Practice Test- 03

(CHEMISTRY)

Q.46 Which of the following orbital overlaps is involved in the formation of the carbon–carbon single bond in the molecule $HC\equiv C-CH=CH_2$

(A) $sp^3–sp^3$ (B) $sp^2–sp^3$

(C) $sp–sp^2$ (D) $sp^3–sp$

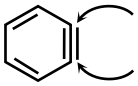
Q.47 Which of the following species (I), (II), (III), (IV) has an sp^2 hybridized carbon -

CH_3^+ CH_3^- $CH_3\cdot$ $:CH_2$

(I) **(II)** **(III)** **(IV)**

(A) (I) only (B) (I) and (II) only

(C) (I) and (III) only (D) (I), (III) and (IV)

Q.48 Hybridisation of arrow headed 'C' is 

(A) sp^2sp^3 (B) sp^3sp^3

(C) sp^2sp^2 (D) sp^3sp^3d

Q.49 Which of the following has a bond formed by overlap of $sp–sp^3$ hybrid orbital ?

(A) $CH_3–C\equiv CH$

(B) $CH_3–CH=CH–CH_3$

(C) $CH_2=CH–CH=CH_2$

(D) $CH\equiv CH$

Q.50 The maximum number of carbon atoms arranged linearly in the molecule

$CH_3–C\equiv C–\ CH=CH_2$ is -

(A) 5 (B) 4

(C) 3 (D) 2

Q.51 The inductive effect -

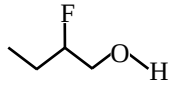
(A) implies the atom's ability to cause bond polarization

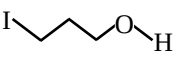
(B) increases with increase of distance

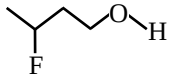
(C) implies the transfer of lone pair of electrons from more electronegative atom to the lesser electronegative atom in a molecule

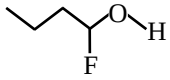
(D) implies the transfer of lone pair of electrons from lesser electronegative atom to the more electronegative atom in a molecule

Q.52 In which of the following compounds is hydroxylic proton the most acidic ?

(A) 

(B) 

(C) 

(D) 

Q.53 Decreasing – I power of given groups is -

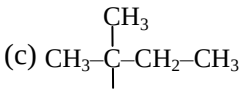
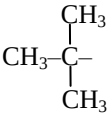
(a) –CN (b) $–NO_2$ (c) $–NH_2$ (d) –F

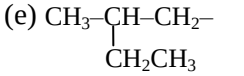
(A) b > a > d > c (B) b > c > d > a

(C) c > b > d > a (D) c > b > a > d

Q.54 Express in decreasing order of (+ I) -

(a) $CH_3CH_2–CH_2–$ (b) $CH_3–$

(c)  (d) 

(e) 

Correct answer is -

(A) (c) > (d) > (e) > (a) > (b)

(B) (d) > (a) > (b) > (c) > (e)

(C) (a) > (b) > (c) > (d) > (e)

(D) (a) > (b) > (c) > (e) > (d)

Q.55 Which among the given acid has lowest pKa value -

(A) Chloroacetic acid

(B) Bromoacetic acid

(C) Nitroacetic acid

(D) Cyanoacetic acid

Q.56 Arrange basicity of the given compounds in decreasing order -

(a) $CH_3 - CH_2 - NH_2$ (b) $CH_2 = CH - NH_2$

(c) $CH \equiv C - NH_2$

(A) a > b > c (B) a > c > b

(C) c > b > a (D) b > c > a

Q.57 Consider following acid

$ClCH_2COOH$, CH_3COOH, CH_3CH_2COOH

I II III

Correct order of their pH value

(A) III < II < I (B) I < II < III

(C) I < III < II (D) II < I < III

Q.58 Which is the correct order of increasing basicity ?

(A) $CH_3CH_2CH_3 < CH_3CH_2SH < CH_3CH_2OH < CH_3CH_2NH_2$

(B) $CH_3CH_2CH_3 < CH_3CH_2OH < CH_3CH_2SH < CH_3CH_2NH_2$

(C) $CH_3CH_2NH_2 < CH_3CH_2SH < CH_3CH_2OH < CH_3CH_2CH_3$

(D) $CH_3CH_2CH_3 < CH_3CH_2OH < CH_3CH_2NH_2 < CH_3CH_2SH$

Q.59 'M' effect is the resonance of -

(A) π electrons only

(B) σ electrons only

(C) π and σ both

(D) (+)ve and (-) charge.

Q.60 Which of the following contain + M but - I effect -

(A) O = CH – (B) $- NO_2$

(C) – Cl (D) $CH_3 -$

Q.61 The meta-directing power of the groups $-NH_2$, $-OCH_3$, $-C_6H_5$ and $- NO_2$ follows the order

(A) $-NH_2 > -OCH_3 > -C_6H_5 > -NO_2$

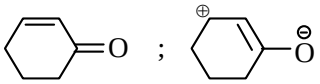
(B) $-NO_2 > -C_6H_5 > -OCH_3 > -NH_2$

(C) $-OCH_3 > -NH_2 > -C_6H_5 > -NO_2$

(D) $-OCH_3 > -NO_2 > -NH_2 > -C_6H_5$

Q.62 Which of the following pairs of structures do not represent resonating structures -

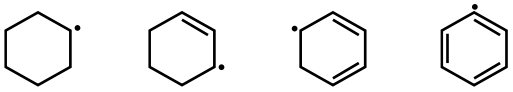
(A) $CH_3 - \overset{\overset{O}{\|}}{C} - CH_3$; $CH_3 - \overset{\overset{OH}{|}}{C} = CH_2$

(B)  ;

(C) $CH_3 - \overset{\overset{\oplus OH}{\|}}{C} - CH_3$; $CH_3 - \overset{\overset{\ddot{O}H}{|}}{\underset{\oplus}{C}} - CH_3$

(D) $CH_3 - \overset{\overset{\ddot{O}H}{|}}{\underset{\underset{O}{\|}}{C}} - \ddot{O}H$; $CH_3 - \overset{\overset{\oplus}{O}H}{\underset{\underset{\ominus O}{|}}{C}} = OH$

Q.63 Rank the following radicals in order of decreasing stability



I II III IV

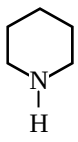
(A) III > II > I > IV

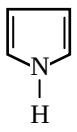
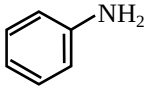
(B) III > II < I < IV

(C) II > III > II > IV

(D) III < II < I < IV

Q.64 Which of the following is the strongest base -

(A)  (B) 

(C)  (D) 

Q.65 Arrange in increasing order of basicity in Aqueous solution.

CH_3NH_2, $(CH_3)_2NH$, $C_6H_5NH_2$, $(CH_3)_3N$

(A) $(CH_3)_3N < (CH_3)_2NH < CH_3NH_2 < C_6H_5NH_2$

(B) Reverse of (A)

(C) $C_6H_5NH_2 < (CH_3)_3N < CH_3NH_2 < (CH_3)_2NH$

(D) Reverse of (C)

Q.66 Which of the following pairs represent resonating structures -

(A) $ClCH_2CH=CHCH_3$ and $CH_2=CH-\underset{\underset{Cl}{|}}{CH}-CH_3$

(B) $:\overset{\ominus}{C}H_2-\overset{\oplus}{N}\equiv N:$ and $CH_2=\overset{\oplus}{N}=\overset{\ominus}{\ddot{N}}$

(C) $CH_3-C\equiv N$ and $CH_3-N\rightleftharpoons C$

(D) All the above

Q.67 In following acid, the correct increasing order of acidic strength acid

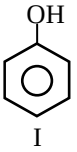
HCOOH, CH_3COOH, C_6H_5COOH

I II III

(A) I < II < III (B) II < I < III

(C) III < II < I (D) II < III < I

Q.68 Arrange their Acidic strength



I

H_2O CH_3OH

II III

(A) I > II > III (B) II > I > III

(C) III < II > I (D) II < III < I

Q.69 Arrange the following in Increasing of their basicity

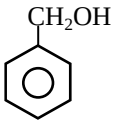
OH^-, CH_3COO^- Cl^-

I II III

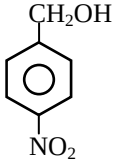
(A) III > II > (B) III < II < I

(C) II < III < I (D) II < III > I

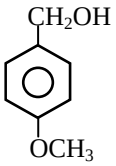
Q.70 Consider following benzyl alcohol



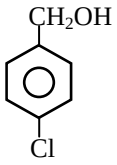
I



II



III



IV

Correct order of their K_b value is -

(A) III > IV > II > I (B) III > I > IV > II

(C) I < II < III < IV (D) IV > II > I > III

Q.71 Greater reactivity of 'H' is explained on the basis of -

(A) + M effect

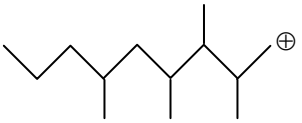
(B) conjugative effect

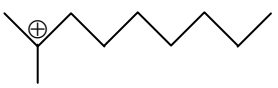
(C) Hyper conjugative effect

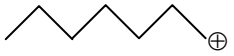
(D) – I effect

Q.72 Select the most stable carboncation among the following -

(A) 

(B) 

(C) 

(D) 

Q.73 Which of the following molecule has longest C = C bond length ?

