
	A	B
(A)	Thylakoid	Light reaction
(B)	Stroma	Dark reaction
(C)	PS II	P = 700
(D)	CO ₂ reduction	C ₃ Cycle

95. Which statement is not correct for photosynthesis reaction :-
 (A) H₂O is oxidized
 (B) CO₂ is reduced
 (C) It is a Anabolic reaction
 (D) It is catabolic

96. Which one among following is not a leaf pigment:-
 (A) Chlorophylls (B) Xanthophylls
 (C) Carotens (D) Phycobilins

97. Which one is not a accessory pigment:-
 (A) Chl a (B) Cal b
 (C) Carotenoid (D) Xanthophyll

98.



- Which statement is not correct with above graph:-
 (A) Chlorophyll b show greater absorption peak in blue light
 (B) Chlorophyll a show greater absorption peak in red light
 (C) In red light chl a have greater peak than chlorophyll b
 (D) In blue light chl b have greater peak than chlorophyll a

99. Which colour of light is minimum absorbed by chlorophyll:-
 (A) Red (B) Blue
 (C) Green (D) Yellow

100. Which statement are not true for photosynthesis
 (A) CO₂ reduction occur in dark reaction
 (B) H₂O oxidation occur in light reaction
 (C) Dark reaction is an enzymatic phase of photosynthesis
 (D) Dark reaction may occur in dark if light reaction products are available there

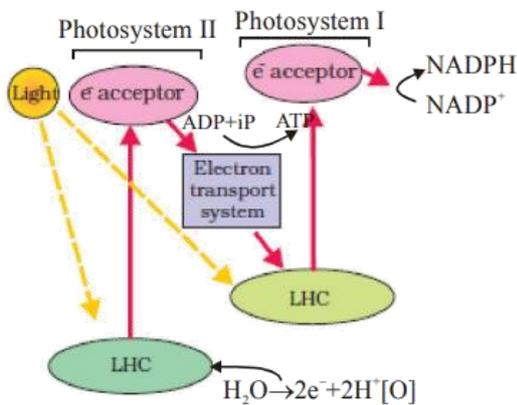
101. Light energy is not used directly or indirectly in following option:-
 (A) Splitting of H₂O
 (B) To develop proton gradient during photophosphorylation
 (C) CO₂ reduction in dark reaction
 (D) To develop proton gradient during oxidative phosphorylation

102. Which option is not correct with red drop event
 (A) Only cyclic photophosphorylation occur
 (B) PS II don't take part during this
 (C) It will occur if mono chromatic light supplied with less than 680 nm
 (D) Photosynthetic yield become less

103. Which event is not related with Z scheme:-
 (A) Splitting of H_2O (B) $NADP^+$ reduction
 (C) CO_2 reduction (D) ATP formation

104. Which one is not character of antennae:-
 (A) To make photosynthesis more efficient
 (B) To make wider range of absorption of incoming light
 (C) Provide electron to primary electron acceptor of photosystem
 (D) Reaction center is not part of it

105. Select the incorrect option for photochemical phase:-
 (A) Sun light energy is stored in form of bond energy
 (B) Hill reaction occur in this phase
 (C) Chemiosmotic process take place
 (D) It occur in granal lamellae only



Q. 106 to Q. 108 are related with above given figure.

106. This is called Z scheme because:-
 (A) Due to characteristic shape
 (B) All member are placed according to redox potential value
 (C) Splitting of H_2O take place here
 (D) PS II take participate first than PS I
107. Which one will have lower redox potential:-
 (A) LHC I
 (B) LHC II
 (C) Primary e^- acceptor of PS II
 (D) H_2O
108. Which option is incorrect about Z scheme:-
 (A) Z scheme is related with photochemical phase
 (B) It will be occur in stroma laemllae & grana lamellae both
 (C) H_2O is e^- donar and $NADP^+$ is final e^- acceptor
 (D) Enzyme required

109. Which are not correctly matched:-

- (A) Kranz anatomy - C_4 plant
 (B) Calvin cycle - C_3 cycle
 (C) Photo respiration - C_2 cycle
 (D) C_4 plant - Only C_4 cycle