(A) $CH_2 = C = CH_2$

(B) $CH_3-CH = CH_2$

(C) $CH_3-\underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}}-CH = CH_2$

(D) $CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle |}{C}} = CH_2$

Q.74 Correct order of reactivity -

(A)$CH_2=CH_2>CH_3—CH=CH_2>(CH_3)_2C=CH_2$

(B)$CH_2=CH_2>CH_3—CH=CH_2 < (CH_3)_2C=CH_2$

(C)$CH_2=CH_2<(CH_3)_2C=CH_2 < CH_3—CH=CH_2$

(D)$CH_3—CH=CH_2<CH_2=CH_2<\ (CH_3)_2C=CH_2$

Q.75 The order of stability of the following carbanion is :


(I)


(II)


(III)


(IV)

(A) I > II > III > IV (B) I > III > II > IV

(C) IV > III > II > I (D) III > IV > I > II

Q.76 Which among the following statement is wrong

(A) Cl–C bond is shorter in CH_2=CH–Cl than that in CH_3CH_2–Cl

(B) CH_2=CH–CH_2^+ is allylic carbocation

(C) C=C bond in CH_2= CH–Cl is shorter than in $CH_2=CH_2$

(D) Electromaric effect comes into play at the demand of attacking reagents

Q.77 Which statement is correct for electromeric effect

(1) It is a temporary effect

(2) It is the property of π bond

(3) It takes place in presence of reagent, i.e., electrophile or nucleophile

(4) All are correct

Q.78 Which of the following exhibit electromeric effect -

(A) alkanes (B) aldehydes

(C) alkyl halides (D) alkyl amines

Q.79 Shifting of electron of a multiple bond under the influence of a reagent is called -

(A) I–effect (B) M–effect

(C) E–effect (D) T–effect

Q.80 Homolytic fission of a hydrocarbon will liberate :

(A) Carbonium ions (B) carbanions

(C) free radicals (D) carbenes

Q.81 Heterolytic fission of carbon-chlorine bond produces :

(A) two free radicals

(B) two carbonium ions

(C) two carbanions

(D) one cation and one anion

Q.82 In CH_3CH_2OH, the bond that undergoes heterolytic cleavage most readily is -

(A) C—C (B) C—O (C) C—H (D) O—H

Q.83 Which among the following statements are correct ?

(1) Energy needed for homolytic bond fission is less than that required for the heterolytic bond fission

(2) Homolytic bond fission gives neutral species which is paramagnetic in character

(3) Energy needed for heterolytic bond fission is less than that required for the homolytic bond fission.

(4) Heterolytic bond fission takes place in non polar solvents

(A) Only 1 (B) 2 and 3

(C) 1 and 2 (D) 1, 2 and 4

Q.84 Which of the following statements is correct?

(A) + I group stabilised carbocation

(B) + I group destabilised carbocation

(C) – I group stabilised carbocation

(D) – I group destabilises carbanion

Q.85 Which of the following statements is wrong ?

(A) a tertiary free radical is more stable than a secondary free radical

(B) a secondary free radical is more stable than a primary free radical

(C) atertiary carbonium ion is more stable than a secondary carbonium ion

(D) a primary carbonium ion is more stable than a secondary carbonium ion

Q.86 Consider the following carbanions -

(a) $CH_3-\overset{\ominus}{C}H_2$ (b) $CH_2=\overset{\ominus}{C}H$

(c) $CH\equiv\overset{\ominus}{C}$

Correct order of stability of these carbanions in decreasing order is -

(A) a > b > c (B) b > a > c

(C) c > b > a (D) c > a > b

Q.87 The stability of given free radicals in decreasing order is -

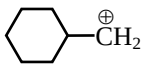
(a) $CH_3-\dot{C}H_2$ (b) $CH_3-\dot{C}H-CH_3$

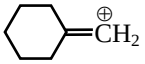
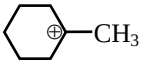
(c) $CH_3-\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{\dot{C}}}$ (d) $\dot{C}H_3$

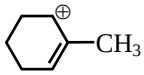
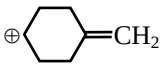
(A) c > d > a > b (B) a > b > c > d

(C) c > b > d > a (D) c > b > a > d

Q. 88 Following carbocation changes to more stable carbocation:



(A)  (B) 

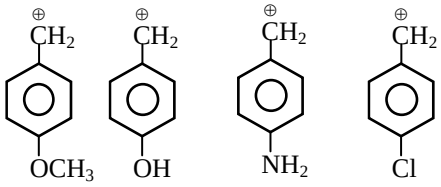
(C)  (D) 

Q.89 Carbon free radicals are -

(A) Diamagnetic (B) Paramagnetic

(C) Ferromagnetic (D) Non magnetic

Q.90 Arrange stability of the given carbocations in decreasing order :



I II III IV

(A) I > II > III > IV

(B) III > I > II > IV

(C) IV > I > II > III

(D) II > III > I > IV

Answer Key

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

Hint And Solution

46 **(C)** C forming the triple bond is sp hybridized while C forming the double bond is sp^2 hybridized:

47 **(D)** I, III and IV are Sp2 hybridised carbon in I, III and IV there are 3 bond pair and Zero lone pair but in II there are 3 bond pair and 1 lone pair, so sp3 hybridised

48 **(C)**

49 **(A)** carbon forming triple bond is sp hybridized, carbon forming single bond is sp3 hybridised.

50 **(B)** sp carbon is planar with 180 angle. Atom connected to sp carbon is also in same plane.

51 **(A)** Inductive effect cause bond polarization due to diff in electronegativity, and decrease with increase in distance

52 **(D)** strength of acidity is directly propotional to the stability of anion formed after removal of H+ ion

53 **(A)** -I order –NO2> -CN > -F > -NH2

54 **(A)** for same alkyl group, + I effect is directly proportional to the molecular mass and inversely proportional to branching.

55 **(C)** pka value is inversely proportional to the acidic strength.

56 **(A)** resonance stabilised the lone pair and decrease the elctron donation tendency and hence decrease basicity.

57 **(B)** Lower the pH value, more will be the acidity. Acidic strength is directly proportional to the –I effect

58 **(A)**

59 **(A)** Mesomeric effect is a type of resonance effect which involve delocalisation of pi electron.

60 **(C)**

61 **(B)** deactivating group which show –I effect or electron withdrawing tendency are meta- directing group

62 **(A)** in A both are not canonical structure but are tautomers of each other.

63 **(A)** stability of free radical is directly proportional to the alpha hydrogen and resonance in free radical.

64 **(A)** aliphatic amines are more basic than aromatic amine. So A is more basic

65 **(C)**

66 **(B)**

67 **(D)** acidic strength of an acid is directly proportional to –I effect and inversely propotional to +I effect.

68 **(D)** in this case find the stability of anion formed after loosing H+ ion more stable anion , more will be stability

69 **(B)** more stable anion less basic

70 **(B)** Kb value is inversely proportional to the acidic strength

71 **(C)**

72 **(C)** c option is more stable because in this option carbocation have maximum number of alpha hydrogen, stability of carbocation is directly proportional to the alpha hydrogen.

73 **(D)**

74 **(A)** more stable alkene is less reactive, and stability of alkene is directly proportional to the alpha hydrogen, more tha alpha hydrogen more stable alkene is and less reactive

75 **(D)** III is aromatic and most stable, IV is resonance stabilised, I is 1 dgree more stable than II 2 degree.

76 **(C)** C=C bond in CH2= CH–Cl is shorter than in CH2=CH2. Because in CH2= CH–Cl backbonding due to chlorine decrease double bond character

77 **(D)**

78 **(B)**

79 **(C)** Shifting of electron of a multiple bond under the influence of a reagent is called –Electromeric – effect

80 **(C)** Heterolytic fission formed carbocation and carboanion, due to electronegative diff. but in

homolytic fission there is no diff in electronegative between atoms and hence free radical is formed.

81 **(D)** Heterolytic fission of any two elements always create one anion and one cation.

82 **(D)** breaking of O-H bond is easy because the intermediate formed after breaking , i.e ethoxide ion and H+ ion are comparatively more stable.

83 **(B)**

84 **(A)** carbocation is stabilised by +I effect and carbanion is stabilised by –I effect.

85 **(D)** stability order of Carbocation- 3>2>1

Stability order of carbanion – 1>2>3

86 **(C)** negative charge is more stable on more electronegative element, E.N. is directly propotional to % s character. EN- sp > sp2 > sp3

87 **(D)** more alpha hydrogen more stable free radical

88 **(B)** given carbocation is changes to B by doing 1-2 hydride shift and make carbocation 3 degree which is more stable.

89 **(B)**

90 **(B)** stability of carbocation is directly proportional to +m effect at para positon

Practice Test- 03

91. In ……year Priestley discovered oxygen-
(A) 1774 (B) 1770
(C) 1733 (D) 1804

92. Only green plants that could release oxygen, this work is done by-
(A) Priestley (B) Ingenhousz
(C) Von Sach (D) Van Neil

93. Find out the incorrect statement from the following-
(A) Dark reaction depends on the product formed by light reaction.
(B) In stroma, enzymatic reactions incorporates CO_2 into the plant leading to the synthesis of sugar.
(D) Purple and green sulphur bacteria use H_2S as hydrogen donor.
(D) There is no division of labour in chloroplast.

94. Light reaction and photochemical phase includes-
(A) Light absorption
(B) Water splitting and release of oxygen
(C) ATP and NADPH formation
(D) All of these

95. Which of the following is incorrect about photosystem?
(A) There are two photosystem (PS I and PS II).
(B) PS I and PS II are named in sequence of their discovery.
(C) LHC is made up of hundred of pigment molecules which are bounded proteins.
(D) Each photosystem has all the pigments (Except one molecule of chlorophyll 'b').

96. At high light intensity, small increase in CO2 concentration can show effect on photosynthesis in C_3 plant is-
(A) no effect (B) increase
(C) first increase than decrease
(D) decrease

97. In Z-scheme, Z-shape is formed when-
(A) Carriers are placed uphill
(B) Carriers are placed downhill
(C) Carriers are placed in sequence on a redox potential scale
(D) None of the above

98. Where water splitting complex associated with PS II is situated?
(A) Inner side of chloroplast outer membrane
(B) Inner side of thylakoid membrane
(C) Outer side of thylakoid membrane
(D) Inner side of chloroplast outer membrane

99. Where are the protons and O_2 formed likely to be released?
(A) Lumen of thylakoid
(B) Outside of thylakoid membrane
(C) In stroma
(D) None of these

100. The place where cyclic flow of electrons occur-
(A) Thylakoid of grana
(B) Stroma
(C) Stroma lamellae
(D) All of these

101. Stroma lamellae lacks all except-
(A) PS II
(B) NADP reductase
(C) PS I
(D) Water splitting complex

102. Which of the following is incorrect about cyclic photophosphorylation?
(A) Only PS I is involved.
(B) It occurs only when light of wavelength beyond 680 nm is available
(C) Only synthesis of ATP occurs.
(D) Synthesis of NADPH + H^+occurs.

103. During light reaction-
(A) pH of stroma -es
(B) pH of lumen -es
(C) pH of lumen -es
(D) pH of stroma has no effect

104. Which acts as a transmembrane channel?
(A) F_0 of ATPase (B) F_1 of ATPase
(C) Both (A) and (B) (D) None of these

105. Chemiosmosis requires-
(A) Membrane (B) Proton pump
(C) Proton gradient (D) All of these

106. Which type of phosphorylation takes place in photosynthesis?
(A) Cyclic (B) Non-cyclic
(C) Both (A) and (B) (D) None of these

107. Photosynthetic pigments in chloroplast are embedded in the membrane of-
(A) Thylakoids (B) Photoglobin
(C) Matrix
(D) Envelope of chloroplast

108. Low PH present in Mitochondria –
(A) Thylakoid lumen
(B) Intermembrane space
(C) Matrix
(D) Cytoplasm

109. Which of the following wavelength occurs in red part of the spectrum?
(A) 470 nm (B) 390 nm
(C) 680 nm (D) 830 nm

110. The process for which manganese and chloride ions are required in-
(A) Photolysis of water
(B) For transfer of H+ ion to NADP
(C) For transfer of charge of hydroxyl ion to chlorophyll
(D) None of the above

111. What is the absorption maxima of P-700?
(A) 700 Å (B) 683 nm
(C) 700 cm (D) 700 nm

112. Biosynthetic phase of life uses all except _____ that is produced in photochemical phase-
(A) ATP (B) NADPH
(C) O_2 (D) None of these

113. If light is available for a given duration and then again made unavailable, the biosynthetic process will-
(A) Continue for long duration
(B) Continue for unlimited time
(C) Continue for short duration
(D) Will stop immediately

114. The similarity between C_3 and C_4 pathway is-
(A) Both are equally efficient.
(B) Organic acid is formed as the first product of CO_2 fixation.
(C) Both requires one type of cell to occur.
(D) Both takes place in all the plants.

115. Which pathway takes place in all photosynthetic plant?
(A) C_3 (B) C_4
(C) Both (A) and (B) (D) None of these

116. Which process of Calvin cycle requires RuBP?
(A) Carboxylation (B) Reduction
(C) Regeneration (D) None of these

117. Reduction process of Calvin cycle requires how many ATP and NADPH for the reduction of one molecule of CO_2?
(A) 2 mole ATP and 3 mole NADPH
(B) 2 mole ATP and 2 mole NADPH
(C) 1 mole ATP and 2 mole NADPH
(D) 3 mole ATP and 2 mole NADPH

118. How many moles of ATP is required to regenerate one mole of RuBP?
(A) 1 (B) 2
(C) 3 (D) 4

119. Which of the following not occur when light higher than 680nm fall on leaf–
(A) PS I become active
(B) Photolysis of water occur
(C) Low PH develop inside lumen of thylakoid
(D) ETS is functional

120. In C_4 plants, CO_2 combines with PEP in the presence of-
(A) PEP carboxylase
(B) RuBP carboxylase
(C) RuBP oxygenase
(D) Hydrogenase

121. Which of the following plant will show increase in photosynthesis when CO_2 conc. Increase in environment-
(A) tomato and brinjal
(B) sugarcane and artiplex
(C) maize and sorghum
(D) all

122. How many Calvin cycle forms one hexose molecule?
(A) 2 (B) 6
(C) 4 (D) 8

123. In which plant Calvin experimented the radioactive isotopy to discover the stable product of C_3 cycle?
(A) Chlorella (B) Cycas
(C) Carrot (D) Tobacco

124. Mesophyll chloroplast of which plant alone is capable of synthesizing starch or sucrose?
(A) C_3 plant (B) C_4 plant
(C) Both (A) and (B)
(D) Neither C_3 nor C_4

125. The enzymes of dark reaction in C_4 plants are found in-
(A) Bundle sheath chloroplast
(B) Mesophyll chloroplast ,
(C) Both (A) and (B)
(D) None of these

126. In C_4 plants, the mesophyll cells are connected with bundle sheath cells with the help of-
(A) Cytoplasmic connection
(B) Special connecting tissues
(C) Plasmodesmata
(D) Connection is not essential

127. Which one is a C_4 plant?
(A) Papaya (B) Pea
(C) Potato (D) Maize

128. Which of the following occur in C-3 plant not in C-4 plant-
(A) Calvin cycle
(B) photorespiration
(C) C-4 cycle
(D) light reaction

129. The first reaction in photorespiration is-
(A) Carboxylation
(B) Decarboxylation
(C) Oxygenation
(D) Phosphorylation

130. Which of the following is correct about photorespiration?
(A) Wasteful process
(B) ATP is utilized
(C) Release of CO_2
(D) All of these

131. During photorespiration-
(A) RuBisCO binds with O_2
(B) Phosphoglycerate and phosphoglycolate is formed
(C) Sugar is not synthesized
(D) All the above

132. Photorespiration does not take place in C_4 plant because-
(A) O_2 is not released in C_4 plant during photosynthesis.
(B) Intracellular concentration of CO_2 is high in bundle sheath and it ensures RuBisCO function as carboxylase.
(C) They are found in cold environment.
(D) Stomata in them opens during night.

133. Photorespiration takes place in-
(A) Chloroplast, mitochondria
(B) Mitochondria, peroxisome
(C) Chloroplasts, peroxisome, mitochondria
(D) Chloroplasts, cytoplasm, Mitochondria

134. The number of carboxylation in C4 cycle is/are-
(A) 1 (B) 2
(C) 5 (D) 3

135. Kranz type of anatomy is found in-
(A) C_2 plants (B) C_3 plants
(C) C_4 plants (D) CAM plants

ANSWERS KEY

91. (A)
92. (B)
93. (D)
94. (D)
95. (D)
96. (A)
97. (C)
98. (B)
99. (A)
100. (C)
101. (C)
102. (D)
103. (C)
104. (A)
105. (D)
106. (C)
107. (A)
108. (B)
109. (C)
110. (A)
111. (D)
112. (C)
113. (C)
114. (B)
115. (A)
116. (A)
117. (B)
118. (A)
119. (B)
120. (A)
121. (A)
122. (B)
123. (A)
124. (A)
125. (C)
126. (C)
127. (D)
128. (C)
129. (C)
130. (D)
131. (D)
132. (B)
133. (C)
134. (B)
135. (C)

Hints and Solutions

91. (A)
NCERT Pg.No-207
Joseph Priestley (1733-1804) in 1770 performed a series of experiments that revealed the essential role of air in the growth of green plants. Priestley, discovered oxygen in 1774.

92. (B)
NCERT Pg.No-207
Ingenhousz in an elegant experiment with an aquatic plant showed that in bright sunlight, small bubbles were formed around the green parts while in the dark they did not. Later he identified these bubbles to be of oxygen. Hence he showed that it is only the green part of the plants that could release oxygen

93. (D)
NCERT Pg.No-209
Within the chloroplast there is membranous system consisting of grana, the stroma lamellae, and the matrix stroma (Figure 13.2). There is a clear division of labour within the chloroplast.

94. (D)
NCERT Pg.No-211
Light reactions or the 'Photochemical' phase include light absorption, water splitting, oxygen release, and the formation of high-energy chemical intermediates, ATP and NADPH.

95. (D)
NCERT Pg.No-211
Each photosystem has all the pigments (except one molecule of chlorophyll a) forming a light harvesting system also called antennae (Figure 13.4).

96. (A)
NCERT Pg.No-222
At higher light intensities, gradually the rate does not show further increase as other factors become limiting (Figure 13.10).

97. (C)
NCERT Pg.No-212
This whole scheme of transfer of electrons, starting from the PS II, uphill to the acceptor, down the electron transport chain to PS I, excitation of electrons, transfer to another acceptor, and finally down hill to $NADP^+$ reducing it to $NADPH + H^+$ is called the Z scheme, due to its characterstic shape (Figure 13.5). This shape is formed when all the carriers are placed in a sequence on a redox potential scale.

98. (B)
NCERT Pg.No-213
Since splitting of the water molecule takes place on the inner side of the membrane.

99. (A)
NCERT Pg.No-213
Since splitting of the water molecule takes place on the inner side of the membrane, the protons or hydrogen ions that are produced by the splitting of water accumulate within the lumen of the thylakoids.

100. (C)
NCERT Pg.No-213
A possible location where this could be happening is in the stroma lamellae

101. (C)
NCERT Pg.No-213
The membrane or lamellae of the grana have both PS I and PS II the stroma lamellae membranes lack PS II as well as NADP reductase enzyme.

102. (D)
NCERT Pg.No-213
The cyclic flow hence, results only in the synthesis of ATP, but not of $NADPH + H^+$

103. (C)
NCERT Pg.No-214

Within the chloroplast, protons in the stroma decrease in number, while in the lumen there is accumulation of protons. This creates a proton gradient across the thylakoid membrane as well as a measurable decrease in pH in the lumen.