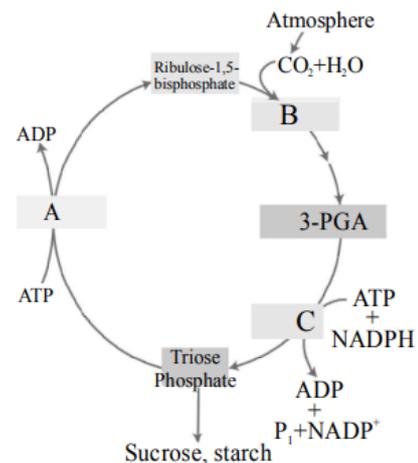
110. Which statement is not correct with photo phosphorylation:-

- (A) It occure in chloroplast and in mitochondira both
 (B) Non cyclic photo phosphorylation does not take place in stroma lamellae
 (C) ATP is product of photo phosphorylation
 (D) It follow chemiosmotic theory

111. Which option is not correct for chemiosmotic theory:-

- (A) ATP synthesis is linked with proton gradient
 (B) Break down of proto gradient releases energy
 (C) ATPase enzyme act as pump to break proton gradient
 (D) It is applicable for photo phosphorylation and oxidative phosphorylation

- 112.



Which one is not correct with given marks:-

- (A) B-carboxylation -fixation of CO_2 with aldose sugar
 (B) C-reduction - reverse of glycolysis
 (C) A-regeneration - reformation of pentose sugar
 (D) C-reduction - carbohydrate formation

113. Kranz anatomy is related with:-

- (A) C_4 pathway (B) C_3 cycle
 (C) C_2 cycle (D) CAM cycle

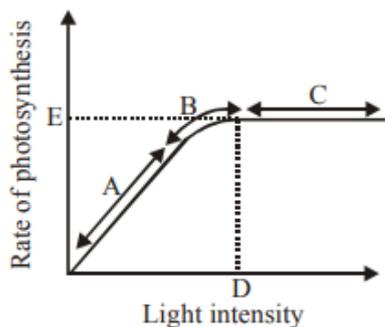
114. Which cell organells is not related with photorespiration:-

- (A) Mitochondria (B) Chloroplast
 (C) Glyoxysome (D) Peroxysome

115. What is the product of oxygenase activity of rubisco:-

- (A) Phosphoglycerate
- (B) Phosphoglycolate
- (C) (A) and (B) both
- (D) Phosphoglyceraldehyde

116. Which point show a rate limiting step in given figure:-



- (A) A
- (B) B
- (C) C
- (D) D

117. Which one is not correct for oxidation of food:-

- (A) It is multistep process
- (B) All released energy is trapped in form of ATP
- (C) Trapped energy is further used for bio synthesis of other molecules
- (D) Oxidisable compound is known as respiratory substrate

118. The condition which is not required for glycolysis:-

- (A) Partial oxidation of glucose
- (B) The presence of oxygen
- (C) Availability of NAD^+
- (D) Vigorous exercise of muscles

119. What will be the metabolic fate of pyruvic acid in absence of O_2 :-

- (A) Partial oxidation will take place
- (B) Complete oxidation
- (C) Utilization for reoxidation of NADH
- (D) Dependent on energy need

120. The function of hexokinase is:-

- (A) Phosphorylation to sugar
- (B) Oxidation of sugar
- (C) Dephosphorylation of sugar
- (D) Break down to sugar

121. In which step substrate level phosphorylation will take place:-

- (A) Glucose \rightarrow glucose-6-phosphate
- (B) 3-phosphoglycerate \rightarrow 2 phosphoglycerate
- (C) Phosphoenol pyruvate \rightarrow pyruvic acid
- (D) Glyceral dehyde 3-phosphate \rightarrow 1-3 bis phosphoglycerate

122. Which one is correct for glycolysis:-

- (A) Glucose is completely oxidized
- (B) Glucose is partially oxidized
- (C) It provide eight ATP during anaerobic respiration
- (D) Its key product is triose sugar

123. At how many step glycolysis can be regulated:-

- (A) One
- (B) Two
- (C) Three
- (D) Four

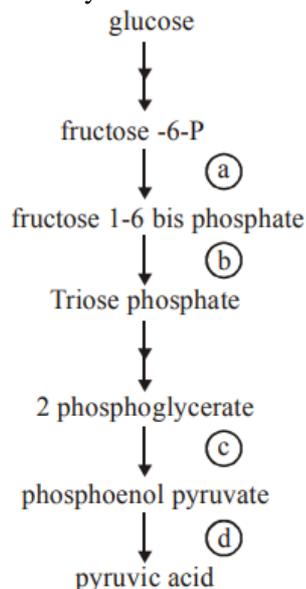
124. Which will not occur if O_2 is not available for respiration:-