104. (A)
NCERT Pg.No-215
The ATP synthase enzyme consists of two parts: one called the CF_0 is embedded in the thylakoid membrane and forms a transmembrane channel that carries out facilitated diffusion of protons across the membrane

105. (D)
NCERT Pg.No-215
Chemiosmosis requires a membrane, a proton pump, a proton gradient and ATP synthase

106. (C)
NCERT Pg.No-212 and 216

107. (A)
NCERT Pg.No-214
Figure 13.7

108. (B)
NCERT Pg.No-213
There is one difference though, here the proton accumulation is towards the inside of the membrane, i.e., in the lumen. In respiration, protons accumulate in the intermembrane space of the mitochondria when electrons move through the ETS

109. (C)
NCERT Pg.No-211
In photosystem II the reaction centre chlorophyll a absorbs 680 nm wavelength of red light causing electrons to become excited and jump into an orbit farther from the atomic nucleus.

110. (A)
NCERT Pg.No-198

111. (D)
NCERT Pg.No-211
In PS I the reaction centre chlorophyll a has an absorption peak at 700 nm,

112. (C)
NCERT Pg.No-215
The products of light reaction are ATP, NADPH and O_2 . Of these O_2 diffuses out of the chloroplast while ATP and NADPH are used to drive the processes leading to the synthesis of food, more accurately, sugars. This is the biosynthetic phase of photosynthesis.

113. (C)
NCERT Pg.No-215
Immediately after light becomes unavailable, the biosynthetic process continues for some time, and then stops. If then, light is made available, the synthesis starts again.

114. (B)
NCERT Pg.No-216
Experiments conducted over a wide range of plants led to the discovery of another group of plants, where the first stable product of CO_2 fixation was again an organic acid,

115. (A)
NCERT Pg.No-220
the basic pathway that results in the formation of the sugars, the Calvin pathway, is common to the C_3 and C_4 plants.

116. (A)
NCERT Pg.No-216
Carboxylation is the most crucial step of the Calvin cycle where CO_2 is utilised for the carboxylation of RuBP.

117. (B)
NCERT Pg.No-217
2 molecules of ATP for phosphorylation and two of NADPH for reduction per CO_2 molecule fixed.

118. (A)
NCERT Pg.No-217
The regeneration steps require one ATP for phosphorylation to form RuBP.

119. (B)

NCERT Pg.No-212

We need to emphasise here that the water splitting complex is associated with the PS II.

120. (A)

NCERT Pg.No-219

The primary CO_2 acceptor is a 3-carbon molecule phosphoenol pyruvate (PEP) and is present in the mesophyll cells. The enzyme responsible for this fixation is PEP carboxylase or PEPcase.

121. (A)

NCERT Pg.No-218

C4 plants are special: They have a special type of leaf anatomy, they tolerate higher temperatures, they show a response to high light intensities, they lack a process called photorespiration and have greater productivity of biomass

122. (B)

NCERT Pg.No-219

The fixation of six molecules of CO_2 and 6 turns of the cycle are required for the formation of one molecule of glucose from the pathway.

123. (A)

NCERT Pg.No-214

The use of radioactive ^{14}C by him in algal photosynthesis studies led to the discovery that the first CO_2 fixation product was a 3-carbon organic acid

124. (A)

NCERT Pg.No-220

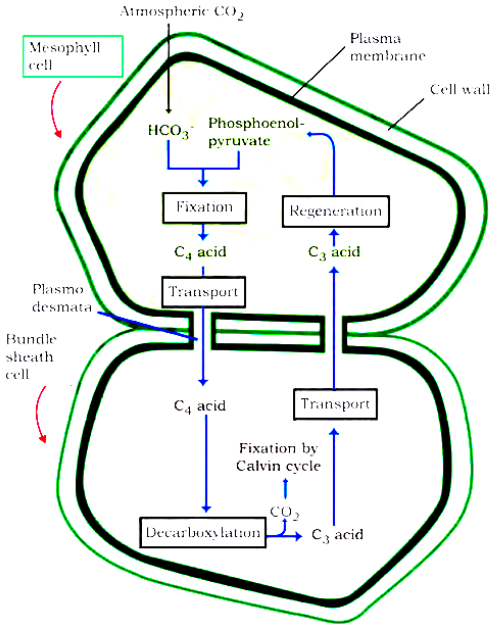
the Calvin pathway occurs in all the mesophyll cells of the C_3 plants. In the C_4 plants it does not take place in the mesophyll cells but does so only in the bundle sheath cells.

125. (C)

NCERT Pg.No-219 ; Fig.13.9

126. (C)

NCERT Pg.No-219



127. (D)

NCERT Pg.No-218

leaves of C_4 plants – maize or sorghum

128. (C)

NCERT Pg.No-220

In C_4 plants photorespiration does not occur.

129. (C)

NCERT Pg.No-220

In C_3 plants some O_2 does bind to RuBisCO, and hence CO_2 fixation is decreased. Here the RuBP instead of being converted to 2 molecules of PGA binds with O_2 to form one molecule of phosphoglycerate and phosphoglycolate (2 Carbon) in a pathway called photorespiration

130. (D)

NCERT Pg.No-220

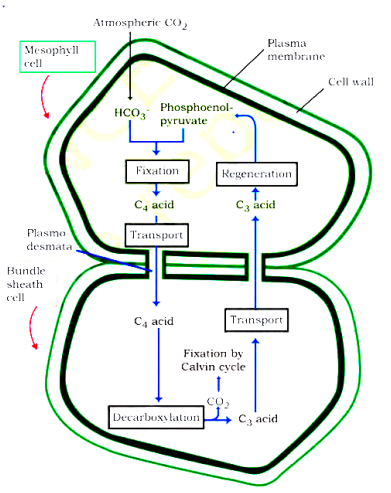
In the photorespiratory pathway, there is neither synthesis of sugars, nor of ATP. Rather it results in the release of CO_2 with the utilisation of ATP

131. (D)
NCERT Pg.No-220

132. (B)
NCERT Pg.No-220
In C_4 acid from the mesophyll is broken down in the bundle sheath cells to release CO_2 – this results in increasing the intracellular concentration of CO_2 . In turn, this ensures that the RuBisCO functions as a carboxylase minimising the oxygenase activity. In turn, this ensures that the RuBisCO functions as a carboxylase minimising the oxygenase activity.

133. (C)
It takes place in chloroplast and uses peroxisome and mitochondria.

134. (B)
NCERT Pg.No-209



13.9 Diagrammatic representation of the Hatch and Slack Pathway

135. (C)
NCERT Pg.No-218
The particularly large cells around the vascular bundles of the C_4 plants are called bundle sheath cells, and the leaves which have such anatomy are said to have ‘Kranz’ anatomy.

Practice Test- 03

136. Which of the following statements is false?
(A) PO_2 is the major factor which effect the binding of CO_2 with hemoglobin
(B) PCO_2 is low and PO_2 is high as in the tissues, more binding of CO_2 with Hb occurs
(C) RBC contains a very high conc. Of carbonic anhydrase and minute quantities of the same in the plasma
(D) Every 100ml of deoxygenated blood delivers approximately 4 ml of CO_2 to the alvoli

137. Which of the following equation is correct?
(A) $CO_2 \rightarrow H_2CO_3 \rightarrow HCO_3^- + H^+$
(B) $CO_2 + H_2O \overset{carbonic\ anhydrase}{\rightleftarrows} H_2CO_3 \overset{carbonic\ anhydrase}{\rightleftarrows} H^+ + HCO_3^-$
(C) $CO_2 + H_2O \rightarrow CH_4 + 2O_2$
(D) $CO_2 + H_2O \rightleftarrows CO + H_2O_2$

138. Respiratory process is regulated by certain specialized centres in the brain. One of the following listed centres can reduce the inspiratory duration upon stimulation
(A) Medullary inspiratory centre
(B) Pneumotaxis centre
(C) Chemosynthetic centre
(D) Apneustic centre

139. The largest proportion of CO_2 carried by blood is in the form of
(A) Molecular CO_2 dissolved in the plasma
(B) Bicarbonates (HCO_3^-) carried within RBCs
(C) HCO_3^- carried in the plasma
(D) Molecular CO_2 chemically bound to hemoglobin

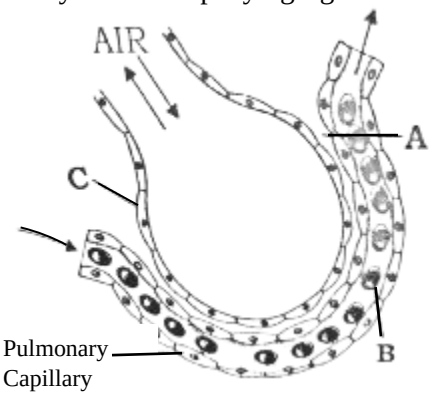
140. The breathing centre initiated ventilation in response to
(A) A decrease in air pressure
(B) A decrease in O_2
(C) An increase in CO_2
(D) The rate of gas exchange in the alveoli

141. All of the following factors play role in the regulation of respiratory rhythm except
(A) CO_2
(B) H^+ conc.
(C) O_2
(D) None of these

142. Receptors associated with aortic arch and carotid artery can recognize changes in……and……..conc. and send necessary signal to……for remedial action
(A) O_2, CO_2, Pneumothorax
(B) CO_2, H^+, rthythm centre
(C) CO_2, H^+, apneustic centre
(D) O_2, H^+, Pneumothorax

143. Which of the following equation is correct?
(A) $Hb + O_2 \overset{Association\ (in\ tissue)}{\underset{dissociation(in\ lungs)}{\rightleftarrows}} HbO_2$
(B) $Hb + O_2 \overset{dissociation\ (in\ lungs)}{\underset{Association(in\ tissue)}{\rightleftarrows}} HbO_2$
(C) $HbO_2 \overset{Dissociation(in\ tissue)}{\underset{Association(in\ lungs)}{\rightleftarrows}} Hb + O_2$
(D) $HbO_2 \overset{Association(in\ lungs)}{\underset{dissociation(in\ tissue)}{\rightleftarrows}} Hb + O_2$

144. Study the accompanying figure



Identify A to C

	A	B	C
(A)	Basement substance	RBC	Alveolar wall
(B)	O_2	CO_2	Alveolar O_2
(C)	Pleura	RBC	Pericardium
(D)	Pleura	WBC	Pulmonary vein

145. The barrier between the air in alveolus and blood in pulmonary capillary consists of 3 layers and its total thickness
(A) 1mm
(B) more than 1mm
(C) much less than 1mm
(D) 2mm

146. Respiration involving following steps
I. Diffusion of gases O_2 and CO_2 across alveolar membrane
II. Transport of gases by blood
III. Utilization of O_2 by cell for catabolic reactions and 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 blood and tissues

The correct sequence of steps is
(A) I→II→III→IV→V
(B) V→IV→III→II→I
(C) III→V→II→I→IV
(D) III→II→V→I→IV

147. CO_2 is transported
(A) By RBC
(B) As bicarbonate
(C) In a dissolved state through plasma
(D) All

148. Blood carries the CO_2 in 3 forms. The correct percentage of CO_2 in these forms are

	As carbinohaemo-globin in RBC	As bicarbonates	Dissolved form in plasma
(A)	20-25%	70%	7%
(B)	70%	20-25%	7%
(C)	20-25%	7%	70%
(D)	7%	20-25%	70%

149. Additional muscles for forceful breathing are
(A) Diaphragm and external intercostals muscles
(B) Abdominal muscles and internal intercostals muscles
(C) Diaphragm and abdominal muscles
(D) External and internal intercostals muscles

150. Match the following

Column-A		Column-B	
1	Tidal volume	a	Tidal volume and inspiratory reserve volume and expiratory reserve volume
2	Residual volume	b	Additional amount of air inhaled beyond tidal volume when taking a very deep breath
3	Expiratory reserve volume	c	Amount of air remaining in lungs after expiratory reserve volume is expelled
4	Inspiratory reserve volume	d	Tidal volume and inspiratory reserve volume
5	Inspiratory capacity	e	Volume of air in one volume
6	Vital capacity	f	Amount of air exhaled in forced exhalation

(A) 1-c, 2-e, 3-b, 4-f, 5-d, 6-a
(B) 1-e, 2-f, 3-c, 4-b, 5-a, 6-d
(C) 1-e, 2-c, 3-f, 4-b, 5-d, 6-a
(D) 1-e, 2-c, 3-b, 4-f, 5-a, 6-d

151. Arrange the following in order of increasing volume
1. Tidal volume
2. Residual volume
3. Expiratory reserve volume
4. Vital capacity

(A) 1 < 2 < 3 < 4 (B) 1 < 4 < 3 < 2
(C) 1 < 3 < 2 < 4 (D) 1 < 4 < 2 < 3

152. Air entering lung is
1. Warmed 2. Filtered
3. Deprived of some oxygen
4. Enriched with CO_2

What is true?
(A) 1, 2, 3 and 4 (B) 1 and 2
(C) 2 and 4 (D) 2 and 3

153. Different respiratory volumes are given below
I. Tidal volume = 500 ml
II. Residual volume = 1000 ml
III. Inspiratory reserve volume = 2500ml
IV. Expiratory Reserve volume = 1000 ml

The functional residual capacity (FRC) is
(A) 3500 ml (B) 2000 ml
(C) 600 ml (D) 3000 ml

154. Expiratory capacity is equal to
(A) TV + ERV (B) ERV + IRV
(C) ERV + RV (D) IRV + RV

155. The part starting with the external nostrils upto the terminal bronchioles constitute the
(A) Respiratory or exchange part of respiratory system
(B) Inspiratory part
(C) Conducting part
(D) Expiratory part

156. Respiratory or exchange part of the respiratory system consists of
(A) The parts starting with external nostrils upto terminal bronchioles
(B) Alveoli and their ducts
(C) All bronchi and terminal bronchioles
(D) All bronchioles

157. The chambered formed dorsally by the vertebral column, ventrally by sternum, laterally by ribs and on the lower side by dome-shaped diaphragm is
(A) Abdominal cavity
(B) Thoracic cavity
(C) Pelvic cavity
(D) Cranial cavity

158. The lungs expand in inspiration/inhalation because
(A) Diaphragm contracts upward
(B) The volume of thoracic cavity increases
(C) External intercostals muscles relax
(D) Diaphragm relaxes

159. Which of the following statement about the mechanism of ventilation/breathing is false?
(A) As the diaphragm relaxes, air is expelled from the respiratory system
(B) During inspiration the lungs act as suction pump
(C) Inspiration is a passive and expiration is an active process
(D) For quit breathing external intercostals muscles and diaphragm play an important role

160. Inspiration occurs when there is a negative pressure in the lungs with respect to atmospheric pressure. This negative pressure is 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 the atmospheric pressure
(D) Intrapleural pressure becomes more than the intra-alveolar pressure

161. Which of the following sequences is correct to initiate inspiration?

I. The contraction of external intercostals muscles raises the ribs and sternum
II. Volume of thorax increases in the dorso-ventral axis
III. Intrapulmonary pressure decreases
IV. Diaphragm contraction
V. Air rushes into lungs
VI. Volume of thorax increases in the anterior-posterior axis

(A) I, II, IV, V, III,VI
(B) I, II, III, IV, V
(C) I, II, IV, VI, III, V
(D) VI, V, I, II, III, IV

162. Lacteals take part

(A) Digestion of milk
(B) Absorption of fat/fatty acids and glycerol
(C) Digestion of lactic acid
(D) None of these

163. Enterokinase/enteropeptidase takes part in conversion of

(A) Pepsinogen to pepsin
(B) Trypsinogen to trypsin
(C) Protein into polypeptides
(D) Caseinogen into casein

164. Optimum pH for enzyme trypsin is

(A) 5.9 (B) 4.6
(C) 8.5 (D) 7.0

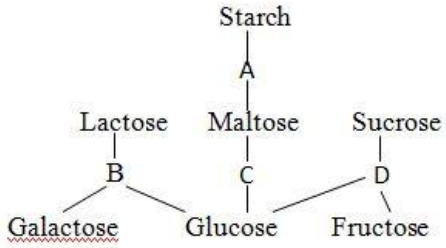
165. First step in digestion of fat is

(A) Emulsification (B) Enzyme action
(C) Absorption by lacteals
(D) Storage in adipose tissue

166. Point out the wrong enzymatic reaction

(A) Sucrose $\xrightarrow{Invertase}$ Glucose + Fructose
(B) Lactose $\xrightarrow{Lactase}$ Glucose + Fructose
(C) Pepsinogen $\xrightarrow{Hcl}$ Pepsin
(D) Maltose $\xrightarrow{Maltase}$ Glucose + Glucose

167. Identify enzymes a, b, c and d in digestion of carbohydrates



(A) A-Amylase, B-Invertase, C-Maltase, D-Lactase
(B) A-Amylase, B-Lactose, C-Maltase, D-Invertase
(C) A-Amylase, B-Maltase, C-Lactase, D-Invertase
(D) A-Amylase, B-Maltase, C-Invertase, D-Lactase

168. Which of the following lists the four stages of food processing in order?

(A) Ingestion, digestion, absorption, elimination
(B) Digestion, ingestion, absorption, elimination
(C) Ingestion, absorption, elimination, digestion
(D) Ingestion, digestion, elimination, absorption

169. Which of the following statements is true regarding digestion and absorption of food in humans?

(A) Glucose and some amino acids are absorbed through intestinal mucosa with the help of carrier ions like Na^+
(B) Chylomicrons are small lipoprotein particles that are transported from intestine into blood capillaries
(C) About 60% of starch in hydrolysed by salivary amylase in our mouth
(D) Oxyntic cells in our stomach secrete the pro-enzyme

170. Digestion of proteins begins in the…….and digestion of polysaccharide begins in the……..
(A) Mouth……stomach
(B) Stomach……small intestine
(C) Stomach……..mouth
(D) Stomach……..stomach

171. Most of the chemical digestion of food in humans is completed in the
(A) Small intestine (B) Appendix
(C) Ascending colon (D) Stomach

172. Which function of the liver results in the production of bile pigments?
(A) Breakdown of haemoglobin
(B) Deamination of amino acids
(C) Detoxification of metabolic poisons
(D) Release of store vitamin A

173. Vermiform appendix is made up of
(A) Digestion tissue
(B) Respiratory tissue
(C) Excretory tissue
(D) Lymphatic tissue

174. Bile acids in digestion and absorption of fats because it contains
(A) Lipase (B) Bile salts
(C) Bile pigments (D) All of the above

175. Number of salivary glands present in human being is
(A) 5 pairs (B) 3 pairs
(C) 4 pairs (D) 2 pairs

176. Parotids glands are located below
(A) Eye
(B) Tongue
(C) Floor of mouth
(D) In cheek near ear

177. In adult human liver weighs
(A) 2 kg (B) 2-3 kg
(C) 500 g (D) 1.2 to 1.5 kg

178. Liver is situated in
(A) Thoracic cavity
(B) Above the thoracic cavity
(C) In abdominal cavity below diaphragm
(D) In abdominal cavity above diaphragm

179. Find out the correct match

Column-I		**Column-II**	
a	Hepatic lobule	i	Base of villi
b	Crypts of leiberkuhn	ii	Glisson's capsule
c	Sphincter of Oddi	iii	Gall bladder
d	Cystic duct	iv	Hepato-pancreatic duct

(A) a-ii, b-i, c-iv, d-iii
(B) a-i, b-ii, c-iv, d-iii
(C) a-i, b-ii, c-iii, d-iv
(D) a-iv, b-iii, c-ii, d-i

180. Function of gall bladder is
(A) Storage of bile
(B) Secretion of bile
(C) Formation of digestive enzyme
(D) Formation of bile salts

ANSWER KEY

136. (B)
137. (B)
138. (B)
139. (C)
140. (C)
141. (C)
142. (B)
143. (C)
144. (A)
145. (C)
146. (C)
147. (D)
148. (A)
149. (B)
150. (C)
151. (C)
152. (B)
153. (B)
154. (A)
155. (C)
156. (B)
157. (B)
158. (B)
159. (C)
160. (A)
161. (C)
162. (B)
163. (B)
164. (C)
165. (A)
166. (B)
167. (B)
168. (A)
169. (A)
170. (C)
171. (A)
172. (A)
173. (D)
174. (B)
175. (B)
176. (D)
177. (D)
178. (C)
179. (A)
180. (A)

Hints and Solutions

136. (B)

In tissues because of metabolism there is high concentration of CO_2 and low concentration of O_2 which cause more binding of haemoglobin with CO_2

137. (B)

formation and breakdown of H_2CO_3 is important event in gaseous transport, it is a reversible reaction and both steps are catalysed by carbonic anhydrase enzyme.