- (A) Release of CO_2
- (B) Reduction of NAD
- (C) Krebs cycle
- (D) Glycolysis

125. Which step is key regulation step of glycolysis:-

- (A) Glucose \rightarrow glucose 6-phosphate
- (B) Fructose 6 phosphate \rightarrow fructose 1-6 bis phosphate
- (C) Phosphoenol pyruvate \rightarrow pyruvic acid
- (D) Triose phosphate \rightarrow 1-3 bis phosphoglycerate

126. Recognize the figure and find out the correct matching for enzyme:-



	a	b	c	d
(A)	Hexokinase	Enolase	Mutase	Pyruvate kinase
(B)	Phospho fructo kinase	Aldolase	Enolase	Mutase
(C)	Phospho fructo kinase	Aldolase	Enolase	Pyruvate kinase
(D)	Glucokinase	Phosphotransferase	mutuse	enolase

127. How many ATP are produced during glycolysis in anaerobic respiration:-

- (A) One
- (B) Two
- (C) Six
- (D) Eight

128. How many ATP are produced in mitochondria on complete oxidation of glucose:-

- (A) 24 (B) 30
(C) 34 (D) 38

129. If one triose phosphate completely oxidized inside prokaryotic cell than gain of ATP of energy equal to:-

- (A) 5 ATP (B) 4 ATP
(C) 20 ATP (D) 19 ATP

130. Which one is not correct for anaerobic respiration:-

- (A) Oxygen is not oxidizing agent
(B) gain of 2 ATP
(C) NADH is oxidized by a organic molecule
(D) Pyruvic acid is form acetyl Co-A

131. For which step plasma membrane of bacteria is functionally coordinated with mitochondria during respiration:-

- (A) Link reaction
(B) Glycolysis
(C) Oxidation of reducing power
(D) Krebs cycle

132. The molecule which enter in krebs cycle will have total carbon no:-

- (A) One (B) Two
(C) Three (D) Four

133. How many substrate level phosphorylation will take place in mitochondria on oxidation of glucose:-

- (A) One (B) Two
(C) Four (D) Five

134. Energy required to develop proton gradient during respiration comes from:-

- (A) Oxidation - process of NADH
(B) Oxidation - reduction process of CO₂ and NADH respectively
(C) From heat energy developed during respiration
(D) Oxidation - reduction process of NADPH and O₂ respectively

135. Which one respiratory complex is not part of ETS:-

- (A) Complex I (B) Complex II
(C) Complex IV (D) Complex V

ANSWER KEY

91. (A)
92. (A)
93. (C)
94. (C)
95. (D)
96. (D)
97. (A)
98. (B)
99. (C)
100.(D)
101.(D)
102.(C)
103.(C)
104.(C)
105.(D)
106.(A)

107.(C)
108.(B)
109.(D)
110.(A)
111.(C)
112.(A)
113.(A)
114.(C)
115.(C)
116.(A)
117.(B)
118.(B)
119.(C)
120.(A)
121.(C)
122.(B)

123.(C)
124.(C)
125.(B)
126.(C)
127.(B)
128.(C)
129.(C)
130.(D)
131.(C)
132.(B)
133.(B)
134.(A)
135.(D)

HINTS AND SOLUTIONS

91. (A)
92. (A)
NCERT Pg. No. 207
93. (C)
NCERT Pg. No. 207
94. (C)
95. (D)
96. (D)
97. (A)
NCERT Pg. No. 211
98. (B)
NCERT Pg. No. 210
99. (C)
100. (D)
101. (D)
102. (C)
103. (C)
NCERT Pg. No. 212
104. (C)
NCERT Pg. No. 211
105. (D)
NCERT Pg. No. 212, 213 Figure 13.6
106. (A)
NCERT Pg. No. 212
107. (C)
NCERT Pg. No. 212
108. (B)
NCERT Pg. No. 212
109. (D)
110. (A)
111. (C)
NCERT Pg. No. 215
112. (A)
NCERT Fig. 13.8
113. (A)
NCERT Pg. No. 218 Figure 13.8
114. (C)
NCERT Pg. No. 207
115. (C)
NCERT Pg. No. 207
116. (A)
NCERT figure 13.10
117. (B)
NCERT Pg. No. 227
118. (B)
119. (C)
120. (A)
121. (C)
122. (B)
123. (C)
124. (C)
125. (B)
126. (C)
127. (B)
128. (C)
129. (C)
130. (D)
131. (C)
132. (B)
133. (B)
134. (A)
135. (D)