138. (B)

Pneumotaxic centre is situated in pons which inhibits output from medullary respiratory rhythm centre and thus it can reduce inspiration upon stimulation.

139. (C)

Almost 70 percent of carbon dioxide is carried in form of sodium bicarbonate in plasma.

140. (C)

All chemoreceptors are sensitive for rising concentration of carbon dioxide and protons

141. (C)

All chemoreceptors are sensitive for rising concentration of carbon dioxide and protons

142. (B)

All chemoreceptors are sensitive for rising concentration of carbon dioxide and protons

143. (C)

oxyhaemoglobin formation occurs in presence of high concentration of oxygen which is observed in alveoli while dissociation occurs in presence of low concentration of O_2 in tissues

144. (A)

The interstitium is present between alveolar wall and capillary wall which includes interstitial fluid and basement membranes.

145. (C)

The interstitium is present between alveolar wall and capillary wall which includes interstitial fluid and basement membranes. All these structures have total thickness of less than 1 mm.

146. (C)

According to given option we can only select the correct sequence of removal of carbon dioxide produced in tissues so it will initiate from production of CO_2 and will end on removal of this gas in expiration.

147. (D)

Carbon dioxide is carried in 3 forms 1st bound form to haemoglobin (20 to 25%) in form of sodium bicarbonate in plasma (around 70%) and 5 to 7 percent in form of dissolved form in plasma.

148. (A)

Carbon dioxide is carried in 3 forms 1st bound form to haemoglobin (20 to 25 %) in form of sodium bicarbonate in plasma (around 70 %) and 5 to 7 percent in form of dissolved form in plasma .

149. (B)

Abdominal muscles and internal intercostal muscles are accessory group of muscles which play role only during forceful respiration.

150. (C)

Tidal volume is volume of air exchanged during normal respiration while capacities involve sum of tidal volume and respective reserve volume. vital capacity is total lung capacity without residual volume.

151. (C)

Tidal volume is volume of air exchanged during normal respiration while capacities involve sum of tidal volume and respective reserve volume. vital capacity is total lung capacity without residual volume.

152. (B)

Function of conduction zone in breathing is to filter and making air warm and humid.

153. (B)

Functional residual capacity is sum of residual volume and expiratory reserve volume

154. (A)

Tidal volume is volume of air exchanged during normal respiration while capacities involve sum of tidal volume and respective reserve volume. vital capacity is total lung capacity without residual volume.

155. (C)

Conduction part is part of respiratory tree before respiratory bronchioles, from this part there is no gaseous exchange takes place.

156. (B)

alveoli alveolar sac acinus and alveolar duct are the main part of exchange zone and this is the place from which gaseous exchange takes place between respiratory tract and blood.

157. (B)

Thoracic cavity is the space present between vertebral column, sternum ribs and diaphragm

158. (B)

Lungs/pulmonary cavity expands during inspiration as diaphragm and rib cage pull it outwards and because of this volume of thoracic cavity increases.

159. (C)

During inspiration muscle contraction is required therefore it is an active process while expiration is a passive process as it is result of muscle relaxation.

160. (A)

During inspiration gases enter into lungs because pressure in lungs drops below atmospheric pressure because of increase in volume/expansion.

161. (C)

Lungs/pulmonary cavity expands during inspiration as diaphragm and rib cage pull it outwards and because of this volume of thoracic cavity increases. During inspiration gases enter into lungs because pressure in lungs drops below atmospheric pressure because of increase in volume/expansion.

162. (B)

Lacteals are lymphatic capillaries in villi help in fat absorption.

163. (B)

Enterokinase is a part of succus entericus which induces conversion of trypsinogen to trypsin (active form of proteolytic enzyme)

164. (C)

Trypsin is functional at alkaline pH of 8.5

165. (A)

To initate fat digestion we have to activate enzymes and emulsify fat droplets with the help of bile salts.

166. (B)

Lactose is a disaccharide which is made of glucose and galactose and can be hydrolysed with the help of lactase.

167. (B)

Sucrase enzyme is also termed invertase and starch is hydrolysed with amylase.

168. (A)

The correct sequence of food transit in body is ingestion, digestion, absorption and elimination.

169. (A)

Glucose and amino acids are absorbed by active absorption along with Na ions. Chylomicrons are absorbed into lacteals rather than blood capillaries.

170. (C)

Protein is digested 1st in stomach and starch is 1st digested in oral cavity.

171. (A)

Most of the food is digested in small intestine as food is thoroughly mixed with bile, pancreatic juice and succus entericus.

172. (A)

Bile pigments are produced as a bi product of haem digestion in hepatocytes.

173. (D)

Vermiform appendix is devoid of any glandular or digestive tissue, but there is aggregate of lymphocytes there which act as secondary lymphoid organs.

174. (B)

The main component of bile which participates in fat digestion/emulsification is bile salts.

175. (B)

There are total 3 pairs of salivary glands present situated outside oral cavity name parotid(near ear), sublingual (beneath tongue) and submandibular/submaxillary.

176. (D)

There are total 3 pairs of salivary glands present situated outside oral cavity name parotid (near ear), sublingual (beneath tongue) and submandibular/submaxillary.

177. (D)

Total weight of healthy human liver in adult is around 1.2 to 1.5 kg.

178. (C)

Liver is an abdominal organ located just beneath diaphragm.

179. (A)

Glisson's capsule is covering of hepatic lobules, sphincterr of oddi regulates opening of hepatopancreatic duct, cystic duct originates from gall bladder.

180. (A)

Bile is synthesised in liver while it is stored and concentrated in gall bladder.

(Physics)

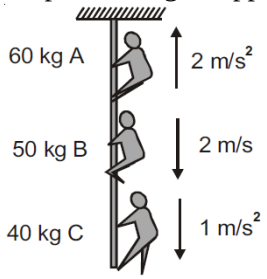
1. When a 4 kg rifle is fired, the 10 g bullet receives an acceleration of 3×10^6 cm/s^2. The magnitude of the force acting on the rifle (in newton) is

(A) Zero (B) 120
(C) 300 (D) 3000

2. A man of mass 50 kg carries a bag of weight 40 N on his shoulder. The force with which the floor pushes up his feet will be

(A) 882 N (B) 530 N
(C) 90 N (D) 600 N

3. Tension in the rope at the rigid support is (g = 10 m/s^2)

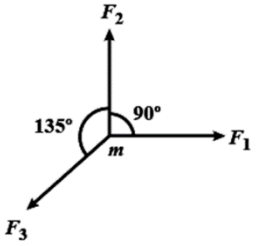


(A) 760 N (B) 1360 N
(C) 1580 N (D) 1620 N

4. If force F = 500 –100t, then impulse as a function of time will be :-

(A) 500t – 50t^2 (B) 50t – 10
(C) 50 – t^2 (D) 100t^2

5. When a force F acts on a body of mass m the acceleration produced in the body is a. If three equal forces $F_1 = F_2 = F_3 = F$ act on the same body as shown in figure, then the acceleration produced is:

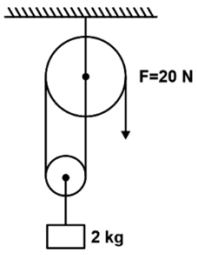


(A) $(\sqrt{2}-1)a$ (B) $(\sqrt{2}+1)a$
(C) $\sqrt{2}\,a$ (D) a

6. A rope of length L and mass M is hanging from a rigid support. The tension in the rope at a distance x from the rigid support is:

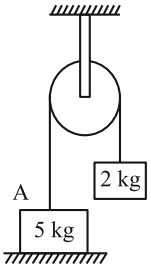
(A) Mg (B) $\left(\frac{L-x}{L}\right)Mg$
(C) $\left(\frac{L}{L-x}\right)Mg$ (D) $\frac{x}{L}Mg$

7. The acceleration of the 2 kg block if the free end of string is pulled with a force of 20 N as shown is:



(A) *Zero* (B) *10 m/s^2*
(C) 5 m/s^2 upward (D) 5 m/s^2 downward

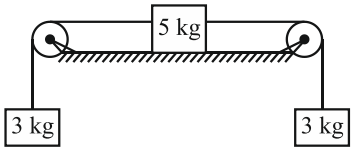
8. In the arrangement shown, what is the normal reaction between the block *A* (mass = 5 kg) and ground



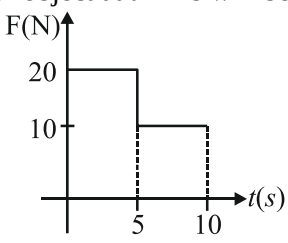
(A) 50 N (B) 20 N
(C) 30 N (D) Zero

9. A bock of mass 5 kg is placed on a smooth table and tied from both ends by two masses 3 kg and 2 kg by means of light, inextensible strings passing through pulleys as shown in the string connecting 5 kg and 3 kg is is (g = 10 m/s^2)

(A) 22 N
(B) 27 N
(C) 33 N
(D) 30 N



10. Force is applied on an object of mass 2 kg at rest on a frictionless horizontal surface as shown in the graph. The speed of object at t = 1 s will be

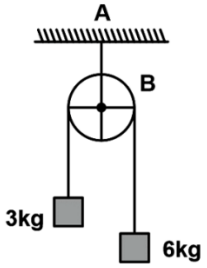


(A) 7.5 m/s (B) 12.5 m/s
(C) 10 m/s (D) 25 m/s

11. A block of mass 2 kg rests on the floor of an elevator, which is moving down with an acceleration 'g', then the apparent weight of the block is [take g = 10 m/s^2]

(A) 20 N (B) 12 N
(C) 16 N (D) Zero

12. In the arrangement shown in the figure, the pulley has a mass 9 kg. Neglecting friction on the contact surface, the force exerted by the supporting rope AB on the ceiling is (g = 10 ms^{-2})

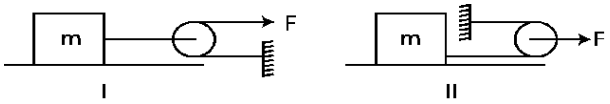


(A) 170 N (B) 85 N
(C) 340 N (D) 80 N

13. A block of mass m is released from the top of fixed inclined smooth plane. If θ is the angle of inclination, then vertical acceleration of the block is

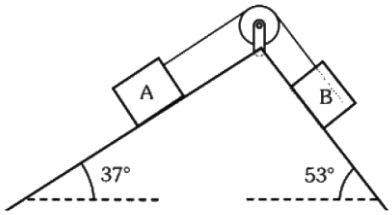
(A) g (B) $g\ sin^2\theta$
(C) g sinθ (D) g sinθ cosθ

14. A block of mass m is pulled on the smooth horizontal floor using two methods I and II as shown in the figure below. The ratio of acceleration $\frac{a_I}{a_{II}}$ is



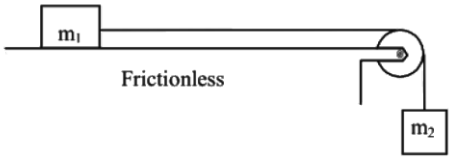
(A) 2 (B) 4
(C) $\frac{1}{2}$ (D) $\frac{1}{4}$

15. The acceleration of the block A is 2 m/s^2 down the incline. The ratio of the mass of A to that of B is-



(A) 7 : 6 (B) 5 : 2
(C) 5 : 3 (D) 3 : 4

16. In the arrangement shown, the blocks of unequal masses are held at rest. When released, acceleration of the blocks is-



(A) g/2
(B) g.
(C) a value between zero and g.
(D) a value that could be greater than g.

17. An athlete does not come to rest immediately after crossing the winning line due to the

(A) Inertia of rest
(B) Inertia of motion
(C) Inertia of direction
(D) None of these

18. On the horizontal surface of a truck a block of mass 1 kg is placed (m = 0.6) and truck is moving with acceleration 5 m/sec^2 then the frictional force on the block will be

(A) 5 N (B) 6 N
(C) 5.88 N (D) 8 N

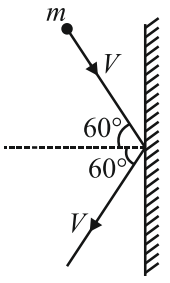
19. A cricketer catches a ball of mass 150 gm in 0.1 sec moving with speed 20 m/s, then he experiences force of

(A) 300 N (B) 30 N
(C) 3 N (D) 0.3 N

20. When an object is in equilibrium state, then

(A) It must be at rest
(B) No force is acting on it
(C) Its net acceleration must be zero
(D) All of these

21. A rigid ball of mass m strikes a rigid wall at 60° and gets reflected without loss of speed as shown in the figure. The value of impulse imparted by the wall on the ball will be



(A) mV (B) 2 mV
(C) $\frac{mV}{2}$ (D) $\frac{mV}{3}$

22. Which one of the following statement is incorrect?

(A) Rolling friction is smaller than sliding friction

(B) Limiting value of static friction is directly proportional to normal reaction
(C) Frictional force opposes the relative motion
(D) Coefficient of sliding friction has dimensions of length

23. A block of metal weighing 2 kg is resting on a frictionless plane. It is struck by a jet releasing water at a rate of 1 kg/s and at speed of 5 m/s. The initial acceleration of the block will be
(A) 2.5 m/s^2 (B) 5 m/s^2
(C) 10 m/s^2 (D) 20 m/s^2

24. Bullets of 0.03 kg mass each hit a plate at the rate of 200 bullets per second with a velocity of 30 m/s. The average force acting on the plate is newton is
(A) 120 (B) 180
(C) 300 (D) 480

25. A machine gun fires a bullet of mass 40 g with a velocity 1200 ms^{-1}. The man holding it can exert a maximum force of 144 N on the gun. How many bullets can he fire per second at the most?
(A) One (B) Three
(C) Two (D) Four

26. 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) It moves in a straight line
(C) It kinetic energy is constant
(D) Its acceleration is constant

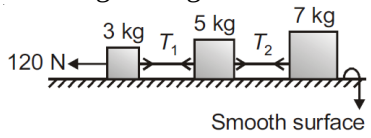
27. If a pushing force making an angle α with horizontal is applied on a block of mass m placed on horizontal table and angle of friction is β, then minimum magnitude of force required to move the block is
(A) $\frac{mg\sin\beta}{\cos[\alpha-\beta]}$ (B) $\frac{mg\sin\beta}{\cos[\alpha+\beta]}$
(C) $\frac{mg\sin\beta}{\sin[\alpha+\beta]}$ (D) $\frac{mg\cos\beta}{\cos[\alpha-\beta]}$

28. A block slides down a rough inclined plane of slope angle θ with a constant velocity. It is then projected up the same plane with an initial velocity v. The distance traveled by the block up the plane before coming to rest is
(A) $\frac{v^2}{4g\sin\theta}$
(B) $\frac{v^2}{2g\sin\theta}$
(C) $\frac{v^2}{g\sin\theta}$
(D) $\frac{4v^2}{\sin\theta}$

29. The angle of inclination of an inclined plane is 60°. Coefficient of friction between 10kg body on it and its surface is 0.2, g = 10 /ms^{-2}. The acceleration of the body down the plane in ms^{-2} is
(A) 5.667 (B) 6.66
(C) 7.66 (D) Zero

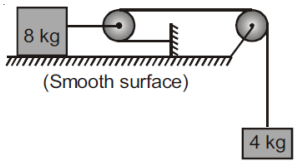
30. When a body slides down an inclined plane with coefficient of friction as μ_k, then its acceleration is given by
(A) $g(\mu_k \sin\theta + \cos)$ (B) $g(\mu_k \sin\theta - \cos\theta)$
(C) $g(\sin\theta + \mu_k \cos)$ (D) $g(\sin\theta - \mu_k \cos\theta)$

31. T_1 and T_2 in the given figure are



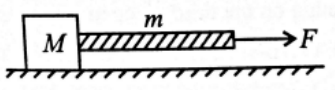
(A) 28 N, 48 N (B) 48 N, 28 N
(C) 96 N, 56 N (D) 56 N, 96 N

32. If pulleys shown in the diagram are smooth and massless and a_1 and a_2 are acceleration of blocks of mass 4 kg and 8 kg respectively, then



(A) $a_1 = a_2$ (B) $a_1 = 2a_2$
(C) $2a_1 = a_2$ (D) $a_1 = 4a_2$

33. The block is placed in a frictionless surface in gravity free space. A heavy string of a mass m is connected and force F is applied on the string, then the tension at the middle of rope is



(A) $\frac{\left(\frac{m}{2}+M\right).F}{m+M}$ (B) $\frac{\left(\frac{M}{2}+m\right).F}{m+M}$

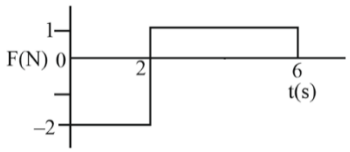
(C) zero (D) $\frac{M.F}{m+M}$

34. A ball of mass *m* is thrown upward with a velocity *v*. If air exerts an average resisting force *F*, the velocity with which the ball returns back to the thrower is

(A) $v\sqrt{\frac{mg}{mg+F}}$ (B) $v\sqrt{\frac{F}{mg+F}}$

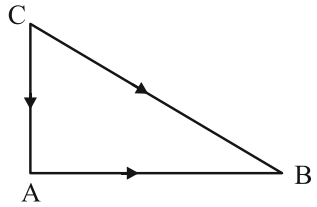
(C) $v\sqrt{\frac{mg-F}{mg+F}}$ (D) $v\sqrt{\frac{VF}{mg+F}}$

35. A force time graph for the motion of a body is as shown in figure. Change in linear momentum between 0 and 6s is



(A) zero (B) 8 Ns
(C) 4 Ns (D) 2 Ns

36. Three forces starts acting simultaneously on a particle moving with velocity $\vec{v}$. These forces are represented in magnitude and direction by the three sides of a triangle ABC. The particle will now moves with velocity



(A) $\vec{v}$ remaining unchanged
(B) less than $\vec{v}$
(C) Greater than $\vec{v}$
(D) $\vec{v}$ in the direction of the largest force BC

37. A car of mass 1000 Kg is moving with a velocity of 15 m/s and it is acted upon by a forward force of 500 N due to engine and retarding force of 120 N due to friction. What will be its Velocity after 10 seconds.?
(A) 15 m/s (B) 16 m/s
(C) 18.8 m/s (D) 20 m/s

38. A block of mass 5 kg is moving horizontally at a speed of 1.5 m/s. A perpendicular force of 5W acts on it for 4 sec. What will be the distance of the block from the point where the force started acting
(A) 10 m (B) 8 m
(C) 6 m (D) 2 m

39. A lift of mass 1000 kg is moving with an acceleration of 1 ms^2 in upward direction. Tension developed in the string, which is connected to the lift, is
(A) 9,800 N (B) 10,000 N
(C) 10,800 N (D) 11,000 N

40. A mass is hanging on a spring balance which is kept in a lift. The lift ascends. The spring balance will show in its reading
(A) Increase
(B) Decrease
(C) No change
(D) Change depending upon velocity

41. An army vehicle of mass 1000 kg is moving with a velocity of 10 m/s and is acted upon by a forward force of 1000 N due to the engine and a retarding force of 500 N due to friction. What will be its velocity after 10 s
(A) 5 m/s (B) 10 m/s
(C) 15 m/s (D) 20 m/s

42. A body of mass 2 kg is moving with a velocity 8 m/s on a smooth surface. If it is to be brought to rest in 4 seconds, then the force to be applied is
(A) 8 N (B) 4 N
(C) 2 N (D) 1 N

43. If rope of lift breaks suddenly, the tension exerted by the surface of lift (a = acceleration of lift)
(A) mg
(B) $m(g + a)$
(C) $m(g – a)$
(D) 0

44. A boy whose mass is 50 kg stands on a spring balance inside a lift. The lift starts to ascent with an acceleration of 2 ms^{-2}. The reading of the machine or balance (g = 10 ms^{-2}) is
(A) 50 kg (B) Zero
(C) 49 kg (D) 60 kg

45. A rocket is ejecting 50g of gases per sec at a speed of 500m s. The accelerating force on the rocket will be
(A) 125 N (B) 25 N
(C) 5 N (D) Zero

ANSWER KEY

1. (C)
2. (B)
3. (C)
4. (A)
5. (A)
6. (B)
7. (B)
8. (C)
9. (B)
10. (A)
11. (D)
12. (D)
13. (B)
14. (B)
15. (B)
16. (C)
17. (B)
18. (A)
19. (B)
20. (C)
21. (A)
22. (D)
23. (A)
24. (B)
25. (B)
26. (C)
27. (B)
28. (A)
29. (C)
30. (D)
31. (C)
32. (B)
33. (A)
34. (C)
35. (A)
36. (A)
37. (C)
38. (A)
39. (C)
40. (A)
41. (C)
42. (B)
43. (D)
44. (D)
45. (B)

HINT AND SOLUTIONS

1. (C)

$$F = ma = \frac{10}{1000} \times 3 \times 10^6 \times 10^{-2}$$

F = 300 N

2. (B)

$$N = m_1 g + m_2 g$$

N = 50 (9.8) + 40

N = 490 + 40 = 530 N

3. (C)

For 40 kg

400 – T_1 = 40

T_1 = 360 N

For 50 kg

500 + T_1 – T_2 = 50

T_2 = 760 N

For 60 kg

T_3 – 600 – T_2 = 60

$\boxed{T_3 = 1580 \text{ N}}$

4. (A)

5. (A)

6. (B)

7. (B)

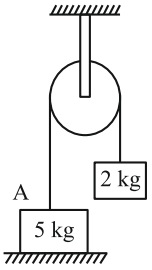
8. (C)

$T + N = 50$

$20\ N + N = 50$

$N = 50 - 20$

$\boxed{N = 30N}$



9. (B)

$$a = \frac{F_{net}}{m} = \frac{10}{10} = 1 m/s^2$$

$30 - 3 = T$

$\boxed{T = 27N}$

10. (A)

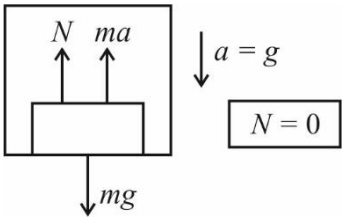
$$F = \frac{dp}{dt}$$

$$\int dp = \int F.dt$$

$$m\Delta v = (20.5 \times .5) + (.5 \times 10)$$

$\boxed{\Delta v = 7.5 m/s}$

11. (D)



12. (D)

13. (B)

14. (B)

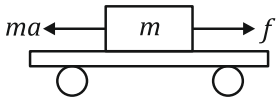
15. (B)

16. (C)

17. (B)

While running athlete is in the state of motion. So due to inertia of motion athlete does not come to rest.

18. (A)



$f_{max} = \mu N = 6N$

$\boxed{f = ma = 5N}$

19. (B)

$$F = \frac{\Delta P}{t} = \frac{m(v_f - v_i)}{t}$$

$$\Rightarrow \quad \frac{1.5(0-20)}{1}$$

$\boxed{f = 30N}$

20. (C)

Equilibrium $\Rightarrow \vec{F}_{net} = 0$

Using Newton's second law,

$\boxed{\vec{a} = 0}$

21. (A)

$\Delta P = mv\cos 60° - (mv\cos 60°)$

$\boxed{\Delta P = mv}$

22. (D)

23. (A)

Change in momentum per second = 5 kg m/s

$F = 5N,\ a = \dfrac{F}{M}$

$\boxed{2.5 m/s^2}$

24. (B)

$F = \dfrac{nmv}{t} = \dfrac{200 \times 0.03 \times 30}{1}$

$\boxed{F = 180N}$

25. (B)

$n(\Delta P)$ = force exerted

$n \times mv = 144$

$n \times 0.04 \times 1200 = 144$

$\boxed{n = 3}$

26. (C)

27. (B)

Angle of friction β

$\mu = \tan\beta$

$N = mg + F\sin\alpha$

To just block move

$F\cos\alpha = u/N$

$F\cos\alpha = \tan\beta\,(mg + F\sin\alpha)$

$F(\cos\alpha\cos\beta - \sin\alpha\sin\beta) = mg\sin\beta$

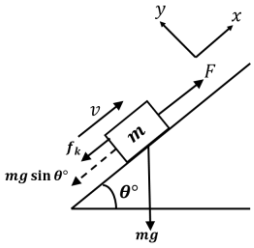
$F = \dfrac{mg\sin\beta}{\cos(\alpha+\beta)}$

28. (A)

$mg\sin\theta = \mu mg\cos\theta$

if $\boxed{v = \text{const.}}$

$\mu = \tan\theta$



$v^2 = u^2 + 2as$

$O = v_0^2 - 2(mg\sin\theta + \mu N)s$

$v_0^2 = 2\left(mg\sin\theta + \dfrac{\sin\theta}{\cos\theta}mg\cos\theta\right)s$

$v_0^2 = 4mg\sin\theta.s$

$\boxed{s = \dfrac{v_0^2}{4g\sin\theta}}$ $\boxed{m = 1}$

29. (C)

$a = g(\sin\theta - \mu\cos\theta)$

$a = 10(\sin 60° - .2 \times \cos 60°)$

$\boxed{a = 7.66 m/s^2}$

30. (D)

$a = g(\sin\theta - \mu_k\cos\theta)$

31. (C)

$a = \dfrac{F_{ext.}}{M_{total}} = \dfrac{120}{3+5+7}$

$a = 8\ m/s^2$

$T_2 = 7(8) = 56N$

$T_1 = T_2 = 5(a)$

$\Rightarrow\quad 56 + 5(8)$

$T_1 = 96N$

32. (B)

$T' = 8a_1$ (for 8 kg)

$4g - T = 4a_2$ (for 4 kg)

$T' = 2T$

$\boxed{a_2 = \dfrac{a_1}{2}}$

33. (A)

$\boxed{a = \dfrac{f}{M+m}}$

$T = m^1 a$

$\boxed{T = \dfrac{F\left(M + \dfrac{m}{2}\right)}{(M+m)}}$

34. (C)

$ma^1 = mg = f$

$a^1 = g + \frac{f}{m}$

$v^2 = \upsilon^2 + 2as$

$s = \frac{u^2}{2\left(g+\frac{f}{m}\right)}$

$v^2 = \upsilon^2 + 2as$

$v^2 = 2\left(g - \frac{f}{m}\right) \times \frac{u^2}{2\left(g+\frac{f}{m}\right)}$

$\boxed{v = \sqrt{\frac{gm-f}{gm+f}} \times u}$

35. (A)

$\Delta P = \int f.dt$

$\Delta P = -4 + 4 = 0$

36. (A)

$\overrightarrow{F_{net}} = 0$

$\boxed{v = \text{const.}}$

37. (C)

$f_{net} = ma$

$500 - 120 = 1000\ a$

$a = \frac{380}{1000}$

$\boxed{v = 18.8 m/s}$

38. (A)

$S_y = ut + \frac{1}{2}at^2$

$S_y = 8\ m$

$S_x = 1.5 \times 4 = 6$ m

$S = \sqrt{S_y^{\ 2} + S_x^{\ 2}}$

$\boxed{S = 10 m}$

39. (C)

T = $mg + ma$

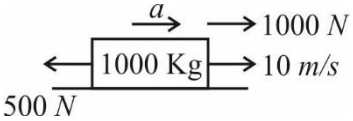
$\boxed{T = 10800 N}$

40. (A)

$K_x = mg + ma$

[Increasing]

41. (C)



$a = \frac{f_{net}}{m} = 0.5 m/s^2$

$v = \mu + at$

$\boxed{v = 15 m/s}$

42. (B)

$\Delta P = mv$

= 16 kg m/s

$f = \frac{\Delta P}{t} = \frac{16}{4}$

$\boxed{f = 4}$

43. (D)

44. (D)

$N = mg + ma$

$N = 500 + 100$

$\boxed{N = 600 N}$

= 60 kg

45. (B)

$F = \frac{vdm}{dt}$

$F = 500 \times 0.5$

$\boxed{F = 25 N}$